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## Navigating Politeness: The Forms of Polite Sentences between Health Workers and Patients in Padang's Government Public Hospital



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**ABSTRACT:** The ineffectiveness of communication in health services is reflected in the impoliteness of communication which makes the interaction between health workers and patients disharmonious. Language politeness will create an atmosphere of mutual trust, appreciation, and respect for each other. A harmonious atmosphere will encourage patients to accept the quality of health services with full awareness, so that patient disappointment can be avoided. This study aims to identify the forms of polite sentences that occur between health workers and patients in interaction. The research method used in this study is descriptive qualitative method. The data is obtained by using the observational method, this method is followed by recording and note-taking techniques. Data analysis is explained by using the pragmatic pairing method. The result of this study is explain that health workers most frequently use four types of sentence to express politeness to patients: declarative, imperative, interrogative, and exclamative. Declarative sentences are the most common, as they allow healthcare workers to share information or updates respectfully and courteously, creating a polite and comfortable communication environment. This type of sentence allows the health worker to convey instructions or details about the procedure in an informative yet non-coercive manner.

**KEYWORDS:** Polite, politeness, sentence form, health worker, patients, hospital

### I. BACKGROUND OF THE STUDY

The idea of using language in a respectful way that conforms to the rules and conventions of a specific society is known as politeness in language (Leech, 1983). Hospitals and other health worker service settings are among the many contexts in which polite language can be used. People who are in need of medical attention often visit hospitals. Relationships between hospital employees and patients, particularly in outpatient services, are essential to building mutual comfort and trust. Therefore, in order to guarantee a satisfying and encouraging experience, courteous language is crucial in these interaction.

Numerous elements, such as communication abilities, social standing, and intercultural considerations, can affect how courteously healthworker speak to the patients. Since excellent engagement depends on clear and effective communication, hospitals should refrain from employing language that is difficult for patients to understand. However, when healthworker engage with the patients, using courteous language might be difficult. First, health workers frequently lack instruction on how to speak in a kind and respectable manner. Secondly, they might not comprehend the etiquette norms that are expected in their workplace. Finally, they might not completely understand the value of using courteous language when delivering medical care to patients. It must be taken several ways to raise health worker understanding of the value of using politeness language when speaking with patients in order to overcome these obstacles. One of the way is workshops and training. Health workers can better comprehend appropriate language standards in patient encounters by attending regular training sessions that emphasize polite language use and efficient communication. The value of empathy, respect, and clear communication should all be discussed in these sessions. The forms of the sentences that the health workers produce will effect indirectly to the patients recovery.

Patients are entitled to adequate medical care. The sentence forms and markers that health workers use during interactions can affect how patients receive and understand the messages conveyed. Ultimately, the context of the utterance, sentence markers, and sentence form determine how polite the utterance is. For example, imperative sentences that give direct orders often sound less polite compared to declarative sentences that state facts or suggestions. On the other hand, active sentences, which are usually considered more direct, can sound less polite if not delivered carefully. In addition, saying polite



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words such as "please," and "thank you," as well as using politeness markers in Indonesian, such as "you" and titles or greetings, such as "Bapak" or "Ibu," can help people speak better and more polite.

The research about the forms of polite sentences used by health workers to their patients has been conducted both in general and independently on the types of polite sentences. One of the research is done by Rea Utami et al. in 2023. She proposed the research on language politeness in the speech of nurses and patients at the Muara Bangkahulu Health Center, Bengkulu. The previous study discussed the implementation of language politeness in the speech of nurses and patients there. Her study shows that most of the medical staff and patients of Puskesmas Muara Bangkahulu Kota Bengkulu have spoken well.

However, research that focuses on the form of polite sentences used by health workers and patients in their interactions in public hospitals in Padang city has never been conducted. Therefore, this research conducted a study on the form of polite sentences spoken by health workers and patients in public hospitals in Padang city.

The application of politeness can help to create a harmonious and mutually beneficial relationship between the two parties. This is what attracts researchers to further research on language politeness in the interaction of health workers and patients. The problem of this research in this study is: 1. How is the contribution of polite sentence forms implemented by health workers to their patients? Then, obviously, the objectives of this study is: 1. Finding the contribution of polite sentence forms spoken by health workers to patients in the general government hospital of Padang city.

One of the advantages of this study is that it increases our understanding of language politeness in communication. Therefore, this research is expected to help improve the quality of health services by focusing on how health workers and patients communicate politely. The purpose of this study is to gain a better understanding of the ways in which effective and polite communication can help develop better services.

## **II. THEORETICAL FRAMEWORK**

Politeness can be seen from the form of sentences, the principles of politeness that are implemented and the markers used when the speech takes place. A sentence produced from the speech of health workers contains meaning that should be understood by the patient as the interlocutor. The sentence form is part of syntax. Van Valin (2017) defines syntax as the study of the internal structure of sentences, namely the rules and principles that govern how words are combined to form sentences that are grammatical and understood by language speakers. Furthermore, Noam Chomsky (1965) defines syntax as the study of sentence structure and how words are combined to form meaningful sentences. According to Anton Moeliono (2017), there are several types of sentences based on content:

### **2.1 Declarative Sentences**

This type of sentence is used to convey statements or information. Declarative sentences describe facts, ideas, or views, and usually end with a full stop.

Example:

"Today is Friday."

"She is studying in the library."

### **2.2 Interrogative Sentences**

Interrogative sentences are used to ask questions. The main purpose of this type of sentence is to get additional information or an answer from the interlocutor.

Example:

"What did you eat earlier?" "Who came yesterday?"

### **2.3 Imperative Sentences**

Imperative sentences are used to give orders, instructions, or requests to the interlocutor, request to the interlocutor. Usually, these sentences begin with the verb (imperative) verb and often ends with an exclamation mark or full stop.

Example:

"Please close the door!"

"Help me with the housework."

### **2.4 Exclamative Sentences**

This type of sentence is used to express a strong feeling or emotion. It usually ends with an exclamation mark and serves to express surprise, shock, happiness, or other feelings.

Example:

"Wow, what a beautiful view!" "Oh my God, may he get better soon!"

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## III. RESEARCH METHODS

This research was conducted through a qualitative approach and used descriptive research method. The substantive data of this study consisted of several health workers whose utterances the researcher managed to observe. The patient's speech spoken by health workers is the source of the locational data of this study. In this study, the population is the entire use of language that is not certain in number; in other words, the research sample is the politeness utterances spoken by health workers to patients at the Padang City Government General Hospital.

The researcher used the simak method to collect data (Sudaryanto, 2015). Power collection is done by paying attention to the language or speech of health workers and patients. This technique is called "listening". The technique of "tapping" intercepts the speech of the speaker and his speech partner. The author uses the technique of simak bebas libat cakap (SLBC). With SLBC, the researcher only acts as an observer and listens to the interaction between health workers and patients. This method is also used by recording on data cards. This technique is referred to as note-taking technique.

After the data was collected and transcribed, the pragmatic pairing method was used to analyze the data. Processing was done by grouping the data in the form of polite sentences, and the analysis was supported by context. Hymes and Janet Holmes presented the context theory used.

The presentation and arrangement of the results of data analysis are carried out in the form of a comprehensive narrative (Sudaryanto, 2015). After the data is explained using the natural language of analysis, each utterance will have a clear context. The results of the analysis will show what types of polite sentences are most frequently used during interactions between health workers and patients in government public hospitals in Padang. It will show what forms of polite sentences contribute to the communication between health workers and patients, which in turn will have an indirect impact on the recovery rate of patients seeking treatment.

## IV. DISCUSSION

### 4.1 Contribution of Polite Sentence Forms spoken by health workers to their Patients

The data presented by the researcher consists of the original source as well as the translation into Standard Indonesian which is thoroughly described according to the sentence form and politeness principles. The following is the description:

#### 4.1.1 Declarative Sentences:

A news sentence is a type of sentence that aims to convey information to others. Moeliono (1993) states that news sentences function to inform others, so the expected response is usually attention shown through facial expressions that show attention. The following are some examples of conversational data using news sentences in polite speaking situations between health workers and patients at the Padang City Government General Hospital:

#### Datum 1

Health worker : *"Buk, mohon maaf kami yo. Di ruangan ko ndak bisa bakumpua bana do Buk. Ndak bisa barami-rami di ruangan ko do Buk. Tau Ibuk kan ruangan awak ko kurang gadang" (nada keras dan tegas)*

*'Bu, mohon maaf kami ya. Di ruangan ini tidak bisa berkumpul terlalu ramai ya Bu. Tidak bisa ramai-ramai di ruangan ini Bu. Ibu tahu kan ruangan kita ini kurang besar' (nada keras dan tegas)*

*Ma'am, please excuse us. This room cannot be too crowded, Ma'am. You can't be crowded in this room, Ma'am. You know, our room is not big enough' (loud and firm tone)*

Patient : *"Iyo Pak, sabanta dulu Pak. Ambo nio ngecek samo keluarga ambo."*

*'Iya Pak, sebentar dulu Pak. Saya mau berbicara dengan keluarga saya.'*

*'Yes sir, just a moment Sir. I want to talk to my family.'*

: Spoken by a male health worker to the family of a patient who was visiting his relative who was receiving treatment during a repeat control treatment. The health worker told them that there should not be a lot of people in the room. The tone of the health worker's speech during the interaction was loud but informing the patient's family.

The health worker said, "Ma'am, please excuse us. Ma'am, there can't be too many people in this room. Ma'am, you cannot be crammed into this space. According to syntactic theory, "You know, our room is not big enough" is a set of declarative sentences that, despite its hard tone, can be classified as a polite sentence. Declarative sentences are mostly employed in syntax to state facts or convey information. The health worker conveys room occupancy rules in this instance by using a string of declarative words, such as "This room cannot be too crowded" and "Our room is not big enough." This sentence is less directive than an imperative form (e.g., "Leave the room" or "Clear this room now") and avoids explicitly telling the listener what to do,

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which helps in maintaining a neutral and informative tone. This is one way that the declarative form honors the listener's autonomy, which is essential to courteous communication. Additionally, the language exhibits politeness through a number of linguistic traits. The sentence repeatedly uses address terms like "Ma'am," which formally acknowledges the listener and establishes a respectful tone. By framing the request in terms of the staff's limits ("please excuse us") rather than a straight demand, the opening line "please excuse us" not only indicates humility but also that the health professional is aware of the difficulty. By framing the restriction as a common issue and gently evoking empathy, this adds a dimension of civility. This strategy is categorized in **Politeness Theory** (Brown and Levinson) to mitigate potential face-threatening acts (FTAs).

The whole wording and structure assist counterbalance the health worker's tone, which is described as "loud and firm," which could be interpreted as less courteous. In the healthcare industry, where maintaining regulations on room occupancy may be crucial to safety, a firm tone may be required. However, because the wording stays focused on the information being conveyed rather than a direct order, the declarative structure and word choice avoid making the statement appear harsh or authoritative. The health professional can maintain power in enforcing the rule while also being mindful of the listener's "face" or sense of self-respect, which is a crucial component of polite language

### Datum 2:

: "Apakah pernah rekam jantung sebelumnya?"

'Pak, apakah Bapak sudah pernah rekam jantung sebelumnya?'

"Have you had a heartogram before?"

Patient: "(menggeleng) alun Dok."

'(menggelengkan kepala) belum Dok'.

'(shakes head) no Doc.

: "Awak EKG jantung apak dulu dih?"

'We will ECG your heart first, won't we?'

Patient : "(mengangguk) iyo Dok."

'(menganggukkan kepala) iya Dok'.

'(Nods head), okay Doc.

: Spoken by a female health worker to a middle-aged male patient who had to have an ECG of his heart for further action by the doctor.

Declarative sentences are essential for promoting a courteous and productive discussion between the patient and the healthcare provider. Syntax theory states that declarative phrases are more often used to state facts or convey information than to issue instructions. "Have you had a heartogram before?" and "We will ECG your heart first, won't we?" are declarative remarks made by the healthcare provider. The health professional utilizes these lines to inquire about the patient's medical history and confirm the future steps instead of giving directions. This strategy is consistent with declarative sentence style, which seeks to lessen burden on the listener by presenting information in a less directive, more factual manner.

In this exchange, the decision to employ declarative statements also improves civility. The first question the health worker provider asks, "Have you had a heartogram before?" is framed as a straightforward inquiry regarding the patient's medical history, omitting any suggestion that the patient must give a certain response. The patient is positioned as an active participant in his care and his autonomy is respected by this system. Furthermore, the question tag "won't we?" softens the second sentence, "We will ECG your heart first, won't we?" and subtly solicits the patient's consent. The patient can agree or offer input in response to this tag question, which is a courteous and non-coercive method of ensuring he understands.

Additionally, the respectful tone and contextual address phrases improve the usage of polite language. The healthcare provider politely uses "apak," which is suitable for a middle-aged male patient in terms of culture. This phrase not only demonstrates the health professional's regard for the patient's age and social standing, but it also conforms to cultural standards of civility in work-related situations. This deliberate address selection is a simple yet effective method of establishing rapport and demonstrating respect. In a similar vein, the patient's polite replies, referring to the medical professional as "Doc," further emphasize the formality and deference that permeate the exchange.

Declarative sentence usage is consistent with Politeness Theory, particularly when it comes to reducing "face-threatening acts" (FTAs). FTAs are words or deeds that might violate the listener's sense of independence or dignity. When a healthcare professional uses a declarative style, they are less likely to put the patient under pressure and instead provide them information that makes them feel like a collaborator rather than a passive recipient. This strategy is especially helpful in medical situations where patients may experience anxiety or uncertainty; using kind, non-threatening language makes them feel valued and

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supported. While an imperative ("Stay here for your treatment") could come out as dominating or contemptuous of the patient's comfort, a remark such as "You will receive your treatment here" provides reassurance.

### 4.1.2 Imperative sentences

#### Datum 3:

Health worker: *"Duduak Ibuk dulu dih, beko tapanggia namo Ibuk baru masuak ka dalam dih."*

*'Duduk dulu Ibu ya. Nanti nama Ibu dipanggil baru boleh masuk ke dalam ya.'*

*'Sit down first, Mom. Your name will be called and then you can go inside.'*

Patient : "yo, dih"

'iya, Baik.'

: Spoken by a female health worker to a young patient who was waiting for her turn to be called by the doctor in the internal medicine room.

The health worker's advice was to "sit down first, Mom." According to syntactic theory, the line "Your name will be called and then you can go inside" is imperative. Imperative sentences, which usually begin with a verb and leave off the subject (which is inferred), are used to provide orders, requests, or instructions. Here, the health professional sets a clear expectation for action by using the imperative sentence "Sit down first" to direct the patient on what to do next. This format facilitates direct communication, which is frequently required in medical environments where clear instructions are essential to upholding order and guaranteeing patient flow.

Despite the fact that imperative phrases are frequently linked to directness, this example is presented as a courteous sentence that has been softened by other linguistic components. According to the Politeness Theory, mandatory statements can be considered courteous if they accept the listener's autonomy and limit any sensation of imposition. The health professional uses the warm and friendly name "Mom" to address the patient, which not only builds rapport but also demonstrates cultural etiquette. In order to lessen the directness of the demand and make the exchange sound more like a polite recommendation than an order, this respectful address phrase is crucial. The addition of "Mom" softens the tone of the health worker's sentence, which could otherwise sound abrupt: "Sit down first."

Additionally, the health worker's statement is courteous since it is designed to control the patient's expectations and let her know what to anticipate next. The health professional gives the patient more context by outlining the procedure by stating, "Your name will be called and then you can go inside." The patient is encouraged to wait in comfort by this additional knowledge, which reassures her that her turn will arrive. This method shows consideration for the patient's time and contributes to the development of openness and trust in the medical setting. The health professional's decision to explain the next steps to the patient rather than giving a command without explanation fosters a cooperative environment, which is essential to being polite.

This imperative sentence's classification as polite is also influenced by the circumstances. This imperative phrase takes into account the listener's age and situation when it is spoken by a female healthcare professional to a young patient. Despite the patient's younger age, the health worker's use of "Mom" is culturally appropriate and shows respect for her. By adapting her language to the patient's demographic, the health worker provider keeps her tone courteous and culturally sensitive. Furthermore, the word choice demonstrates a harmony between professional authority and empathy, demonstrating the health worker's cognizance of the patient's potential worry while awaiting medical care.

#### Datum 4

: *"Pak, pareso labor dulu yo, abis tu baru apak dipareso dek dokter dih."*

*'You need to check your labor first, Sir. After that you will be examined by a doctor.'*

: "yo Buk. Awak pareso dulu buk"

'Iya Bu, saya periksa dulu'

Yes ma'am, I'll check first

: Spoken by a Health worker to a middle-aged male patient who is asked to immediately check the labor first and then can return to the place when it is finished and the patient will be examined by a doctor.

"You need to check your lab work first, Sir," the health worker instructed. According to syntactic theory, "After that, you will be examined by a doctor" is organized as an imperative sentence. Usually starting with a verb or a subject-verb combination that speaks directly to the listener, imperative sentences provide a clear, action-oriented message and are frequently used to provide instructions, directives, or requests. The imperative phrase "You need to check your lab work first" is used in this instance to instruct the patient to finish a particular activity before beginning his doctor's examination. This sentence style offers directness

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and clarity, which is frequently required in healthcare settings where precise and unambiguous instructions are required to guarantee patient flow and prevent misunderstandings.

Despite the fact that imperative sentences are typically linked to direct or authoritative communication, this example manages to remain courteous by using language choices that respect the patient's position and soften the directive. When speaking to a middle-aged patient, the honorific address term "Sir" is used to show respect for their culture. By addressing the patient as "Sir," you are acknowledging their status and maturity and bringing the exchange into line with official healthcare setting civility and respect standards. This type of address lessens the impact of the imperative, turning it from a potentially harsh directive into a polite reminder of the actions required for his medical treatment. This strategy reduces the imperative's face-threatening aspect by framing it as a recommendation rather than a rigid directive, in accordance with politeness theory.

Furthermore, rather than merely giving a directive, the health professional organizes the statement to educate and direct the patient through the procedure. The second portion of the statement, "After that, you will be examined by a doctor," successfully sets the patient's expectations and eases any potential fear or confusion about what will happen next by outlining the actions he can anticipate taking. By placing the instruction in a broader perspective, this extra information makes the direction seem less intimidating and demonstrates regard for the patient's comfort and understanding. A seamless and courteous contact in the hospital setting depends on the health worker reassuring the patient and encouraging participation by outlining the procedure.

This imperative's classification as courteous is further supported by the conversation's context. The imperative, as expressed by a healthcare practitioner to a middle-aged male patient, considers the professional and social relationships between the speaker and the listener. Although the healthcare provider is in charge in this situation, treating the patient with dignity as "Sir" and outlining the procedures shows that the provider is aware of the patient's condition and upholds the standard of professionalism that is anticipated in medical dealings. This mix of respectful language and detailed directions makes the patient feel valued and informed rather than just directed, which is beneficial in a healthcare setting when patients may feel vulnerable or uncertain.

### 4.1.3 Interrogative Sentences

#### Datum 5

Health worker : *"Ibuk alah ronsen dada?"*

*'Apakah Ibu sudah rontgen dada?'*

*'Have you had a chest X-ray?'*

Patient : *"alun ado di suruah dek dokter ronsen dada."*

*'belum di suruh oleh dokter untuk rontgen dada.'*

*The doctor has not been told to have a chest x-ray.*

Health worker : *"oo alun yo? , yo lah. Awak ronsen dulu yo Buk."*

*'oo belum ya, baik Bu. Kami rontgen dulu ya Bu.'*

*'hmm.. not yet. Okay Mam. We'll take an X-ray first Mam.'*

A health worker in the internal medicine clinic spoke to a middle-aged female patient who was called by her name. Then, the health worker asked the patient whether he had taken a chest X-ray or not.

According to syntactic theory, the health worker's question, "Have you had a chest X-ray?" is an example of an interrogative sentence. Usually starting with an auxiliary verb (in this case, "have") and reversing the subject and auxiliary verb, interrogative sentences are constructed to elicit information. Because its main purpose is to request information rather than to state facts or issue instructions, its structure differs from declarative or imperative sentences. A discussion rather than a one-sided order is fostered and the exchange becomes more participatory when the health professional uses an interrogative form, which allows the patient to answer.

This interrogative phrase, which is categorized as a polite statement, shows the patient respect and courtesy, which is essential in a medical situation. Since questions invite rather than compel a response, they can lessen the imposition that is frequently associated with demands or directions, according to the Politeness Theory. The health professional asks if the patient has already finished this procedure rather than giving a directive like "Get a chest X-ray," which could come across as abrupt or unnecessarily direct. In addition to respecting the patient's autonomy, this sets an inquisitive tone, demonstrating that the healthcare provider appreciates the patient's knowledge of their medical history and values their feedback.

In this situation, the interrogative form helps the patient and the health professional establish rapport and confidence. In therapeutic discussions where patients may feel vulnerable or worried, it is especially crucial that the patient feels involved in

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their care, which is made possible by the courteous inquiry. The health professional fosters an environment of open communication and collaborative decision-making by starting with an inquiry. Because the patient feels that their opinions are respected and that they are being taken into consideration, this method increases their comfort level and willingness to engage in the medical process.

### Datum 6

: *"Ado hasil labor Ibuk?"*

*'apakah Ibu mempunyai hasil labor?'*

*"Do you have your labor results?"*

Patient : *"Labor apo?"*  
*'Labor apa?'*

*'What labor?'*

: *"apo dokter ndak suruah Ibuk pareso labor?"*

*'Apakah Dokter tidak menyuruh Ibu untuk periksa labor? "Did the doctor not tell you to check your labor?"*

Patient : *"ndak"*

*'tidak'*

*"No"*

: Spoken by a Health Worker in the pharmaceutical installation to young patient who was called by name. Then, the health worker asked the patient.

The exchange between the patient and the healthcare provider serves as an example of how to utilize interrogative sentences to communicate politely in a medical situation. As demonstrated by the health worker's inquiries, "Do you have your labor results?" interrogative phrases are distinguished by their structure in syntax theory and frequently start with auxiliary verbs like "do" or "did." and "Didn't the doctor advise you to have your labor checked?" Frequently inverting the conventional subject-verb-object structure and placing the auxiliary verb at the beginning of the sentence, interrogative phrases are designed to directly ask the listener for information or clarification. The sentences are more engaging because of this form, which also draws the listener's attention and invites a response.

By inquiring if the patient has brought their test results and whether they were told to do so by the doctor, the health professional is using interrogative phrases to get crucial information regarding the patient's readiness for treatment. These inquiries accomplish two goals: they ascertain whether the patient has the documents or information required for their visit, and they do it in a way that honors the patient's comfort and autonomy. The health worker's wording respects the patient's potential hesitancy or lack of experience with medical procedures rather than giving a clear directive or making an assumption.

The tone and wording of these interrogative statements, which are intended to convey patience and empathy, further contribute to their politeness. This method enables the healthcare provider to convey essential procedural requirements without pressuring or burdening the patient. Because it presents the health worker's request for information as a friendly inquiry rather than a demand, the questioning structure is courteous and gives the patient room to freely respond. In healthcare settings, this type of courteous questioning is crucial because it fosters trust and guarantees that patients feel valued and acknowledged at all times.

### 4.1.4 Exclamative sentences

#### Datum 7

: *"Onde, rancak kemajuan Ibuk kini ko. Barubek Ibuk rancak dan teratur."*

*"Masya Allah, kemajuan yang sangat bagus Bu?. Pengobatan Ibu bagus dan teratur."*

*"Oh, I see! What a great progress you've made, Mam! You've been following the treatment very well!"*

Pasien : *"Alhamdulillah, Dok. Lah agak mendingan kini."*

*Alhamdulillah, Dok. Saya sudah lebih baik sekarang."*

*"Thank you, Doc. I feel much better now."*

: *"sanang danga nyo , Buk. Pertahankan yo Buk. Bia awak tetap sehat."*

*"Senang sekali mendengarnya! Pertahankan, dan kita akan bekerja sama untuk membuat Anda tetap sehat!"*

*"That's wonderful to hear! Keep it up, and we'll work together to keep you healthy!"*

: This utterance was spoken by a health worker to a middle-aged woman who was doing a medication re-control. The doctor praises the patient because the treatment is going well and the patient has become better and healthier than before.



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The health professional's words, "Oh, I see! What wonderful strides you have made, Ma'am! For instance, "You've been following the treatment very well!" is an exclamatory statement. According to syntax theory, exclamatory phrases are distinguished by their expressive structure and are frequently employed to express astonishment, appreciation, or intense emotions. These lines convey a great deal of emotion and usually start with terms like "What a..." or "How..." The phrase "What a great progress you've made, Ma'am!" conveys the health professional's excitement and admiration while highlighting the patient's accomplishments in a sincere and motivating manner. Exclamatory sentences are characterized structurally by their inversion of the conventional subject-verb-object form, which highlights the speaker's intense emotions rather than just facts.

Because of the kind and respectful tone ingrained in the language, this sentence is also classified as polite. By using the honorific title "Ma'am," the healthcare provider not only recognizes the patient's age and status but also upholds civility and respect. According to the Politeness Theory, showing appreciation and support, especially in formal contexts like the medical field, can improve the listener's positive "face" by making them feel appreciated and respected. This is especially crucial in the medical field, as patients frequently experience anxiety or vulnerability related to their illnesses. By enabling the healthcare provider to express sincere concern and gratitude, the exclamatory tone enhances this civility and can create a supportive atmosphere for the patient.

The subsequent remark, "That's wonderful to hear! The phrase "keep it up, and we'll work together to keep you healthy!" adds even more civility and encouragement to the exchange. The exclamatory phrase, "That's wonderful to hear!" shows a favorable emotional response and warmly and appreciatively acknowledges the patient's efforts. The supportive and inclusive phrase "Keep it up, and we'll work together to keep you healthy" strengthens the patient-health professional relationship and can increase the patient's motivation and readiness to follow treatment regimens. This method highlights that the patient is an active participant in their health journey rather than just a passive recipient of care, while still respecting their autonomy.

### V. CONCLUSION

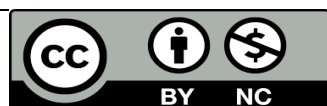
After analyzing the data, The four phrase and sentence forms that health worker most frequently use to express politeness to the patients in the case of the forms of sentences are declarative, imperative, and interrogative, and exclamatory sentences. Since health worker frequently have to inform or update patients in a courteous and respectful way, declarative statements are the most commonly employed. By using this style, they can provide information regarding procedures or guidelines without coming across as overly direct or demanding, fostering a polite and relaxed exchange.

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## Semantic Features of Tools Used in The Nyadran Ritual of Tengger Residents in Lumajang



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**ABSTRACT:** Semantic features are the study of semantics that discusses the shape of an object or object that is characterized by the presence of signs or features and other explanatory components attached to the object or object based on its features. The purpose of this study is to obtain an objective overview of the form, function, and meaning of the semantic features of the tools used in the *nyadran* ritual. The approach used in this study is an ethnolinguistic approach. The data in this study is in the form of quotations of words, phrases and sentences about the form, function, and meaning of the semantic features of the tools used in the *nyadran* ritual. The data sources of this research are traditional leaders and community leaders as well as books and journals that provide information about the semantic features of the tools used in rituals. The instrument used in this study is the researcher as the main instrument coupled with interview guidelines and data description sheets. The data collection technique is carried out using three methods, namely through observation, interviews, and documentation. Data analysis techniques use interactive patterns, namely data reduction, data presentation, and verification. Based on the results of the study, the following findings were obtained. First, the shape of the semantic features of the tools used in the *nyadran* ritual, namely round, long, and square based on materials, sizes, and colors. Second, the function of the semantic features of the tools used in the *nyadran* ritual, namely as a substitute for containers for eating, containers for cooking, and containers for storing foodstuffs used on a daily and ritual basis. Third, the meaning of the tools used in the *nyadran* ritual is different, namely as a symbol of the presence of ancestors, as the pride and honor of a certain person and as a form of respect for people who died unnaturally, which are interpreted in terms of days and rituals. The suggestions that the researcher can convey based on the results of this study are as follows. (1) This research can increase students' knowledge about the shape, function and meaning of an object or object. (2) The results of this study can help teachers in maximizing Indonesian language and literature lessons about the semantic features of the tools used in the *nyadran* ritual in tengger residents in Lumajang. (3) For future researchers, this research is expected to be a reference for conducting further research.

**KEYWORDS :** Semantic Features , Tools, Nyadran Ritual

### INTRODUCTION

Semantic features are the study of semantics that discusses how the shape of an object or other object is characterized by signs or explanatory features and components other objects attached to the object. An object can be explained its meaning, as well as other elements based on the so-called features or markers of the semantics that exist in the object. This means that the meaning of a word or object is a combination of these semantic features. There are several types of semantic features, namely features that refer to motion, sound, objects and others. Similarly, the semantic features of the tools used in the *nyadran* ritual for the Tengger residents in Lumajang are also available.

In the *nyadran* ritual, several tools are used, and these tools are not clearly known by the residents of Lumajang regarding their shape, function and meaning which are analyzed in terms of their features. The feature in question is all the elements and components that build or form an object, so that the literal meaning of these tools can be known. In line with this opinion, the researcher is interested in conducting research on the semantic features of the tools used in the *nyadran* ritual in the residents of Lumajang, so that the community can know the shape, function, meaning of each tool used clearly based on its semantic phrase. The cultural structure or cultural elements that have been explained by an anthropologist such as C. Kluckhohn in his book *Universal Categories of Culture* (1953) states that one of the seven cultural elements is the language in which the cultural system is

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contained. According to this, culture and language have a very close relationship so that from the explanation and understanding and theories obtained, the researcher concludes that the elements of Culture and language is the study of ethnolinguistics which discusses how people live with language and culture in a certain group, including the *nyadran* ritual which discusses about the tools used in the nyadran ritual. An explanation of the form, function, and meaning of the semantic features of the tools used in the nyadran ritual, will be described in detail some of the tools used to support the ritual. These are as follows:

The introduction of semantic features that refer to shapes, is initially introduced to the concept of an object, so that the process of obtaining the object or tool can be clearly understood its meaning or meaning. The following will be explained the tools used in the nyadran ritual for the residents of tengger in Lumajang. *The jug* (a substitute container for storing water) is made of clay. The top or mouth of *the jug* is perforated to attach or tied with a rope, and the leaves are pinned as a filter called *a snap*. The tool has a long and rounded shape. The function of the tools used in the *nyadran* ritual is the purpose or use of each tool used. The function of these tools is to find out clearly from each tool used in the nyadran ritual. The functions of these tools are as follows.

a). *Jug* (a container to replace a kettle/teapot made of bamboo).

The daily function for the residents of Perch in Lumajang is as a substitute for containers to accommodate water. While ritually the *jug* is a tool to store holy water.

The meaning of the tools used in the nyadran ritual is studied in semantic studies, in this case the meaning of the use of these tools. The meaning of the tools used in the nyadran ritual can be explained as follows.

b) *Jug* (a substitute container for a kettle/teapot made of clay).

The daily meaning in the lives of the residents of the perch in Lumajang, this tool has no historical or other meaning. Because this *jug* is made of clay and is usually used as a material for making bricks. While the meaning of the ritual is as a symbol of the strength of men to bring holy water and people who drink *holy* water stored using this tool will get physical and spiritual freshness to follow the *nyadran* ritual.

## RESEARCH METHODOLOGY

### a. Research Approach

The approach used in this study is an ethnolinguistic approach .

The ethnolinguistic approach is considered by the researcher to be the right approach to be used in the object of this research, because basically the ethnolinguistic approach examines the relationship between language and the behavior or cultural activities of its speakers.

### b. Data and Data Sources

The data obtained from this study is in the form of exposure to words, sentences, and paragraphs about the form of semantic features of the tools used in the *nyadran* ritual. The data sources in this study are in the form of humans, in this case traditional leaders and community leaders who provide information about the form, function and meaning of the semantic features of the tools used in the nyadran ritual in the tengger residents in Lumajang.

### a. Research Instruments

The research instruments used in this study are in the form of interview guidelines, data description sheets and data identification sheets. The interview guidelines contain questions about matters related to the research title.

Data description sheets are used to write the variations of the data obtained in the study. Data description sheets are used to identify data according to the type being researched and then recapitulate or transcribed for analysis.

### b. Data Collection Techniques

Data collection techniques are methods or methods used by researchers to collect research data by using several instruments to take data obtained in the field. The data collection techniques used in this study are Observation, Interview and Documentation

### c. Data Analysis Techniques

The data analysis technique is the process of systematically searching for and compiling data obtained from the results of interviews, field notes, and documentation, by organizing the data into categories, describing them into units, synthesizing, organizing them into patterns, choosing which ones are important and what will be studied, and making conclusions so that they are easily understood by yourself and others. The data analysis techniques used in this study are as follows.

1. *Data Reduction*)

2. Data ) Display

3. Verification(*Conclusion Drawing*)

## Semantic Features of Tools Used in The Nyadran Ritual of Tengger Residents in Lumajang

### d. Data Triangulation

Triangulasi can be interpreted as checking data from various sources in various ways and at various times. According to (Kutu 2017:46) triangulation is a technique for checking the validity of data that utilizes something other than the data for the purpose of checking as a comparison to the data.

## RESULTS AND DISCUSSION

The results of the research obtained from this research are about the form, function, and meaning of the semantic features of the tools used in the nyadran ritual. Here's the explanation.

### 1. Form of Semantic Features of the tools used in the Nyadran Ritual.

2. Based on the results of the research, the form of semantic features of the tools used in the nyadran ritual is as follows: Based on the findings and analysis, the *jug* has a (+) shape feature, has a (+) size feature, has a (+) color feature, is limited (+) its use time and has a permanent (+) feature. This means that *the jug* has a shape feature, namely *round*, has a size feature, namely *panjang*, has a color feature, which is *dark*, has a use feature, namely during *ritual* ceremonies and is used for a long time. The use of the (-) and (+) signs above shows that the tool called *the jug* used in the nyadran ritual has a semantically characteristic shape.

### 1. Function of Semantic Features of Tools Used in the Nyadran Ritual.

The function of the semantic feature is to clearly know the usefulness of each tool used in the nyadran ritual, namely daily functions and ritual functions. The following will explain the functions of the tools used in the nyadran ritual. Based on the findings and analysis, *jugs* have (+) features of daily functions and have (+) functions in a ritual manner. This means that *jugs* have daily function features because *jugs* on a daily basis for the lives of perpendicular residents in Lumajang are usually used as a substitute for *containers to store water* (water used for cooking and drinking). While the feature of its function ritually is as a tool to *store tuak water*. The use of the (+) sign in daily functions and ritual functions shows that the jug function used in the nyadran ritual has a semantic feature function.

### 2. The Meaning of Semantic Features of the Tools Used in the Nyadran Ritual.

The meaning of semantic features is the elements formed from a word or sentence that explain the purpose and purpose of an object in the reader's society. The following will explain the meaning of the tools used in the nyadran . Based on the findings and analysis, *jugs* do not have the feature (-) meaning of everyday terms and have the feature (+) meaning of terms ritually. This means that in the lives of the residents of the perch in Lumajang *Jug, it has no meaning of everyday terms*, because it is usually used to store water that is used for cooking or for other benefits. The mention of the term in days is *jug*, while the meaning of the term ritually is that the noble people of tengger in Lumajang have blessed the holy water stored using *jugs* so that people who drink *holy water* from the *jug* get inner freshness in participating in the nyadran ritual. The use of the sign (-) in the meaning of everyday terms indicates that *the jug* does not have a meaningful feature. Meanwhile, the use of the (+) sign in the meaning of the term ritually shows that the use of *jugs* in the nyadran ritual has semantic features.

## CONCLUSIONS

Based on the results of research and discussion that have been presented about the semantic features of the tools used in the nyadran ritual in the tengger residents in Lumajang, it can be concluded that: The form of the semantic features of the tools used in the nyadran ritual has different shapes. These differences are seen in terms of materials, sizes, colors, their use and The manufacture will produce different tools. The function of the semantic features of the tools used in the nyadran ritual, has different functions. These differences are based on daily functions and ritual functions. The meaning of the tools used in the nyadran ritual has different meanings from one another. The difference in meaning in terms is the everyday meaning and the ritual meaning.

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## **Choice of Strand among Senior High School Students: Perspectives, Problems and Opportunities**



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### **INTRODUCTION**

Philippine Educational System has taken a great innovative stride in adopting the Senior High School (SHS) of K to 12 Program which was implemented School Year 2016 – 2017. One of the leaps that the program has introduced along with it was that a senior high school student is expected to be enrolled to the Senior High School Track that is in line with their interest, ability, skills and higher education course they wish to pursue. However, it has been a perplexing question among senior high school students what track and strand to take that is in line with their choice. The researcher as a teacher wanted to find out what are the choices of strand among students in senior high school focusing on the perspectives, problems and opportunities with the hope that it can give insight to senior high school students, parents and mentors to understand the choice of strand among senior high school students. And possibly the result of the study may lead to the understanding why the importance and the need on having a Career Guidance Program for Grade 10 students before taking Grade 11.

For social entrepreneur Filipino French Henry Motte-Muñoz, the key is to help students determine the best senior high school track for them and the university courses they can eventually take should they wish to get a college degree. In the last quarter of 2015, Motte-Muñoz launched Edukasyon.ph, an online platform that aims to solve the labor mismatch by giving students a comprehensive look at where the choices will lead them: "Out of the one million and a half kids who will finish high school, only 300,000 at most will go on to higher education, graduate, and find a job," he said. That means there are more than one million Filipinos who are left behind because they cannot afford college, or because they go in and drop out or end up taking the wrong subjects (Schnabel, 2016).

Thus, the senior high school students' choice of track and strand must be in line with their capability and interest to avoid labor mismatch, unemployment and drop out. It is in this premise that the researcher was desirous to find out the choice of strand among senior high school students and their perspectives, problems and opportunities. The purpose of this research is for the senior high school students to have an overview on the status or challenges on a certain strand as well as the opportunities that could be available to them with their choice of strand. This research study also aims to provide an insight to stakeholders of education like the community constituencies, school administrators/ operators, parents, curriculum designers and educators in general and may provide direction also to senior high school students on their choice of strand and track.

### **METHODOLOGY**

This study used descriptive cross – sectional survey research design to gather the perceptions of selected Grade 12 students about senior high school. It is a descriptive research as it describes the opinions of the respondents on their choice of strand. It is cross – sectional as the data were collected in Marawi City, Cagayan de Oro City and Lanao del Norte at a single point in time during the School Year 2018 – 2019.

A researcher-made questionnaire was employed in this study. It consisted of five (5) parts, namely: Part I is the profile of the respondents. Part II is the factors that influence the choice of strands of the Grade 12 students. Part III is the perspectives of the Grade 12 respondents on senior high school. Part IV is the problems encountered by Grade 12 students. And Part V is the opportunities of the Grade 12 students after senior high school graduation.

Specifically, this study sought to answer the following questions: 1) What are the profiles of the respondents in terms of sex, age, track and strand?; 2) What are the perceived factors that influence the respondents' choice of strands in terms of family, school policy, peer influence, residence and academic performance?; 3) What are the perspectives of the respondents in

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terms of Senior High School status, facility, faculty strength, student admission, curriculum, library holdings, school plant and student services?; 4) What are the problems encountered by the respondents in terms of lack of preparation, financial, parents' perception and teacher performance?; and 5) What are the perceived opportunities of the respondents after senior high school graduation in terms of higher education, employability, entrepreneurship and middle-level skill development? To analyze the data, statistical tools such as Frequency Count and Simple Percentage, Weighted Mean and Standard Deviation were used.

### RESULTS

On the profile, it revealed that majority (62.30%) of the respondents were female; a little majority (54.97%) of the respondents were between 17-18 years of age; many (20.16%) of the respondents had chosen the academic track (HUMSS strand).

While on the factors that influence their choice of academic track and strand, it revealed that among others, most of the respondents considered their peers and classmates as an important factor that made them chose their strand so that they would be in the same class again (WM= 2.48; SD= 0.6937). Another important finding was that the respondents admitted they matched their academic performance or skills to the strand that they opted (WM= 2.55; SD= 0.7074). Also, according to the respondents, there was more fun where the home and the school were in the same place (WM= 2.35; SD= 0.7587). Moreover, on the average, the respondents failed to agree that the family influenced their choice of strand (WM= 2.29; SD= 0.7110) though they believed that parental support and encouragement are important factors that could influence career choice (WM= 2.58; SD= 0.6898). Lastly, the respondents revealed that school policy did not generally influence their career choice (WM= 2.24; SD= 0.7582).

In terms of perspectives on choice of strand, the respondents affirmed that the curriculum prepared the Senior High School students to learn more advanced skills in college as it offered subjects like Research 1 (Qualitative) and Research 2 (Quantitative) (WM= 2.70; SD= 0.5974). Another was that the respondents confirmed they underwent work immersion which included earn-while-you-learn opportunities (WM= 2.64; SD= 0.6145). As to faculty strength, the respondents revealed that the Senior High School teachers demonstrated knowledge, skills and expertise in their area of specialization (WM= 2.57; SD= 0.7019). Along the aspect of student services, the respondents agreed that during enrollment, the Career Guidance Program (CGP) helped Senior High School in making informed choices regarding their future career path (WM= 2.48; SD= 0.7305); the Registrar's Office was always ready with students' academic record (WM= 2.48; SD= 0.7305); and the school principal disseminated clear and accurate information/memoranda (WM= 2.48; SD= 0.7553). The most visible facility that the respondents observed was the school's multi-functional social hall for Senior High School program (WM= 2.40; SD= 0.7126); sufficient classroom for Senior High School (WM= 2.48; SD= 0.7051); and laboratory faculties for computer, science and Home Economics (WM= 2.40; SD= 0.7451). As reported by the respondents, the school plant in general was conducive to learning for Senior High School (WM= 2.44; SD= 0.7903); the school environment had good sanitation (WM= 2.44; SD= 0.7534); and functional multi-purpose auditorium, gymnasium and social hall for students' activities (WM= 2.44; SD= 0.7529). Computers and electronic equipment were accessible in the library (WM= 2.39; SD= 0.7514); the library resources such as books were new and relevant (WM= 2.36; SD= 0.7897); and the library featured Information and Communication Technology suited to complement research activities (WM= 2.34; SD= 0.7755).

Most of the respondents admitted lack of preparation for Senior High School as the most often problem encountered like they had less time to read and study because of being hooked to social media such as Facebook (WM= 3.01; SD= 0.9693). Another problem often encountered by the respondents was parents' perception that spending more money was the disadvantage of having Senior High School (WM= 3.02; SD= 0.9971). Most of the respondents had agreed that irregular daily allowance due to family's financial problem (WM= 3.08; SD= 0.9386) was often experienced. The respondents enumerated problems on teacher performance that were often encountered like teachers' lack mastery in the subject taught (WM= 2.65; SD= 1.0230); teachers did not give attention to each student individually (WM= 2.60; SD= 1.0963); and some of the Senior High School teachers were not well prepared when they come to class (WM= 2.57; SD= 1.0935).

Among the opportunities after Senior High School, the respondents considered higher education as the highest opportunity for them to gain standard knowledge, skills and competencies needed in college (WM= 2.53; SD= 0.6704). Also, Senior High School graduates achieve higher opportunity in middle-level skill development like specialized skills in technical-vocational school (WM= 2.43; SD= 0.7240). Further, Senior High School graduates have higher opportunity in engaging small-scale business activities because of what they learned in entrepreneurship subject (WM= 2.52; SD= 0.6629). Lastly, most of the respondents perceived that there was only moderate opportunity of employability after Senior High School (WM= 2.30; SD= 0.7404).



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### ANALYSIS AND DISCUSSION

Based on the findings of the study, among the factors that influence the choice of strand, most of the respondents considered their peers and classmates as an important factor that made them chose their strand. The respondents matched their academic performance or skills to the strand. They admitted that there was more fun where the home and the school were located. However, the respondents failed to agree that the family influenced their choice of strand and that the school policy did not generally influence their career choice.

In terms of perspectives on Senior High School, the respondents affirmed that the curriculum prepared the Senior High School students to learn more advanced skills; they underwent work immersion; the Senior High School teachers demonstrated knowledge, skills and expertise; the Career Guidance Program (CGP) helped Senior High School in making informed choices regarding their future career path; the most visible facility observed by the respondents was the school's multi-functional social hall, classroom and laboratory faculties; the school plant in general was conducive to learning for Senior High School with functional multi-purpose auditorium, gymnasium and social hall; and computers and electronic equipment were accessible in the library.

On the problems encountered, most of the respondents admitted that they lacked preparation for Senior High School as the most often problem encountered like they had less time to read and study because of being hooked to social media such as Facebook. Another problem often encountered by the respondents were parents' perception, irregular daily allowance due to family's financial problem and teacher performance like teachers' lack mastery of the subject taught.

While on the opportunities after Senior High School, the respondents considered higher education as the highest opportunity, higher opportunity in middle-level skill development and higher opportunity in engaging small-scale business activities. But most of the respondents perceived that there was only moderate opportunity of employability after Senior High School.

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### AUTHOR'S PROFILE



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## Banking Transformation in the Digital Era: Bank Cooperation with Financial Technology and the Role of the Financial Services Authority in Digital Bank Supervision

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**ABSTRACT:** The Industrial Revolution 4.0 has brought significant transformations to various aspects of life, including financial activities, which have increasingly transitioned into digital systems facilitated by financial technology (fintech). Fintech accommodates remote financial activities, reshaping the banking industry through the emergence of digital banks that enhance customer convenience in accessing banking services. This development reflects the growing cooperation between banking institutions and fintech companies. However, digital-based financial activities are inherently susceptible to system vulnerabilities, potentially causing customer losses. This study explores two main issues: (1) the nature of cooperation between banks and fintech and (2) the role of the Financial Services Authority (OJK) in supervising digital banking operations. The findings reveal that collaboration between banking and fintech is achieved by integrating banking services with fintech platforms, enabling seamless customer access. The OJK employs direct (on-site) and indirect (off-site) supervision methods to ensure regulatory compliance and mitigate risks. Additionally, the OJK leverages advanced technologies such as the OSIDA (OJK Suptech Integrated Data Analytics) system to optimize supervision and implement a regulatory sandbox framework to foster innovation while maintaining oversight.

**KEYWORDS:** Financial Technology, Supervision, Digital Bank.

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### I. INTRODUCTION

In the digital era, technology and information accommodate and enhance the efficiency of society's basic needs. The Industrial Revolution 4.0, the digital revolution, emerged with the influence of the Internet of Things (IoT), integrating industry with advanced technology. This transformation has significantly reshaped people's lives, making them more practical, efficient, and productive<sup>1</sup>. As a German legal scholar, Friedrich Carl von Savigny, stated, "*Das recht wird nicht gemacht, es ist und wird mit dem volke*," meaning that the law is not created but grows and evolves with society<sup>2</sup>. As a nation governed by law, this presents a challenge for Indonesia to align its legal framework with these boundless technological advancements without deviating from the 1945 Constitution of the Republic of Indonesia (UUD NRI, 1945).

One prominent example of the widespread adoption of technology and information is financial technology (fintech). This innovation has driven the digitization of conventional financial systems, transitioning from paper money to fully digital platforms accessible via smartphones. Fintech enables financial activities such as payment systems and online trading to be conducted efficiently and in real-time, anytime and anywhere. The effectiveness and convenience offered by fintech have garnered significant public interest, as reflected in the remarkable growth of electronic money transactions, which surged by 172.85% year-on-year in January 2020. <sup>3</sup>This study focuses on two main aspects: (1) the collaboration between banking institutions and

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<sup>1</sup> Muhammad Rifqi Suhaidi, "Peran dan Pengaruh Revolusi Industri 4.0 Terhadap Penerapan Omnibus Law Sebagai Perkembangan Sistem Hukum di Indonesia", *Journal of Law, Administration, and Social Science*, Vol. 3, No. 1, (2023): 15.

<sup>2</sup> Magister Ilmu Hukum Pascasarjana Universitas Medan Area, "Het Recht Hink Achter De Feiten Aan". <https://mh.uma.ac.id/het-recht-hink-achter-de-feiten-aan/>, diakses pada 26 Februari 2024.

<sup>3</sup> Giri Hartono, "BI Catat Penggunaan Uang Elektronik Tumbuh 172,85%", <https://economy.okezone.com/read/2020/02/20/320/2171484/bi-catat-penggunaan-uang-elektronik-tumbuh-172-85>, diakses pada 26 Februari 2024.

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fintech companies and (2) the role of the Financial Services Authority (OJK) in supervising digital banking operations. The research finds that integrating banking services with fintech platforms enhances customer accessibility. At the same time, OJK employs advanced supervisory mechanisms such as OSIDA (OJK Suptech Integrated Data Analytics) and a regulatory sandbox to ensure innovation aligns with regulatory standards.

The adoption of financial technology (fintech) has grown rapidly, particularly during the COVID-19 pandemic, as societies sought to reduce the risk of virus transmission. Responding to this, the World Health Organization (WHO) recommended minimizing cash transactions and embracing contactless payment systems, leading to the emergence of a cashless society.<sup>4</sup> This transition underscores the crucial role of fintech as a secure, efficient, and legally regulated tool for financial transactions. Regulatory frameworks provided by Bank Indonesia, including Regulation Number 18/40/PBI/2016 on Payment Transaction Processing, Circular Letter Number 18/22/DKSP on Digital Financial Services, and Regulation Number 18/17/PBI/2016 on Electronic Money, alongside the Financial Services Authority's POJK Number 13/POJK.02/2018 concerning Digital Financial Innovation, ensure the lawful and reliable implementation of fintech in Indonesia.

Within this framework, digital transformation in the banking sector has materialized through digital banking services. As stipulated in Financial Services Authority Regulation Number 12/POJK.03/2021, digital banking refers to legally recognized banking institutions that operate exclusively online, except for a central head office. Digital banks offer services similar to conventional banks, such as fund collection, money transfers, and transaction processing. However, their distinctiveness lies in the flexibility and efficiency of operations, allowing customers to conduct transactions independently, in real-time, and from any location without visiting physical branches.

Digital banking further expands its functionality by integrating with e-commerce platforms. It enables customers to top up electronic wallets, make cashless payments through the standardized QRIS system, and access detailed transaction histories to track income and expenses. These features provide unparalleled convenience while maintaining robust security and operational efficiency. Additionally, adopting digital banking enhances customer experiences and aligns with global financial practices. This evolution reflects technological progress and emphasizes the critical importance of a rigid and comprehensive legal framework to support sustainable growth in the digital financial ecosystem.

The emergence of digital banks as a key form of financial technology has fundamentally reshaped the way banking services are provided and consumed, shifting from traditional face-to-face interactions to fully digital platforms. This development underscores a significant collaboration between the banking sector and financial technology (fintech), opening the door to innovative approaches to delivering financial services<sup>5</sup>. Through smartphone applications, digital banks offer broader access and enhanced customer convenience, extending financial inclusion to previously underserved populations. However, while digitalising financial services provides unprecedented ease, it also introduces various risks, such as transaction failures, data breaches, and privacy concerns. These challenges necessitate a robust operational framework to safeguard customer interests and ensure the integrity of digital banking systems.

Given these risks, the Financial Services Authority (OJK) plays a pivotal role in regulating and supervising digital banking activities. As the regulatory body overseeing financial institutions, including banks, the OJK ensures compliance with legal standards and promotes digital financial systems' secure and efficient operation. At its core, financial technology integrates technology into financial activities through remote digital systems, making transactions faster, easier, and more efficient. The transition from cash-based to online financial transactions marks a significant milestone in the evolution of the financial industry.

Fintech's versatility is evident in its various applications, including electronic money, which can exist as chip-based cards or server-based electronic wallets, such as Gopay, ShopeePay, Dana, OVO, LinkAja, and others. In the banking sector, fintech is exemplified by digital banking services, which facilitate seamless transactions, including payments, money transfers, peer-to-peer lending (P2P), crowdfunding, online loans, investment management, and digital identity verification. These features streamline financial processes and redefine the customer experience in financial services.

Despite its benefits, integrating digital banking and fintech requires addressing critical vulnerabilities in operational systems to prevent customer losses and maintain trust. Enhancing system reliability, ensuring robust data security, and complying with regulatory frameworks are essential to mitigating risks associated with digital financial services. The OJK,

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<sup>4</sup> Elshabyta Auditya Bintarto, "Fintech dan Cashless Society: Sebuah Revolusi Mendongkrak Ekonomi Kerakyatan", Call For Essays, Universitas Gajah Mada, 9.

<sup>5</sup> Hida Hiyanti, "Peluang dan Tantangan Fintech (Financial Technology) Syariah di Indonesia", Jurnal Ilmiah Ekonomi Islam, Vol. 5, No. 03, (2019): 327.

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through its regulatory and supervisory functions, is instrumental in fostering innovation while ensuring that digital banking aligns with legal, ethical, and security standards, thereby supporting a sustainable and resilient financial ecosystem.

Banks are financial institutions trusted by the public as intermediary institutions where they collect public funds and channel them back to the real sector for the development and stability of the country's economy.<sup>6</sup> Banking regulations are regulated in Law Number 10 of 1998, an amendment to Law Number 7 of 1992 concerning Banking. The development of financial technology in the banking industry is with the existence of digital banks. According to POJK No. 12/POJK.03/2021 concerning General Banks in article 1 number 22, "Digital Bank is a BHI Bank that provides and carries out business activities mainly through electronic channels without physical offices other than KP or using limited physical offices." The article explains that digital banking activities are carried out electronically. Then, according to POJK No. 12/POJK.03/2018 in article 1 number 4, "Digital Banking Services are Electronic Banking Services that are developed by optimizing the use of customer data in order to serve customers faster, easier, and according to their needs (customer experience), and can be carried out independently by customers, by paying attention to security aspects." The article explains that the services provided by digital banks can be carried out independently by customers to be more effective and efficient. Digital banks provide financial services like general banks, such as saving money, transferring funds, loans and other services. Where what distinguishes them from conventional banks, in general, is that these services can be accessed independently by customers through the platform provided. Digital banks also still have banking functions, like conventional banks, namely the intermediary function, the intermediary party that brings together the party that owns the funds and the party that needs the funds.<sup>7</sup>

The Financial Services Authority is an independent institution that has the function of regulating and supervising the activities of the financial services sector including banking, capital markets, insurance, pension funds, financing institutions and other financial services institutions. This is marked by the enactment of Law Number 21 of 2011 concerning the Financial Services Authority. The Financial Services Authority has authority over financial services institutions in terms of supervision, investigation, consumer protection in the financial services sector, and other actions related to financial services sector institutions<sup>8</sup>. In the digital era, the Financial Services Authority also has regulations related specifically to digital banking services, which can be seen in POJK Number 12 / POJK.03 / 2018 concerning the Implementation of Digital Banking by Commercial Banks, Financial Services Authority Regulation (POJK) Number 12 / POJK.03 / 2021 concerning Commercial Banks, and other regulations.

Based on the background of the problem, this study aims to identify the problem, namely, How is Bank Cooperation with Financial Technology? and What is the role of the Financial Services Authority (OJK) in regulating and supervising digital banking activities to ensure the stability of the financial system, consumer protection, and compliance with applicable regulations? Hopefully, this research can be useful for increasing insight and knowledge for the banking industry, financial regulators, and the general public.

## II. RESEARCH METHODS

Research is one way to produce developments in the field of science theoretically and practically with the aim of further deepening and broadening the understanding of the existence of science.<sup>9</sup> To conduct research, a research methodology is needed. Namely, the thinking used in research, techniques in science, and procedures in conducting research. Therefore, it can be said that the method is an absolute thing in research.<sup>10</sup>

Based on the background of the problem above, the approach taken in this study is the normative legal approach method. Normative legal research focuses on laws and regulations that have a close relationship with libraries, so it can be said to be library research or literature studies.<sup>11</sup> This is because literature studies use secondary data. The secondary data material is divided into primary legal materials, secondary legal materials, and tertiary legal materials. Primary legal materials are legal materials that come from positive law, namely from laws and regulations, where this study will review several Bank Indonesia Regulations and also Financial Services Authority Regulations. Secondary legal materials come from studies or literature such as

<sup>6</sup> Lukman Santoso AZ, *Hukum dan Kewajiban Nasabah Bank*. (Yogyakarta: Penerbit Pustaka Yustisia, 2011), 13.

<sup>7</sup> Ditjen Perbendaharaan Direktorat PKN, "ODADING Seri Keuangan Digital Part III : Digital Banking", <https://djpb.kemenkeu.go.id/direktorat/pkn/id/odading/2919-digital-banking.html>. Diakses pada 26 Februari 2024.

<sup>8</sup> Hesty D Lestari, "Otoritas Jasa Keuangan: Sistem Baru Dalam Pengaturan Dan Pengawasan Dalam Sektor Jasa Keuangan", *Jurnal Dinamika Hukum*, Vol. 12, No. 3, (September 2012): 558.

<sup>9</sup> Soerjono Soekanto, *Pengantar Penelitian Hukum*, (Jakarta: Penerbit Universitas Indonesia (UI Press), 2018), 3.

<sup>10</sup> *Ibid.*, 5-7.

<sup>11</sup> Suteki, *Metodologi Penelitian Hukum (Filsafat, Teori, dan Praktik)*, (Depok : Rajawali Pers, 2018), 152-153.

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books, articles, legal theories, and scientific works made by scholars. Tertiary legal materials support finding out the meaning or terms of primary and secondary legal materials that can be obtained from dictionaries or encyclopedias.

The data collection method for this normative legal research is the Library study method, namely by studying literature or legal materials collected previously, namely laws and regulations and books or scientific works. The data analysis method used in this study is qualitative, namely an analysis method that describes its research using sentences, words, descriptions, and narratives without using numbers. Then, the research specifications in this study are analytical descriptive, namely it will describe in full the phenomena or legal issues discussed in this study, which will be presented systematically and logically.

### **III. LITERATURE REVIEW**

The digital era has brought transformative changes across industries, including the banking sector, where technological advancements have reshaped traditional banking operations into more innovative and customer-centric systems. This transformation is marked by the collaboration between banks and financial technology (fintech), revolutionizing financial services by enhancing accessibility, efficiency, and inclusivity. As the banking industry embraces digitalization, regulatory bodies such as the Financial Services Authority (OJK) play a critical role in ensuring these innovations align with legal frameworks and maintain financial system stability.

#### **a. Collaboration Between Banks and Financial Technology**

The synergy between banks and fintech has opened opportunities for innovation in delivering financial services. Fintech is defined as integrating technology into financial services to provide more efficient, accessible, and tailored solutions to consumers. This includes services like electronic money, peer-to-peer lending (P2P), crowdfunding, digital wallets, and online payments. Studies indicate that fintech partnerships enable banks to expand their services beyond physical branches, thereby increasing financial inclusion, particularly for underserved populations. Banks can enhance customer experiences, reduce operational costs, and improve transaction speed and accuracy through digital platforms.

However, this collaboration is challenging. Data security, system vulnerabilities, and regulatory compliance present significant risks. According to Karjoko et al., robust operational systems and effective governance are essential to mitigate these risks and ensure the sustainability of digital banking services.<sup>12</sup>

#### **b. Risks and Challenges in Digital Banking**

Digital banking introduces vulnerabilities such as transaction failures, cybersecurity threats, and data privacy breaches, which can undermine customer trust. The rapid evolution of technology requires continuous improvement in system resilience and security measures. Tandellin highlights the need for banks to invest in advanced cybersecurity technologies and adopt stringent risk management practices to safeguard customer assets and information.

Moreover, shifting to digital banking necessitates reevaluating traditional banking models to address operational and compliance challenges. Fintech's disruptive nature often exposes gaps in regulatory frameworks, which must be bridged to foster innovation while protecting consumer interests.

#### **c. Role of the Financial Services Authority (OJK)**

The OJK plays a pivotal role in regulating and supervising digital banking operations in Indonesia. Its mandate includes ensuring that banks and fintech entities comply with applicable laws, maintain financial stability, and prioritize consumer protection. The OJK employs innovative supervisory tools such as OSIDA (OJK Suptech Integrated Data Analytics) to monitor financial activities effectively.<sup>13</sup> Additionally, the regulatory sandbox framework provides a controlled environment for fintech innovations to be tested and evaluated before full-scale implementation, ensuring they meet regulatory and operational standards<sup>14</sup>.

Regarding consumer protection, the OJK emphasizes transparency and accountability in digital banking services. It ensures that banks and fintech platforms operate with clear terms of service, robust data protection measures, and efficient mechanisms for addressing customer grievances. These efforts aim to balance innovation with regulatory compliance and build public trust in digital financial systems.<sup>15</sup>

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<sup>12</sup> Karjoko, L., et al. "Legal Protection for Financial Consumers in the Digital Era." *Journal of Legal Studies*, vol. 29, no. 3, 2021, pp. 215–229.

<sup>13</sup> Otoritas Jasa Keuangan (OJK). "OSIDA: A New Paradigm in Financial Supervision." *OJK Bulletin*, 2023.

<sup>14</sup> Financial Services Authority Regulation Number 13/POJK.02/2018 on Digital Financial Innovation in the Financial Services Sector.

<sup>15</sup> Bank Indonesia Regulation Number 18/17/PBI/2016 on Electronic Money.

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## IV. DISCUSSIONS

### A. Synergy Between Banks and Fintech: Driving Innovation in Digital Financial Services

Technology and Information continue to develop along with the times. People's lifestyles are inseparable from the use of technology, likewise, in the financial sector, which is the main activity of society. The development of digital technology has entered the world of payment systems or financial products known as financial technology. Financial technology transforms from a conventional financial system accommodated by technology to being all digital with a long-distance system. With financial technology, financial activities can be accessed via smartphones and the internet so that people do not need to carry large amounts of cash. The services provided by financial technology are affordable, easy, and faster financial activities so that financial activities can be effective and efficient.

With the ease of transacting using financial technology, banks have the potential to collaborate with financial technology. According to Article 1, paragraph 2 of Law Number 10 of 1998 concerning Banking, "A bank is a business entity that collects funds from the public in the form of savings and distributes them to the public in the form of credit and other forms in order to improve the standard of living of the people". The public can use financial services in banking, such as making deposits or savings, transferring money, making loans or credit, as a tool or transaction system. With the existence of financial technology, it can be good potential for banks to cooperate or collaborate in the financial sector.

Based on a survey conducted by IDC's Digital Transformation in Banking in 2016 regarding how banks perceive financial technology globally, as many as 34.2% of banks consider financial technology an opportunity to collaborate or cooperate with banks in their business activities. Bank cooperation with financial technology can provide many benefits for banking business activities; in digitalization, financial technology can provide innovative solutions. Financial technology can also improve the quality of services banks provide, conduct deeper analyses related to prospective bank customers, and increase risk mitigation if something unexpected happens. Financial technology can make banking services more efficient and can increase the types of financial service products for customers.<sup>16</sup>

Banking and financial technology cooperation is usually done by integrating banking services with financial technology. Therefore, customers can access various financial technology services through existing platforms. An example of this cooperation can be seen in the Peer Peer Lending (P2P lending) service, namely the lending and borrowing service by the People's Credit Agency or BPR. The parties involved in this cooperation are the People's Credit Agency (BPR) and financial technology lending. Of course, these parties must comply with the provisions and permits imposed by the Financial Services Authority. Cooperation between these parties can be divided into two types: channelling and referral. Channelling cooperates BPR and fintech lending by channelling loan funds or credit to customers through the fintech lending platform. Then, a referral is channelling credit by BPR directly, which is referenced by fintech lending. Cooperation between BPR and fintech lending can be done if the Financial Services Authority supervisor has approved it. Of course, the cooperation between BPR and fintech lending is also based on related regulations, namely Law Number 10 of 1998, which is an amendment to Law Number 7 of 1992 concerning banking, POJK No.12/POJK.03/2016 concerning Business Activities and BPR Office Network Areas Based on Core Capital, POJK No.77/POJK.01/2016 concerning Information Technology-Based Money Lending Services, and so on.<sup>17</sup>

### B. The Role of the Financial Services Authority in the Form of Digital Bank Supervision

Banks are financial institutions trusted by the public as intermediary institutions that collect funds from the public and channel them back to the public in different forms as regulated in Law Number 10 of 1998, which is an amendment to Law Number 7 of 1992 concerning Banking. Banks provide services or services related to the circulation of money and payment traffic, including credit cards, safe deposit boxes, collections, custodians, clearing, bank guarantees, and letters of credit in international and domestic trade<sup>18</sup>. Supported by financial technology that accommodates the conventional financial system to be completely digital, namely with the existence of digital banks or digital banking. The regulations underlie digital banking, namely the Financial Services Authority have regulations related to digital banking, namely the Financial Services Authority Regulation (POJK) Number 12 / POJK.03 / 2021 concerning Commercial Banks. Financial Services Authority Regulation (POJK) Number 12 / POJK.03 / 2018 concerning implementing Digital Banking by Commercial Banks. Digital banks offer banking financial services

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<sup>16</sup> Departemen Penelitian dan Pengaturan Perbankan OJK 2021, "Panduan Kerjasama BPR dan Fintech Lending", [https://www.ojk.go.id/id/berita-dan-kegiatan/publikasi/Documents/Pages/Buku-Panduan-Kerjasama-Bank-Perkreditan-Rakyat-\(BPR\)-dengan-Lembaga-Layanan-Pinjam-Meminjam-Berbasis-Teknologi-Informasi/Buku%20-Panduan%20Kerjasama%20BPR%20dengan%20Fintech%20P2P%20Lending.pdf](https://www.ojk.go.id/id/berita-dan-kegiatan/publikasi/Documents/Pages/Buku-Panduan-Kerjasama-Bank-Perkreditan-Rakyat-(BPR)-dengan-Lembaga-Layanan-Pinjam-Meminjam-Berbasis-Teknologi-Informasi/Buku%20-Panduan%20Kerjasama%20BPR%20dengan%20Fintech%20P2P%20Lending.pdf) Diakses Pada 29 Februari 2024.

<sup>17</sup> Ibid.

<sup>18</sup> Hermansyah, Hukum Perbankan Nasional, (Jakarta: Kencana Prenada Media Group, 2020), 65.



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through electronic networks independently by customers anywhere, anytime, in real-time so that they can offer faster, easier, more effective and efficient financial services for customers.

However, the ease of digital transactions does not rule out the possibility of risks caused by system problems that can cause losses for customers using digital banking services. This can include customer data security, dependence on technology where there are obstacles in the system or network disruptions that can hinder customer financial activities, which can cause the risk of transaction failure or customer balance retention, and other problems. This can affect customer confidence in using financial services from digital banks. Therefore, there needs to be supervision for the ongoing digital banking services to minimize losses for digital bank customers.

By Law Number 21 of 2011 concerning the Financial Services Authority, article 5, the Financial Services Authority has the authority to regulate and supervise the implementation of business activities in the financial services sector, one of which is banks. The function of regulating and supervising banks by the Financial Services Authority is to maximize the performance of banking business activities as financial institutions trusted by the public, namely by collecting and distributing public funds. It can encourage the creation of financial system stability.<sup>19</sup>The Financial Services Authority can supervise the running of banking services through direct supervision (on-site supervision) and indirect supervision (off-site supervision). Direct supervision (on-site supervision) is bank supervision carried out by conducting general and specific examinations. The examination aims to obtain an overview of the bank's financial condition. With the examination, it can also determine the bank's level of compliance with applicable regulations in carrying out its business activities. It can find out if unhealthy practices can endanger the sustainability of banking business activities. Then, indirect supervision or off-site supervision is bank supervision carried out through tools to carry out monitoring, which can be in the form of reports made periodically by the bank, the existence of examination result reports, and other information that can be submitted to the Financial Services Authority.<sup>20</sup>

Supervision carried out by the Financial Services Authority on technology-based banking is carried out with the existence of regulations that regulate and supervise digital banking, namely in the Financial Services Authority Regulation (POJK) Number 12 / POJK.03 / 2021 concerning Commercial Banks and the Financial Services Authority Regulation (POJK) Number 12 / POJK.03 / 2018 concerning the Implementation of Digital Banking by Commercial Banks. This supervision can be started from the registration stage by the registrant to the supervisor, ensuring that the digital financial services sector has been registered. Then, the regulator will test the regulatory sandbox, namely the stages carried out by the Financial Services Authority by conducting tests on the digital financial services sector, namely in terms of governance aspects in the financial services sector business activities, how the business model and business processes are by the financial services sector, and the financial instruments of the organizers. This has been regulated in the Financial Services Authority Regulation Number 13 / POJK.02 / 2018 concerning Digital Financial Innovation in the Financial Services Sector. The Financial Services Authority also has regulations for the technology-based financial services sector or financial technology in the field of lending or Peer Peer Lending, namely in the Financial Services Authority Regulation (POJK) Number 77 / POJK.01 / 2016 concerning Information Technology-Based Money Lending Services which regulates licensing and supervision. The supervision is carried out in two stages, namely, the pre-operational business stage related to the registration and licensing of the organizer. Then the next supervision is the stage during business operations, namely the submission of company reports and the examination of reports by the Financial Services Authority.

Quoting from Press Release SP 13 / DHMS / OJK / III / 2022, along with the development of technology, the Financial Services Authority is developing the Financial Services Industry or (IJK) supervision technology by issuing OSIDA, namely OJK Suptech Integrated Data Analytic which has the function of maximizing and optimizing the data analysis process in the Financial Services Industry report. According to the Chief Executive of Banking Supervision of OJK, the implementation of banking supervision is currently different from before; OSIDA (OJK Suptech Integrated Data Analytic) shows that supervision in the banking industry also continues to move to adapt to developments in the era, especially in the use of technology considering the transformation of banking into digital, namely with the existence of digital banks or digital banking which produces very large data so that the use of technology is needed to optimize analysis and supervision of the data. The existence of OSIDA (OJK Suptech Integrated Data Analytic) can help the Financial Services Authority carry out supervision and take anticipatory steps. This is supported by technology that can be done with OSIDA (OJK Suptech Integrated Data Analytic) which can detect early warning signals and

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<sup>19</sup> Fadhil Irfan Muhammad, "Peran Pengawasan Otoritas Jasa Keuangan dalam Rangka Pengembangan Bank Perkreditan Rakyat", Universitas Brawijaya Malang, 7.

<sup>20</sup> OJK, "Pengaturan dan Pengawasan Perbankan", OJK 2017, <https://ojk.go.id/id/kanal/perbankan/ikhtisar-perbankan/Pages/Peraturan-dan-Pengawasan-Perbankan.aspx> Diakses Pada 28 Februari 2024.

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compliance checks. This is an early indication of weaknesses in governance. These weaknesses can occur in banking business activities, which can be in the form of potential fraud, data manipulation, or if there is non-compliance with applicable regulations or provisions.<sup>21</sup>

### **V. CONCLUSION**

With the ease of transacting using financial technology, banks have the potential to collaborate with financial technology that can provide many benefits for banking business activities; namely, in facing digitalization, financial technology can provide innovative solutions. Financial technology can also improve the quality of services banks provide, conduct deeper analyses related to prospective customers, and increase risk mitigation if something unexpected happens. The cooperation between banking and fintech is usually carried out by integrating banking services with financial technology. An example of this cooperation can be seen in the Peer Peer Lending (P2P lending) service by BPR with financial technology lending in cooperation with channelling and referrals.

The role of the Financial Services Authority in the form of digital bank supervision is through direct supervision or on-site supervision and indirect supervision or off-site supervision. Direct supervision or on-site supervision is a special and general examination of banking business activities to determine the condition of the bank's business activities. Indirect supervision or off-site supervision is monitoring through periodic reports. The Financial Services Authority's supervision of digital banks is also implemented in the regulatory sandbox, namely testing in the digital financial services sector related to aspects of governance in financial services sector business activities regulated in Number 13/POJK.02/2018 concerning Digital Financial Innovation in the Financial Services Sector. The Financial Services Authority is developing the Financial Services Industry or (IJK) supervision technology by issuing OSIDA, namely OJK Suptech Integrated Data Analytic, which aims to optimize and facilitate processing in data analysis supervision.

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## Legal Analysis of Bank Compliance in Implementing the Principle of Prudence in Credit with Trade Receivables Fiduciary Guarantee



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**ABSTRACT:** The prudential principle is a fundamental pillar in maintaining the stability and security of bank finances, especially in the distribution of credit with fiduciary guarantees for trade receivables. Credit secured by trade receivables has special characteristics that require a more in-depth risk evaluation, given the intangible nature of receivables and dependence on the ability of third parties to pay. This study discusses how the prudential principle is applied by banks in the process of creditworthiness analysis, assessing the quality of trade receivables as collateral, and managing related risks, including liquidity, default, and legal risks. In addition, this study highlights the importance of fiduciary registration and complete legal documentation to protect banks from potential legal disputes and ensure effective collateral execution in the event of default. By implementing strict prudential principles and comprehensive risk management, banks can minimize the risks associated with the distribution of credit guaranteed by fiduciary on trade receivables, thereby maintaining their financial and operational stability.

**KEYWORDS:** Prudential principle, bank credit, fiduciary, trade receivables, credit risk.

### I. INTRODUCTION

Banking credit is one of the important economic activities in the modern financial system. As an intermediary institution, banks channel funds from parties with excess liquidity (savers) to parties in need of funds (debtors). In short, banks play a central role in channelling credit to the community and the business world. However, credit distribution is also high risk, especially related to credit risk, where debtors fail to fulfil their obligations, which can cause bank losses.

To mitigate this, banks must apply the principle of prudence to minimize credit risk. This principle is regulated by various regulations, including Law No. 10 of 1998 concerning banking and the regulations of the Financial Services Authority (OJK). Banks are required to conduct adequate credit risk analysis before providing loans, including an assessment of the collateral submitted by the debtor.<sup>1</sup>

In general, banks ask for collateral from debtors. One form of collateral that is often used by debtors in obtaining credit is fiduciary, where ownership of an asset is transferred to the creditor (bank). In contrast, the debtor retains control of the asset. Fiduciary collateral offers flexibility because it allows the debtor to retain control of the collateralized assets as long as they fulfil their obligations to the bank.

In Indonesia, Law No. 42 of 1999 concerning Fiduciary Collateral regulates the mechanisms and procedures for fiduciary collateral, including the use of trade receivables as collateral objects. Trade receivables are the right to demand payment from a third party for the sale of goods or services. Trade receivables are the right to demand payment from a third party for the sale of goods or services. Although trade receivables are valuable assets, their dynamic nature and vulnerability to changes in economic conditions require strict supervision from the bank to ensure that the collateral has adequate value. Although trade receivables are valuable assets, their dynamic nature and vulnerability to changes in economic conditions require strict supervision from the bank to ensure that the collateral has adequate value.

<sup>1</sup> Jatmiko Winarno, "Perlindungan Hukum Bagi Kreditur Pada Perjanjian Jaminan Fidusia," *Jurnal Independent* 1, no. 1 (2013): 44.

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The prudential principle in credit distribution is a fundamental basis that must be adhered to by banks to reduce potential credit risk. This principle is expressly regulated in Law No. 10 of 1998 concerning Amendments to Law No. 7 of 1992 concerning Banking, as well as in a number of regulations of Bank Indonesia and the Financial Services Authority (OJK). This principle requires banks to conduct a careful assessment of the debtor's risk profile, the quality of the collateral, and the debtor's ability to repay the loan. One of the main challenges in credit distribution with trade receivables fiduciary collateral is its more dynamic nature compared to physical collateral such as land or buildings. Trade receivables can change along with economic conditions, the company's cash flow, and the debtor's business performance. Therefore, banks must conduct a proper assessment of the value of trade receivables and monitor them periodically to ensure that the collateral is always sufficient. Law No. 42 of 1999 concerning Fiduciary Guarantees regulates the mechanism for the transfer of ownership rights through fiduciary means. However, it does not specifically regulate how banks should handle trade receivables as collateral; moreover, the execution procedures are quite complicated and need to be more rigidly regulated by law. Bank Indonesia has established regulations through PBI No. 13/23/PBI/2011 concerning the Principle of Prudence in Credit Distribution, which requires banks to assess and monitor collateral submitted by debtors, including trade receivables. However, over time, problems have arisen related to bank compliance in implementing the principle of prudence in the use of trade receivables as fiduciary collateral. Banks often do not conduct an in-depth analysis of the quality of the trade receivables that are pledged, which has the potential to create risks when the value of the receivables decreases or there is a default by the debtor. This not only has an impact on the contractual relationship between the bank and the debtor but also violates the rules set by the regulator regarding the principle of prudence.<sup>2</sup>

Bank Indonesia and the Financial Services Authority have issued various regulations requiring banks to periodically assess and monitor the quality of collateral, including collateral in the form of trade receivables. However, in practice, there are still many cases where banks still need to fulfil this obligation. Weak supervision of trade receivables as collateral often results in a decrease in the value of the collateral, which ultimately leads to losses for the bank if the debtor defaults or fails to pay.

This research is very important considering the increasingly complex economic developments, where trade receivables are one of the assets widely used as collateral in banking. Banks must have a strong supervision and monitoring system for fiduciary collateral in the form of trade receivables and ensure that the value of the receivables is sufficient to cover credit risk. Suppose the bank is negligent in implementing this prudential principle. In that case, it will not only harm the bank financially. However, it can also involve legal consequences, both in the context of civil and criminal law, if there is a violation of applicable regulations.

Furthermore, the Financial Services Authority (OJK), through POJK No. 40/POJK.03/2017, also emphasizes that banks must maintain a high level of compliance in mitigating credit risk with valid and monitored collateral. However, empirical data shows that there are a number of cases where banks fail to conduct adequate due diligence on collateralized trade receivables, resulting in non-performing loans and increasing the risk of default. Therefore, it is important to examine how banks comply with regulations and apply the principle of prudence in handling trade receivables as fiduciary collateral. This study aims to fill this gap by comprehensively reviewing the legal aspects related to bank compliance with the principle of prudence in distributing credit with fiduciary collateral in the form of trade receivables. This study will also review the effectiveness of existing regulations, as well as how banks should manage risk through the implementation of a stricter monitoring and evaluation system.

## II. RESEARCH METHODS

The normative juridical approach is a method that analyzes ideas, conceptions, legal principles, and statutory rules pertaining to significant legal material in order to conduct research. This methodology is sometimes referred to as the bibliographic approach, which involves the examination of books, laws, regulations, and other relevant documents pertaining to the subject matter of the research. (Rony Hanitijo S, 1988)

Soerjono Soekanto and Sri Mamudji defined normative legal research or library legal research as the process of doing legal research solely by studying library materials or secondary data. (Soerjono Soekanto dan Sri Mamuji, 1985)

Furthermore, this study employs analytical descriptiveness, which entails doing research on legal principles for the purpose of describing normative juridical data obtained from library materials or library research. The utilization of normative approaches in the study of law involves the identification and conceptualization of law as a set of norms, rules, and regulations

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<sup>2</sup> Nanang Tri Budiman and Supianto Supianto, "Penerapan Kebijakan Tentang Prinsip Kehati-Hatian Dalam Pemberian Kredit Perbankan," *Widya Yuridika* 3, no. 2 (2020): 327.

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that pertain to the sovereign authority of the State. The legal framework established by the State is deemed adequate in safeguarding the creator (novelist) of their creative work (novel) from actions that are perceived to pose a threat to their status as the rightful owner of moral and economic rights pertaining to the work. (Zainudin Ali, 2009)

### III. LITERATURE REVIEW

#### 1. Prudential Principle in Banking Credit Distribution

The prudential principle is a principle that must be applied by banks in every aspect of their operations, especially in credit distribution. This principle aims to ensure that the credit distributed does not pose uncontrolled risks and to maintain the stability of the bank and the financial system as a whole. In accordance with the provisions of Law No. 7 of 1992 concerning Banking, as amended by Law No. 10 of 1998, banks are required to apply the prudential principle in all aspects of their operations, especially in the credit provision process, in order to avoid the emergence of problematic loans (non-performing loans or NPLs).

In its application, the prudential principle includes an assessment of the debtor's risk profile, the quality of collateral, and periodic monitoring of credit that has been distributed. This principle aims to minimize the risk of loss arising from the debtor's inability to fulfil its obligations. Bank Indonesia, through PBI No. 13/23/PBI/2011 concerning the Principle of Prudence in Credit Distribution, stipulates that banks are required to conduct a comprehensive credit assessment of prospective debtors before providing loans, which includes an evaluation of the character, capacity, financial condition, collateral, and external economic conditions that may affect the debtor's ability to repay their debts. Banks are also required to conduct regular monitoring of credit that has been distributed to ensure debtor compliance with credit agreements and prevent problem loans. Cranston's (2002) research explains that the principle of prudence is an integral part of a bank's fiduciary obligations, which means that banks must act in good faith and in full compliance with regulations in protecting customer funds and the stability of the financial system. Hirtle (2007) emphasizes the importance of the principle of prudence in maintaining public trust in the banking system, which is one of the main factors in the sustainability of bank operations and macroeconomic stability. Violation of the principle of prudence can result in serious consequences, such as bank bankruptcy and financial crises, such as the subprime mortgage crisis in the United States in 2008.<sup>3</sup>

Theoretically, the principle of prudence in banking law is based on the concept of fiduciary duty, where banks, as institutions trusted by the public to manage third-party funds, are required to act carefully, thoroughly, and responsibly. This is in line with the view of Cranston (2002), who states that banking is an institution that must protect public trust by maintaining financial stability through the implementation of healthy and prudent credit policies. This principle also includes the obligation of banks to not only focus on profitability but also maintain systemic financial stability. In the context of Indonesia, Bank Indonesia, through Bank Indonesia Regulation No. 13/23/PBI/2011, establishes guidelines for banks to apply the principle of prudence in credit distribution. This regulation includes the credit assessment process, periodic monitoring of debtors, and the need for in-depth analysis of the guarantees provided by debtors, including trade receivables fiduciary. Mishkin and Eakins (2015) emphasize that one way to implement the principle of prudence is to minimize bank exposure to credit risk through credit diversification, the use of adequate collateral, and the careful assessment of the debtor's payment capacity.

#### 2. Fiducia In Credit Guarantee

Fiduciary collateral is a popular form of banking collateral. In Indonesia, it is used to guarantee movable goods, including trade receivables.

According to Law No. 42 of 1999 concerning Fiduciary Collateral, fiduciary is the transfer of ownership rights of an object based on trust, where the object remains in the control of the debtor. Fiduciary collateral provides flexibility for debtors to maintain control of the collateralized assets because they can still manage and use the collateralized goods as long as their payment obligations to the bank are met. Meanwhile, creditors (banks) get priority rights to the assets in the event of default.

Research by Singarimbun (2020) revealed that fiduciary collateral has several advantages, including flexibility in asset management by debtors and efficiency in transferring rights to collateral. However, fiduciary collateral also has weaknesses, especially related to the lack of effective supervision by the bank of the collateralized assets, thus creating potential risks for creditors (banks) if the asset value decreases or the debtor fails to fulfil its obligations. This is supported by the findings of

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<sup>3</sup> HANI LISDIYANI, "IMPLEMENTASI JAMINAN FIDUSIA DALAM PEMBERIAN KREDIT DI BMT TAMZIS YOGYAKARTA," *Universitas Islam Negeri Sunan Kalijaga Yogyakarta* (Universitas Islam Negeri Sunan Kalijaga Yogyakarta, 2015).

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Harahap (2018), who highlighted that in many cases, the value of fiduciary collateral has decreased drastically because banks failed to conduct periodic assessments of the condition of the collateralized assets.<sup>4</sup>

Trade receivables as objects of fiduciary collateral have different characteristics compared to collateral in the form of fixed assets such as land or buildings. Trade receivables, as assets arising from debtor business transactions, are dynamic and are often vulnerable to changes in the economic and operational conditions of the debtor company. Therefore, banks must conduct in-depth due diligence to assess the quality of the collateralized trade receivables, as well as periodically monitor the financial condition of the debtor company to ensure that the receivables can be maintained in value.<sup>5</sup>

Fiduciary collateral is very important in banking, especially in terms of trade receivables, which are often used as collateral in credit transactions. Trade receivables have economic value because they represent the right to payment owned by the debtor for goods or services that have been provided. However, trade receivables have dynamic characteristics and depend on the debtor's business performance.<sup>6</sup> This means that banks must be more careful in assessing and monitoring the quality of accounts receivable as collateral because their value can fluctuate and decrease along with the debtor's business conditions or general economic conditions.

The fiduciary system in Indonesia, as explained by Singarimbun (2020), needs to improve in terms of enforcing fiduciary rights because the supervision of collateralized assets is not carried out effectively by the bank. There are many cases where the value of collateralized assets has decreased drastically without strict supervision from the bank, which ultimately results in losses for the creditor. For this reason, stricter regulations and better supervision are needed to protect creditors' rights in the event of default by the debtor.

### 3. Trade Receivables as Fiduciary Collateral

Trade receivables are assets that are widely used as collateral in credit transactions because of their flexibility in collection. In Indonesian collateral law, trade receivables can be used as fiduciary objects because they are considered to have economic value. However, Harahap (2018) explains that trade receivables have weaknesses related to their fluctuating value, especially if the company experiences a decline in performance or there are economic problems that affect the company's ability to collect payments from third parties. Banks, as recipients of collateral, must carry out strict due diligence to assess the quality of trade receivables submitted as fiduciary collateral.

According to Handayani and Kurniawan (2021), the use of trade receivables as fiduciary collateral poses challenges for banks. This is due to fluctuations in the value of receivables, which can be influenced by market conditions, the smooth operation of the debtor company, and the ability of third parties to fulfill their obligations to the debtor. Therefore, the assessment of trade receivables as collateral must be carried out carefully, and banks need to periodically monitor changes in the condition of these receivables to ensure that the collateral value is always sufficient to cover the potential credit risk taken.<sup>7</sup>

Prasetyo's research (2019) shows that banks often face difficulties in evaluating and monitoring the quality of collateralized trade receivables, especially if the debtor has a broad and diverse portfolio of receivables.<sup>8</sup> This requires banks to have a strong risk management system and an effective monitoring mechanism to manage the risks arising from the use of trade receivables as collateral. In addition, banks need to ensure that debtors have a good receivables management system, including clear procedures for collecting receivables from third parties. There needs to be a more effective strategy from banks in managing the risk of trade receivables as collateral, including by conducting regular monitoring and reassessment of the quality of collateralized receivables.

### 4. Legal Compliance in the Implementation of the Prudential Principle

Legal compliance in implementing the prudential principle is a key factor in maintaining the stability of the financial system and protecting creditors' rights. According to Prasetyo (2019), regulations governing the prudential principle have been quite

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<sup>4</sup> Muhammad Sabir and Rifka Tunnisa, "Jaminan Fidusia Dalam Transaksi Perbankan (Studi Komparatif Hukum Positif Dan Hukum Islam)," *Mazahibuna: Jurnal Perbandingan Mazhab* 2, no. 1 (2020): 80–97.

<sup>5</sup> Ety Mulyati and Fajrina Aprilianti Dwiputri, "Prinsip Kehati-Hatian Dalam Menganalisis Jaminan Kebendaan Sebagai Pengaman Perjanjian Kredit Perbankan," *Acta Diurnal Jurnal Ilmu Hukum Kenotariatan dan ke-PPAT-an* 1, no. 2 (2018): 134.

<sup>6</sup> Oktaria Travilta Eka, "Prinsip Mengenal Nasabah, Penerapan, Prinsip Kehati-Hatian, Lembaga Perbankan," *Perkembangan Hukum di Indonesia* (2018): 193.

<sup>7</sup> Diah Pradhani Perwirasari and Zulfika Ikrardini, "Penerapan Prinsip Kehati-Hatian Dalam Penyaluran Kredit Usaha Rakyat Non Agunan Ditinjau Dari Sisi Hukum Perikatan," *Jurnal Dialektika Hukum* 2, no. 2 (2020): 148–172.

<sup>8</sup> Fatma Paparang, "Implementasi Jaminan Fidusia Dalam Pemberian Kredit Di Indonesia," *Jurnal LPPM Bidang EkoSosBudKum* 1, no. 2 (2014): 56–70, <https://ejournal.unsrat.ac.id/index.php/lppmekosobudkum/article/view/7220>.

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adequate, but their implementation in the field still faces various challenges. Many banks do not comply with the provisions on periodic monitoring of collateral, including trade receivables, thereby increasing the risk of non-performing loans.

Bank Indonesia and the Financial Services Authority (OJK) have issued various regulations aimed at ensuring that banks implement the prudential principle in all their operational activities, including in the distribution of credit with fiduciary collateral. POJK No. 40/POJK.03/2017 emphasizes that banks are required to conduct adequate risk assessments of fiduciary collateral provided by debtors, including trade receivables, and ensure that the value of the collateral is always sufficient to cover potential losses that may arise from non-performing loans. Sari's research (2020) highlights that violations of the principle of prudence can result in legal problems, both in criminal and civil contexts, which can harm the bank financially and the reputation of the bank itself.

Prasetyo (2019) revealed that although the regulations governing the principle of prudence in banking have been quite comprehensive, their implementation in the field still needs to overcome various obstacles. Many banks do not fully comply with the provisions on periodic monitoring of fiduciary guarantees, including trade receivables, thus increasing the risk of non-performing loans. In addition, Sari (2020) stated that the lack of legal awareness among banks about the importance of periodic monitoring and evaluation of fiduciary guarantees is often the main cause of legal problems and non-performing loans.

Violations of the principle of prudence can not only cause financial losses for banks but also have the potential to cause serious legal consequences, both in civil and criminal contexts. Research by Nugroho (2022) shows that violations of the principle of prudence can be categorized as negligence or default, which can lead to lawsuits from debtors or customers. Therefore, banks need to ensure that all credit distribution procedures with fiduciary guarantees, including trade receivables, are in accordance with applicable legal provisions.<sup>9</sup>

### IV. DISCUSSION

#### 1. Prudential Principle in Credit Distribution

The prudential principle is one of the main pillars of the banking system, which regulates how banks manage risk when distributing credit. In bank credit distribution, this principle aims to ensure that banks have a mechanism to identify, measure, manage, and mitigate risks that may arise. The prudential principle has been regulated in various regulations, such as Banking Law Number 10 of 1998 and POJK Number 18/POJK.03/2016 concerning the Implementation of Risk Management for Commercial Banks. The application of this principle is very important in maintaining the financial stability of banks, especially when facing the risk of default that can affect the bank's liquidity and solvency.

The prudential principle becomes increasingly relevant when providing credit with fiduciary guarantees for trade receivables. This is due to the nature of trade receivables as intangible collateral and fluctuations in value that depend on the financial condition of the third party (debtor of receivables). Unlike collateral in the form of physical assets, trade receivables require special handling and more in-depth evaluation to assess the risks.

#### 2. Creditworthiness Analysis

One of the most important aspects of implementing the principle of prudence is conducting a comprehensive creditworthiness analysis. In providing credit with fiduciary collateral for trade receivables, banks not only assess the ability of the main debtor to repay the loan but must also assess the quality of the trade receivables used as collateral. This analysis process involves several stages, including:<sup>10</sup>

##### a) Evaluation of the Debtor's Financial Capacity

The bank must ensure that the debtor has adequate capacity to repay the credit. This is done by examining the debtor's financial statements, cash flow, and future income projections. This process aims to identify potential risks that may arise if the debtor's financial condition worsens. As part of the feasibility analysis, the bank must also consider the debtor's track record in making previous credit payments.

##### b) Assessment of the Quality of Trade Receivables as Collateral

Trade receivables used as fiduciary collateral must be assessed in depth for quality. The bank must evaluate whether the receivables are collectible, come from a debtor with good financial capacity, and have a clear maturity date. Accounts receivable are accounts receivable that originate from legitimate transactions, are recorded in valid documents, and have a trustworthy

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<sup>9</sup> HANI LISDIYANI, "IMPLEMENTASI JAMINAN FIDUSIA DALAM PEMBERIAN KREDIT DI BMT TAMZIS YOGYAKARTA."

<sup>10</sup> Lastuti; Tri Handayani Abubakar, "Implementasi Prinsip Kehati-Hatian Melalui Kewajiban Penyusunan Dan Pelaksanaan Kebijakan Perkreditan Atau Pembiayaan Bank," *Rechtidee* 13, no. 1 (2018): 62–81.



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third party. Banks must ensure that the accounts receivable are still active and have not matured in the near future. Unworthy accounts receivable or accounts receivable whose value is difficult to measure can increase the bank's credit risk.

### c) Documentation and Legality of Accounts Receivable

As part of the application of the principle of prudence, banks must verify the validity of the documents supporting the accounts receivable. This documentation usually includes trade contracts, sales invoices, and proof of receipt of goods or services by third parties. If these documents are incomplete or invalid, the bank could face legal risks if the accounts receivable are disputed in the future. Therefore, the completeness of documents is one of the crucial elements in distributing credit with fiduciary guarantees.

### d) Fiduciary Registration

As part of the principle of prudence, banks must also ensure that fiduciary guarantees for accounts receivable are registered at the Fiduciary Registration Office in accordance with the provisions of Law Number 42 of 1999 concerning Fiduciary Guarantees. This registration provides strong legal protection to the bank and makes it a preferred creditor in the event of default by the debtor. If the collateral is not registered, the bank could potentially lose its right to execute the trade receivables used as collateral.

## 3. Credit Risk Management

When distributing credit with fiduciary guarantees on trade receivables, banks face several main risks, namely liquidity risk, default risk, and legal risk. Effective credit risk management is crucial in managing these risks. OJK Regulation Number 18/POJK.03/2016 requires banks to implement comprehensive and systematic credit risk management, including for credit guaranteed by fiduciaries.<sup>11</sup>

### a) Trade Receivables Liquidity Risk

Trade receivables are intangible and illiquid. These receivables depend on the ability of the debtor (third party) to make timely payments. If the debtor fails to fulfill their obligations, the bank may have difficulty converting the receivables into cash. Therefore, banks need to periodically monitor the receivables used as collateral, ensuring that the receivables are still collectible and in a safe condition.

### b) Risk of Default of the Main Debtor

The risk of default from the main debtor is always present in every credit distribution. In this scenario, fiduciary guarantees on trade receivables serve as an additional protection mechanism for the bank. However, the bank must be careful in assessing whether the value of the trade receivables is sufficient to cover the amount of credit provided in the event of default.

### c) Legal Risk

Legal risk can arise if there is a dispute regarding the validity of the receivables or if the fiduciary registration process needs to be carried out properly. Therefore, the bank must ensure that all legal documents related to trade receivables have met the requirements stipulated in the legislation. In addition, the bank needs to comply with every provision stipulated in the Fiduciary Guarantee Law to strengthen its position as a fiduciary recipient.

## 4. Execution of Fiduciary Guarantee

If a default occurs, the bank, as the fiduciary recipient, has the right to execute the trade receivables used as collateral. This execution process is regulated in Article 15 of Law Number 42 of 1999 concerning Fiduciary Guarantees, which gives the fiduciary recipient the right to collect or sell the trade receivables that are used as collateral. Execution can be done through:

### a) Direct Collection from the Debtor of Accounts Receivable

If the main debtor fails to pay off his credit, the bank has the right to collect directly from the debtor of the accounts receivable used as collateral. In this case, the bank will replace the position of the main debtor as the party that has the rights to the accounts receivable. However, the bank must ensure that the accounts receivable debtor has the financial ability to pay the accounts receivable.

### b) Sale of Accounts Receivable

If direct collection is not possible, the bank can sell accounts receivable to a third party. This sale can be done through auction or private negotiation. The proceeds from the sale of accounts receivable will be used to pay off the credit that has been given to the main debtor. However, the sale of accounts receivable often faces challenges, especially if the value of the accounts receivable is difficult to determine or if there is a risk that the accounts receivable cannot be collected in full.

The main obstacle in executing fiduciary guarantees on accounts receivable is related to the validity of the accounts receivable and the legal process that must be followed. If the accounts receivable do not have valid supporting documents, the

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<sup>11</sup> Budiman and Supianto, "Penerapan Kebijakan Tentang Prinsip Kehati-Hatian Dalam Pemberian Kredit Perbankan."

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bank can face lawsuits from third parties who claim rights to the accounts receivable. Therefore, fiduciary registration and the completeness of legal documents are key factors in ensuring that the execution process runs seamlessly.

### V. CONCLUSION

The principle of prudence in distributing bank credit with fiduciary collateral for trade receivables is an important foundation in maintaining the operational stability and financial security of banks. Trade receivables, as intangible collateral, require a more careful approach in the credit analysis and risk management process. In this case, banks must conduct a comprehensive evaluation of the debtor's creditworthiness, the quality of trade receivables, and compliance with applicable legal regulations, including registration of fiduciary collateral.

The main risks faced in distributing credit with fiduciary collateral for trade receivables include liquidity risk, default risk, and legal risk. Therefore, banks need to implement systematic and sustainable credit risk management. Banks must also periodically monitor the trade receivables used as collateral to ensure that the receivables are still collectible and in good condition.

Fiduciary registration, as one of the legal requirements, provides strong legal protection to banks and ensures that banks have priority in terms of executing receivables in the event of default by the debtor. In addition, the completeness of legal documents supporting trade receivables is very important to avoid disputes in the future, which can result in financial and legal losses for the bank. By consistently applying the principle of prudence, conducting a comprehensive creditworthiness analysis, and complying with all applicable legal provisions, banks can minimize the credit risks that arise. This will not only increase the trust of debtors and shareholders but will also strengthen the overall financial health of the bank, ensuring that the bank is able to overcome various challenges in a dynamic and risky business environment.

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## Correlation between the Physical Activity, Eating Pattern, And Rest Pattern towards the Physical Fitness of Elementary School Students



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**ABSTRACT:** This research aims to determine the correlation between physical activities, diet, and rest patterns towards the physical fitness of elementary school students at SD Model (Model Elementary School), Sleman, Yogyakarta.

The research method used a quantitative approach. The research population was the senior students from SD Model Sleman totaling 256 students. The research sample was for about 149 students taken by using a sampling technique based on the Isaac and Michael Table formula with an error rate of 5%. The data collection used a questionnaire with item validation with expert consideration and empirical testing. The validity test and reliability test of the instrument used the product moment statistical test with IBM SPSS Statistic 25. The data analysis techniques used simple and multiple linear regression. Data assumption tests consisted of normality, linearity, and multicollinearity tests.

The results of the hypothesis test show that: (1) physical activity has a significant correlation with physical fitness of elementary school students with a significant value of  $0.000 < 0.05$ ; (2) eating pattern has a significant correlation to the physical fitness of elementary school Students with a significant value of  $0.001 < 0.05$ ; (3) rest pattern has a significant correlation to the physical fitness of elementary school students with a significant value of  $0.000 < 0.05$ .; (4) the results of the f test show that the significant value is  $0.000 < 0.05$  and the f-count value is greater than the f-table  $57.098 > 3.146$ , meaning that physical activity, eating pattern, and rest pattern have a simultaneous correlation towards the physical fitness of senior students of SD Model Sleman Yogyakarta.

**KEYWORDS:** Physical Activity, Eating Pattern, Rest Pattern, Physical Fitness

### I. INTRODUCTION

Physical fitness is an important aspect of learner development, especially in the context of primary school education. WHO recommends that children and adolescents aged 5-17 years should engage in at least 60 minutes of moderate to vigorous intensity physical activity, as well as muscle and bone strengthening activities at least three days per week (Bull et al., 2020). Physical activity is positively associated with cardiorespiratory and muscular fitness, bone and cardiometabolic health, and adiposity (Chaput et al., 2020). Previous research has shown a significant correlation between physical fitness levels and student learning outcomes, especially in physical education subjects. (Salamah & Setiawan, 2022) found that there is a significant relationship between the level of physical fitness and learning outcomes in physical education classes in junior high school students, which indicates a link between physical fitness and students' academic achievement. A similar study by (Satriawan et al., 2024) on primary school learners aged 10-11 years also highlighted the importance of physical activity in improving physical fitness and motor skills.

Furthermore, (Supriyanto et al., 2021) emphasized the importance of regular physical activity in improving learners' physical fitness. Physical activity is a complex behavioral variable that varies from day to day, in terms of intensity, frequency, and duration (Hayes et al., 2019). Structured and regular physical activity not only improves physical fitness but also supports learners' ability to carry out daily tasks effectively (Dewi et al., 2016). Low working memory will make it difficult to receive new information, leading to decreased learning achievement (Nadira & Daulay, 2022). In this context, (Aprilia & Januarto, 2022) assert that physical fitness has a close relationship with academic achievement, where students with good physical fitness tend to have better learning outcomes.

The current era of globalization has resulted in the development of science and technology. All the advances from technology make human life more enjoyable and easier, but conversely a drastic change has occurred from an active lifestyle to an inactive



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or sedentary lifestyle (Abdoellah, 2005). Most of the world's population is physically inactive, physical inactivity is considered a public health problem, not an individual problem (Kljajevic et al., 2022). Diet and physical activity directly affect the health status of adults and children (Kljajevic et al., 2022). A good diet is not only important to prevent nutritional problems, but also to support overall health, including dental health and obesity risk (Fadilah & Sefrina, 2022).

Obesity is a metabolic disease characterized by excessive fat accumulation (Sriwahyuni et al., 2021). Factors causing obesity in children and adolescents are multifactorial. Increased consumption of fast food, low physical activity, sleep quality, diet programs, genetic factors, age, gender, climate change, psychological factors, socioeconomic status, are factors that contribute to changes in energy balance and lead to obesity (Yuliani & Nugroho, 2022). Excessive use of smartphones will have a negative impact on the development of students, which is characterized by lazy students in doing movement activities and interacting (Ariyanto et al., 2020). Lack of movement activities causes students to easily experience fatigue during sports activities, overweight or obesity. This change in lifestyle results in changes in diet that refer to a diet high in calories, fat, and cholesterol but low in fiber, especially fast food, which has an impact on increasing obesity (Evert et al., 2019).

Another factor that can affect the fitness level of elementary school students is rest patterns. Sleep needs vary widely throughout human life. Primary school-age learners are advised to sleep with a sleep duration of 9 hours to 12 hours per day (Lim et al., 2021). A person who applies good quality rest/sleep and regularly will have a good level of fitness good physical fitness (Zaky & Wati, 2020). (Supardi, 2023) emphasized the importance of compliance in maintaining a balance between diet, sleep, work, and exercise for patients with diabetes mellitus.

Research by (Ha et al., 2021) emphasizes the importance of health-related fitness in primary school learners, suggesting the need for a comprehensive approach to meet the needs of learners, both low and high achievers, in improving their physical literacy. Research (Erry, 2023) proves that there is a significant relationship between physical activity and the physical fitness of students who take part in extracurricular volleyball at SMP Negeri 1 Sanden. By integrating structured physical education programs, promoting physical activity as early as possible, good diet, regular rest patterns and monitoring the impact of digital technology on learners' physical activity levels, educators and policy makers can work together to improve learners' physical fitness. This study aims to analyze the correlation of physical activity, diet, and rest patterns with Physical Fitness learning outcomes in upper grade students of Sleman Yogyakarta Model Elementary School.

### II. METHOD

The research conducted is a type of quantitative research. The research conducted has a population of upper grade students of SD Model Sleman Yogyakarta, totaling 256 students and the sample of this study was determined using the Isaac & Michael table with an error rate of 5% so that a sample of 149 students was obtained. Quantitative research was conducted by collecting data using a questionnaire given to 149 students. The data collected will be analyzed using simple linear regression analysis and multiple linear regression analysis. IBM SPSS Statistic 25 will be used to help the data analysis process.

### III. RESEARCH RESULT

Below is descriptive statistical data on physical activity, diet, and rest patterns presented in tabular form as follows Table 1. Description of statistical data

Variable		Physical Activity	Diet	Rest Pattern	Physical Fitness Learning Outcomes
N	Valid	149	149	149	149
	Missing	0	0	0	0
Mean		57,46	64,34	52,59	85,83
Median		57	60	53	86
Mode		59	64	53	85
Std. Deviation		9,047	11,814	7,912	1,505
Variance		81,845	139,579	62,608	2,267
Minimum		40	30	31	82
Maximum		84	85	71	89
Sum		8562	8999	7838	12788
Criterion Score		13112	13112	11324	14900

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Based on table 1 above, it is known that the results of the calculation of the physical activity variable obtained a maximum value of 84, a minimum value of 40, a mean of 57.46, a median of 57, a mode of 59, a variation of 81.845, and a standard deviation of 9.047, a total score of 8562, and a criterion score for the physical activity variable is 1311, then the value of the physical activity variable is analyzed using the percentage formula to determine the category.  $\text{Percentage} = (\text{Score obtained}) / (\text{Maximum Score}) \times 100 = 8562 / 13112 \times 100 = 65.30$  categorized as high. The results of the calculation of the Eating Pattern variable items obtained a maximum value of 85, a minimum value of 30, a mean of 64.34, a median of 60, a mode of 64, a variation of 139.579, and a standard deviation of 11.814, a total score of 8999, a criterion score for the eating pattern variable is 13112, then the value of the Eating Pattern variable is analyzed using the percentage formula to determine the category.  $\text{Percentage} = (\text{Score obtained}) / (\text{Maximum Score}) \times 100 = 8999 / 13112 \times 100 = 68.63$  high category. The results of the calculation of the rest pattern variable items obtained a maximum value of 71, a minimum value of 31, a mean of 52.59, a median of 53, a mode of 53, a variation of 62.608 and a standard deviation of 7.912, a total score of 7836, a criterion score for the rest pattern variable is 11324, then the rest pattern variable value is analyzed using the percentage formula to determine the category.  $\text{Percentage} = (\text{Score obtained}) / (\text{Maximum Score}) \times 100 = 7836 / 11324 \times 100 = 69.30$  high category. The results of the calculation of the Physical Fitness value data obtained a maximum value of 89, a minimum value of 82 mean of 85.83, a median of 86, a mode of 85, a variation of 2, 67, and a standard deviation of 1.51, a total score of 12,788, a criterion score for the physical fitness learning outcome variable of 14,900, then the value of the Physical Fitness variable is analyzed using the percentage formula to determine the category.  $\text{Percentage} = (\text{Score obtained}) / (\text{Maximum Score}) \times 100 = 12788 / 14900 \times 100 = 85, 81$  in the very high category.

**Table 2. Hypothesis testing with regression coefficients**

		Coefficients <sup>a</sup>				
Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	
1	(Constant)	77.064	.680		113.412	.000
	Physical Activity	.073	.010	.438	6.968	.000
	Diet	.028	.008	.223	3.558	.001
	Rest Pattern	.054	.012	.286	4.354	.000

a. Dependent Variable: Physical Fitness Learning Outcomes

Testing the first hypothesis (H1). It is known that the Sig. value for the effect (Partial) X1 on Y is 0.000 < 0.05 and the t value is 6.968 > t table 1.655 so it can be concluded that H1 is accepted which means there is a correlation between Physical Activity (X1) and Physical Fitness Learning Outcomes (Y).

Testing the second hypothesis (H2). It is known that the Sig. value for the effect (Partial) X2 on Y is 0.001 < 0.05 and the t value is 3.558 > t table 1.655 so it can be concluded that H2 is accepted which means there is a correlation of Diet (X2) with Physical Fitness Learning Outcomes (Y).

Testing the third hypothesis (H3). It is known that the Sig. value for the effect (Partial) X3 on Y is 0.000 < 0.05 and the t value is 4.354 > t table 1.655 so it can be concluded that H3 is accepted which means there is a correlation of Rest Pattern (X2) with Physical Fitness Learning Outcomes (Y).

Testing the fourth hypothesis (H4) with the F test. To find out the H4 hypothesis, it can be seen in the following table of anova test results:

**Table 3. ANOVA test**

		ANOVA <sup>a</sup>				
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	181.675	3	60.558	57.098	.000 <sup>b</sup>
	Residual	153.788	145	1.061		
	Total	335.463	148			

a. Dependent Variable: Physical Fitness

b. Predictors: (Constant), Rest Pattern, Diet, Physical Activity

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It is known that the Sig. value for the effect (Simultan) X1, X2, and X3 on Y is  $0.000 < 0.05$  and the calculated F value is  $57,098 > F$  table 3,146 so it can be concluded that H4 is accepted which means there is a correlation between Physical Activity (X1), Diet (X2), Rest Pattern (X3) simultaneously with Physical Fitness Learning Outcomes (Y)

### IV. CONCLUSIONS

#### Conclusion

Based on the results of data analysis, description, testing of research results, and discussion, it can be concluded that; Physical Activity has a significant correlation with Physical Fitness Learning Outcomes of Elementary School Students; Diet has a significant correlation with Physical Fitness Learning Outcomes of Elementary School Students; Rest Pattern has a significant correlation with Physical Fitness Learning Outcomes of Elementary School Students; and the variables of Physical Activity (X1), Diet (X2), and Rest Pattern (X3) simultaneously have a significant correlation with Physical Fitness Learning Outcomes (Y) of Elementary School Students.

#### Suggestion

For further research, it is hoped that researchers in this study can add other independent variables, so that more variables that affect Physical Fitness Learning Outcomes can be identified and the results can be generalized.

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## Juridical Analysis on Infringement against Patients' Electronic Medical Records at Telemedicine Services Based on Indonesia Regulation



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**ABSTRACT:** In order to guarantee privacy protection for the health sector, regulations are needed that can bring benefits, balance and legal certainty in securing medical record data and innovation in health services. This research aims to describe the pattern of legal relations in the provision of telemedicine services, the regulatory capabilities of the health and cyber sectors in Indonesia in preventing and enforcing leaks and misuse of patient electronic medical record data. Next, this article will outline the shortcomings in terms of normative, structural and legal culture in enforcing existing rules in Indonesia regarding electronic medical record data. This research is included in qualitative research with a statutory and conceptual approach. The research results show that electronic medical record data is part of human rights which must be protected and recognized as special property rights in terms of civil law. Legal protection for the confidentiality of patient data in Electronic Medical Records (RME) in Indonesia is well accommodated by a number of regulations, including the Personal Data Protection Law, Minister of Health Regulation on RME, and the Civil Code with fairly good and complementary harmonization between regulations. However, Obstacles are still found in enforcement such as a lack of clear boundaries and procedures for opening medical record data and reporting data leaks, the legitimacy of the authority of law enforcers who have the authority to take action and the public's low understanding of the importance of data protection on medical records.

**KEYWORD:** Telemedicine, Electronic-Medical Record, Patient, Privacy, Legal Protection

### I. INTRODUCTION

The industrial era 4.0 is marked by the integration of information systems which is realized by the many start-up companies that produce various kinds of products and services on digital platforms. This phenomenon cannot be separated from the development of internet technology which is able to connect people around the world by erasing physical boundaries in the flow of globalization. The health sector is also developing rapidly with the existence of internet technology, which then allows long-distance consultations through e-health or, in other words, telemedicine. Literally, telemedicine comes from Greek, namely tele which means far and the word medical which means health services by health workers (Lestari, 2021). Meanwhile, according to the Decree of the Minister of Health of the Republic of Indonesia Number: HK.01.07/MENKES/650/2017 concerning Hospitals and Community Health Centers Organizing Telemedicine Service Program Trials, that telemedicine is a combination of information and communication technology with medical expertise in health services (consultation, diagnosis and medical procedures) that can be applied remotely (Gondhowiardjo, 2020).

Based on the definition above, it can be understood that the scope of telemedicine is quite broad, including the provision of long-distance health services (including clinical, educational and administrative services), through the transfer of information (audio, video, graphics), using telecommunications devices (interactive audio-video two directions, computers and telemetry) involving doctors, patients and other parties. In simple terms, according to Jamil, Khairan and Fuad telemedicine has actually been applied when there is a discussion between two doctors discussing a patient's problem over the telephone (Jamil, 2015). Telemedicine services facilitate access to health services, where patients as telemedicine users can have consultations to obtain treatment services without visiting a health facility (Kvedar, 2014). Some examples of telemedicine in Indonesia include Alodokter, Klinik Go, Klinikdok, Good Doctor and Halodoc.

However, security regarding the protection of patient medical record data in telemedicine services in Indonesia is still questionable. This was proven in 2022, the Ministry of Communication and Information of the Republic of Indonesia (hereinafter

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referred to as the Indonesian Ministry of Communication and Information) discovered that around 6 million patient information in Indonesia was suspected to have been traded on a platform called Raid Forums. The perpetrator of this data sale is believed to use the name Astarte. The seller claims that the data offered comes from the central server of the Ministry of Health of the Republic of Indonesia. The information traded includes images, patient identity details, CT scan results, COVID- 19 tests, and X-ray examination results. (<https://nasional.kompas.com/read/2022/01/06/22555491/kemkominfo-telusuri-dugaan-kebocoran-data-pasien-milik-kemenkes>.)

Patient medical record data is included in the privacy section of individual legal subjects, where the individual concerned has the right to limit access regarding health conditions. The concept of privacy is closely related to confidentiality, which is maintaining the confidentiality of patient health data by having the right to provide or refuse to provide information to other parties without the data owner's consent. In practice, it is known that legal products which are tools for regulating society in the cyber world or tools of Social Engineering still refer to Law no.19 of 2016 concerning Electronic Information and

Transactions (hereinafter referred to as the ITE Law) which in fact has not been able to accommodate the overall protection of patient data in the cyber world. Patients who become victims of course suffer a number of losses if this leak occurs due to the negligence of the party who should be responsible for maintaining data confidentiality.

The medical record data contains information, both written and recorded, regarding the patient's identity, anamnesis, physical determination, laboratory/radiological examination, diagnosis, all medical services and actions provided to the patient, including outpatient, inpatient and emergency services provided to the patient. . The role of medical records is also very important in measuring the standardized quality of medical services provided by health service providers. Indicators of good medical record quality are the completeness of the content, accuracy, timeliness and fulfillment of aspects of legal requirements. In the event that an error occurs in recording the medical record, the files and records must not be removed or deleted in various ways (Kurniawan, 2021).

The fairly sporadic penetration of telemedicine platforms in society is not only related to efficiency and effectiveness in facilitating services in the health sector, but it is also necessary to pay attention to the existence of regulations that are adaptive and able to overcome the problem of protecting patient medical record data as part of protected privacy. by law. The existence of Telemedicine as a social phenomenon in health services must be responded to responsively by law so as not to injure human values. Providing cyber security and protecting the confidentiality of patient medical record data must be considered by telemedicine application providers. Article 28 H of the 1945 Constitution of the Republic of Indonesia implicitly recognizes the position of patient medical record data as part of human rights, especially individual personal property rights, and these property rights must not be disturbed or misused by anyone. Starting from these legal issues, this research will examine two problem formulations, namely the scope of legal protection that can be provided to patients regarding the security of confidentiality of patient medical record data in the telemedicine platform and identifying patterns of legal relationships that occur between patients and doctors and telemedicine service providers so that they can It is clearly known about the scope of liability following leakage, misuse of patient medical record information and legal countermeasures for violations of medical record data as part of patient privacy.

A number of studies have discussed legal issues related to telemedicine but have different perspectives from this research, including: First, Mohammad Hilman Nursalat, Efa Lailah Fakriah and Tri Handayani entitled "Judicial problems and principles of legal protection in long-distance health services using information technology and Communication" (Mursalat, 2022). This research focuses on the regulation of telemedicine services in Indonesia and legal protection for service recipients & health workers on telemedicine platforms. Furthermore, in a study researched by Andre M. Watulingas et al regarding the Implementation of Legal Protection of the Medical Profession for Telemedicine Services at RSUP Prof. Dr. R. D. Kandou Manado, focuses on implementing the legal protection given to doctors who provide telemedicine services (Watulingas, 2022). Legal research on telemedicine was also carried out by Carolina Kuntardjo in her scientific paper entitled: "Dimension of Ethics and Telemedicine in Indonesia: Enough of Permenkes No.20/2019 as a Frame for Telemedicine in Indonesia?", which found conflicting legal ambiguities regarding the administration of telemedicine. with the principles of non-maleficence (not harming the patient), beneficence (providing the good of the patient), autonomy (respecting the patient's rights) and justice (justice), so that This has the potential to harm the doctor's legal position because they do not carry out direct examination interactions with Patients (Kuntardjo, 2020).

## **II. RESEARCH METHOD**

This article is included in the type of Normative Legal Research, which is a type of legal research methodology that bases its analysis on applicable laws and regulations that are relevant to the legal issues that are the focus of the research (Benuf & Azhar, 2020).



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The statutory approach and conceptual approach are used to outline the legal protection that can be provided to patients using telemedicine according to regulations applicable to the health and cyber sectors for violations of leakage or misuse of patient medical record data as well as errors in providing health service consultations to patients. Then this study will reveal the legal relationship between the parties involved in the practice of telemedicine, therefore the scope of responsibility for losses experienced by patients can be clearly identified. The data used in this study is secondary data collected through literature study including books, journals, data laws and regulations and other supporting documents related to the legal issue being studied. The research specifications applied are analytical descriptive which aims to describe the research object through the collected data or samples, analysis is then carried out and qualitative conclusions are made (Sugiyono, 2009).

### **III. RESULT AND DISCUSSION**

#### **3.1. Legal Protection to Record Medical-Electronic on Telemedicine's Platform**

##### **3.1.1. Mechanism of Telemedicine as the Platform of Health's Service and Legal Position of Each Parties According to Regulations in Indonesia**

Literally, telemedicine comes from the words "tele" which means "long distance", and "medical" means "of a medical nature". In general, telemedicine services are classified as services that use electronic communication facilities to provide medical services or support from a separate distance (not face to face) (Pukovisa Prawiroharjo, Pratama, & Librianty, 2019). The diversity of telecommunications facilities varies greatly, including: telephone, video calls, internet sites, or other sophisticated tools. Apart from that, Telemedicine can also be interpreted as the use of information and communication technology (including electronics, telecommunication, computers, informatics) to transfer (send and/or receive) medical information, in order to improve clinical services (diagnosis and therapy) and education (Masa, 2014).

Commonly the definition beneath always misunderstood and overlapping perspective with E-Health is the use of telecommunications and information technology to provide access to health assessment, diagnosis, intervention, consultation, supervision and information across distance (Public Health Institute, 2018)<sup>1</sup> Technologies as telephones, facsimile machines, electronic mail systems, and remote member monitoring devices, which are used to collect and transmit member data for monitoring and interpretation (Public Health Institute, 2018).

Paying attention to the scope of the differences in definitions between telemedicine and telehealth above, it is clear that telemedicine has a more specific meaning, referring to health practices using long-distance methods, or in other words the doctor and patient are in different locations. In telemedicine, doctors cannot provide examinations and consultation services to patients directly. The communication pattern between patients and doctors is carried out through available media, for example: chat boxes, such as those available in the application to convey complaints they are experiencing. Meanwhile, doctors can only make diagnoses based on the patient's complaints unilaterally.

Telemedicine is an option for patients who need health services, especially in efforts to heal and restore health. Even though the service delivery is on a different platform from conventional health services, its implementation must still pay attention to the three main components of health services, namely informed consent, medical records and medical confidentiality. Apart from that, patient safety and protection are also aspects that need to be considered in telemedicine's application.

The telemedicine are divided into two types are real-time (synchronous) and store-and-forward (asynchronous) (Public Health Institute, 2018). Real time telemedicine (synchronous telemedicine) is applied simply by using a telephone or sophisticated equipment such as the use of a surgical robot. Synchronous Telemedicine requires the presence of both parties at the same time, then a liaison media is needed between the two parties that can offer real time interaction so that one party can carry out health care. Another form of Synchronous Telemedicine is the use of medical equipment that is connected to a computer so that health inspections can be carried out interactively. An example of a telestethoscope is where a doctor listens to a patient's heartbeat remotely.

The concept of direct telemedicine services is also almost the same as this system, where patients and/or doctors interact via teleconference to convey their health problems. Patients directly communicate with doctors/nurses regarding their health complaints and follow up by providing feedback from the nurse/doctor. This type of telemedicine service is very suitable for use when there is a very emergency situation, and requiring direct media action is more important than the loss, inconvenience, and cost (Rizkiyani Istifada, Sukihananto, & Laagu, 2017). In case a life-threatening injury occurs, real-time teleconsultation or synchronous telemedicine will play a more beneficial role compared to store-and-forward telemedicine.

<sup>1</sup> Public Health Institute, *State Telehealth Laws & Reimbursement Policies: A Comprehensive of the 50 States & The District of Columbia* (Center for Connected Health Policy 2018) 27.

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Meanwhile, store-and-forward telemedicine (asynchronous telemedicine) includes collecting medical data and sending this data to a doctor at the right time for offline evaluation. This type of telemedicine does not require the presence of both parties at the same time. Dermatologists, radiologists and pathologists are specialists who usually use asynchronous telemedicine. Medical records in an appropriate structure should be a component of this transfer (Wootton & Craig, 1999). The concept of indirect telemedicine services is also almost the same as this system, where patients and nurses interact using e-mail as a link between the two. Patients consult about problems or laboratory results with the nurse (Indonesia, 2018). This form of store-and-forward or pre-recorded telemedicine is suitable for use if all the required information can be met without any disturbance for the doctor or medical personnel or the patient who receives it.

Memperhatikan pada pola kerja kedua jenis telemedicine, maka praktek telemedicine tidak mencakup sisi afeksi dikarenakan dokter tidak berurusan secara fisik dengan pasien dalam mendiagnosa keluhan kesehatan pasien yang dinafikan sebagai pola perubahan gaya hidup baru dengan menekankan bahwa interaksi antara dokter dengan pasien tidak memerlukan sentuhan fisik melainkan cukup dengan melakukan komunikasi verbal atau tertulis melalui suatu platform digital.

Referring to the working patterns of both types of telemedicine, the practice of telemedicine does not include the affection side because doctors do not deal physically with patients in diagnosing patient health complaints which are dismissed as a new lifestyle change pattern by emphasizing that interaction between doctors and patients does not require physical touch but is sufficient. by carrying out verbal or written communication via a digital platform

Telemedicine is regulated in Article 1 number 22 Law No.17 of 2023 concerning National Health which defines it as the provision and facilitation of clinical services through telecommunications and digital communication technology. Furthermore, telemedicine is also recognized in more technical settings, namely Government Regulation No. 28/2024 concerning implementing regulations for the National Health Law which confirms that the practice of telemedicine is the provision of long-distance health services by health professionals using information and communication technology including the exchange of information on diagnosis, treatment and disease and injury prevention, research and evaluation, and continuing education and health care providers for the benefit of individual and public health. The scope of telemedicine services is regulated in Minister of Health Regulation No. 20 of 2019 concerning the Implementation of Telemedicine Services which includes: teleradiology, telectrocardiography, teleultrasonography, clinical teleconsultation, telepharmacy and other telemedicine consultation services in accordance with developments in Science and Technology.

According to the understanding outlined in several national regulations in the health sector above, the provision of telemedicine includes various variants of health services provided by health workers who have practice permits at health service providers such as doctors, paramedics and nurses which are carried out in a digital system. The health services provided by health workers in telemedicine include: health facilities providing consultations and receiving consultations. Health facilities that can provide telemedicine include hospitals, community health centers, clinics, independent practices of media or health workers, health laboratories and pharmacies.

The five health service facility providers above are able to conduct telemedicine independently or in collaboration with registered electronic system providers in accordance with the provisions of applicable laws and regulations, where electronic system providers for health services can be carried out by individuals, the State, business entities and communities that provide, manage and/or operate electronic systems either individually or jointly with electronic system users for their own needs and/or the needs of other parties. For example, the telemedicine platform operated by the Indonesian Government is "Telemedicine Indonesia (Temenin)" which was developed by the Ministry of Health. The scope of health service facilities includes radiocardiography, ultrasound, radiology and consultation.

Generally, the provider of telemedicine in Indonesia, are categorized into two kind as follow: health-care facility- provide consultation and health-care facility- receive consultation. Both of them are engage to several mandatory obligations which is stipulated inside The Ministry of Health's Regulation No.20 of 2019 concerning telemedicine are elaborated further in the table below:

**Table 1 Comparison Right and Obligation Amongs Health-Care Facility**

	Health Care Facility- Consultation's Provider	Health Care Facility- Receive Provider
<b>Right</b>	Accepting medical information including: picture, image, text, bio- signal, video and good voice to carry and answer online consultation.	Get an consultation's answer jawaban konsultasi dan obtain the expertise based on proper standart Acquire clear, correct, accountable and credible information relating to the result of consultation and or



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	Gain an honorarium on Telemedicine's service	expertise
<b>Obligation</b>	Delivering a answer consultation and expertise based on standardization Maintain the confidentiality of patient's data Acquire clear, correct, resilience and credible information relating to the result of consultation and or. Expertise Allocate to do consultation for 24 hours/day, 7 days in one week	Delivering a answer consultation and expertise based on standardization Maintain the confidentiality of patient's data Acquire clear, correct, accountable and credible information relating to the result of consultation and or expertise

However, not all digital platforms that provide health facility services can be categorized as Telemedicine according to the regulations in force in Indonesia. Currently, there are a number of platforms providing online consultation services with doctors such as KLIK Dokter, Good Doctor, Get Well, YesDok and AloDokter. Some examples of these platforms are only a means to facilitate the search for health services by consumers. A number of the platforms above can be categorized as E- Health which utilizes information and communication technology for health services with the aim of creating effective and efficient work processes. Indonesian Cyber Law is a regulation which is being a legal basis in utilizing Information Technology. Its existence is effecting significantly on every activities in cyber space. According to article 15 paragraph (1) and (2) arrange that every online platform has responsibility to conduct resilience electronic system and secure dan on operational system inside the relevant platform.

### 3.1.2. Perspective of National Cyber law and Health Law to prevent Data Breach and Misuse of dan Record Medical Electronic in Telemedicine

Accommodating and organizing Health Services to the Community is a mandate mandated by Article 28 H paragraph (1) of the 1945 Constitution of the Republic of Indonesia) which states that: "Everyone has the right to live in physical and spiritual prosperity, to have a place to live, and to have an environment live a good and healthy life and have the right to receive health services." The state guarantees the right of every citizen to have a good and prosperous life physically and mentally in order to realize its commitment to protect all the blood of the Indonesian nation. The development of the public health services sector is part of the development of quality and productive human resources, so policies are needed to support an adaptive and sustainable health sector by emphasizing the principles of equity, prosperity, equity and non- discrimination.

Law No. 17 of 2023 concerning Health (hereinafter referred to as the National Health Law) distinguishes between the practice of telemedicine and telehealth (telehealth) as two different entities even though they are both integrated in electronic systems and offer health services. According to the provisions of Article 1 number 21 of the National Health Law, telehealth is the provision and facilitation of health services, including public health, health information services and independent services, through telecommunications and digital communication technology. Meanwhile, according to Article 1 number 2 of the National Health Law, Telemedicine is the provision and facilitation of clinical services through telecommunications and digital communication technology. The differences of among health service provider lies in the scope of providing services to patients. According to the World Health Organization, Telemedicine services are divided into four elements as follow (Organization, 2009):

- a) *Its purpose is to provide clinical support*, aims to give an health service assistance or clinical support.
- b) *It is intended to overcome geograpichal barriers, connecting users who are not in the same physical location* its mean that the existence of telemedicine has objectives to resolve geographical barriers, and connecting users are not stand in same location.
- c) *It involves the use of various types of ICT*, by involving multi-type of information technology and communication such as computer, internet, and another devices.
- d) *Its goal is to improve health outcomes*, yang artinya bertujuan akhir untuk meningkatkan hasil dari pelayanan kesehatan.

Telemedicine is a system that uses information technology to support long-distance health care for patients in contact with medical personnel or doctors (Andrianto & Athira, 2022). The scope of telehealth is wider than telemedicine. In addition to providing health services, telehealth platforms refer to knowledge, administrative management and clinical care that are broader than in remote health services. Meanwhile, Telemedicine is the provision of medical services remotely by doctors and dentists

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using information and communication technology, including the exchange of information on diagnosis, treatment, disease and injury prevention, research and evaluation, and continuing education of health service providers for the benefit of improving individual and community health.

Telemedicine services function to provide a medium of communication between doctors and patients in a digital application, but basically Telemedicine does not change the ethics of medical personnel in their ethics and obligations to seriously maintain the confidentiality of patient information. This information includes all personal, medical and historical patient information that must be kept confidential without exception. Regulation on medical ethics to maintain the confidentiality of patient data are usually regulated in codes of ethics or medical professional guidelines. In many countries, medical organizations have codes of ethics that outline the principles that medical personnel must follow in maintaining the confidentiality of patient data. One of the codes of ethics that is commonly used is the "Hippocratic Oath", as well as codes of ethics issued by national or international medical associations. Some general principles in regulating medical ethics relating to maintaining the confidentiality of patient data are as follows:

- a) **Professional Confidentiality:** Physicians have an ethical obligation to maintain the confidentiality of patient information they obtain in the course of medical practice. This information should not be disclosed to third parties without valid patient consent.
- b) **Informed Consent:** Doctors must obtain written permission from patients before disclosing personal or confidential medical information to other parties, except in certain situations regulated by law.
- c) **Data Security:** Doctors must ensure that patient data is stored securely and protected from unauthorized access. This may include the use of information security technology and strict internal policies.
- d) **Confidential Communication:** Doctors must be careful when communicating about patients, whether verbally or in writing. Medical discussions involving patients should be conducted in an appropriate and private environment.
- e) **Emergencies:** Although the principle of confidentiality is very important, in some life-threatening emergencies, doctors may provide necessary information to relevant parties for the purpose of saving the patient.
- f) **Data Deletion:** Patient data that is no longer needed should be securely deleted or destroyed to prevent misuse.
- g) **Professional Code of Ethics:** Doctors must follow codes of ethics and guidelines issued by local, national, or international medical institutions that regulate medical practice.

Legal Basis that binds and underlies the professional ethics of doctors or medical personnel is Law Number 29 of 2004 concerning Medical Practice. One of the important parts of Law Number 29 of 2004 is Article 45, which regulates the doctor's code of ethics. This article emphasizes that doctors are obliged to comply with the code of ethics established by the Indonesian Doctors Association. This code of ethics includes ethical principles and procedures for carrying out medical practice, including maintaining patient confidentiality.

Since the advent of telemedicine, the legal basis governing patient confidentiality apart from Law no. 29 of 2004 concerning Medical Practice is Law Number 27 of 2022 concerning Personal Data Protection (hereinafter referred to as the Indonesia Data Protection Law) which is important in maintaining individual privacy in an increasingly complex digital environment. Article 2 of the Regulation of the Minister of Communication and Information of the Republic of Indonesia Number 20 of 2016 concerning Protection of Personal Data in Electronic Platforms states that Protection of Personal Data in Electronic Systems includes protection of the acquisition, collection, processing, analysis, storage, display, announcement, sending, dissemination, and destruction of Personal Data.

### **3.1.3. Imposition of Liability on Misuse of Record Medical Electronic in Telemedicine**

According to Handiwidjojo, electronic medical record data is the use of information technology devices for collecting, storing, processing and accessing data stored in patient medical records at hospitals in a database management system that collects various sources of medical data (Handiwidjojo., 2009). As explained previously, electronic medical records can also be interpreted as an application environment consisting of clinical data storage, clinical decision support systems, standardization of medical terms, computerized data entry, as well as medical and pharmaceutical documentation.

The misuse and leakage of data in cyberspace is something that happens quite often, especially during the COVID-19 pandemic, where all offline habits have been shifted, making people's activities, especially in Indonesia, completely online. A survey from Karpersky stated that as many as 54 percent of respondents admitted that some doctors had conducted remote sessions using applications that were not specifically designed for telehealth, such as FaceTime, Facebook Messenger, WhatsApp, Zoom, so there was still a high risk of leaking patient data. Carrying out the telemedicine process should be the best solution for maintaining the security of patient data leaks. This case of personal data leakage, as mentioned in the introduction, also includes images and patient identity details, one of which includes drug prescriptions.

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However, on the one hand, Article 13 of the Indonesian Medical Ethics Code (hereinafter referred to as KODAKI) regulates the obligation of doctors to maintain the confidentiality of everything they know about a patient, including the patient's personal data in the context of administering drug prescriptions. Apart from that, in Chapter II Article 9 of the Code of Ethics for Pharmacists, a pharmacist must maintain patient confidentiality properly. Ethics comes from the Greek word *ethos* which means morals, customs, habits, character, feelings, attitudes, what is good, what is worthy. Ethics is also a systematic consideration of right and wrong behavior. According to the Big Indonesian Dictionary, ethics, which was later adapted into ethics, is a collection or set of principles or values relating to morals. Basically, drug prescriptions given to patients via the telemedicine platform are included in the electronic medical record data. Data that can be categorized as patient personal data is as follows:

1. Patient Clinical Data refers to the patient's medical records. This data must cover several aspects, including complete patient identity information. In addition, the patient's clinical data must include the date and time of treatment. The patient's clinical data also records the results of the anamnesis (patient complaints and history) as well as the results of the physical examination carried out by the treating doctor. Finally, clinical data should include the diagnosis, treatment methods, and supporting information on the actions recommended by the physician.

2. Patient Administrative Data Patient administrative data is not related to medical records. This data focuses more on patient personal information, such as patient civil administrative records. This includes the following:

- Full name
- Medical record number/identification used
- The complete address of the patient's residence
- Details of the patient's birth (date, month, year and city)
- Patient gender
- Marital status (married or not)
- Contact the patient's closest family
- Date and time the patient received treatment
- Name and identification of the health worker. After these two types of patient data have been recorded completely, it can be said that the data has been recorded correctly. Even though it may seem simple, managing patient data requires accurate knowledge. Apart from its sensitivity, this data also has confidential characteristics.

Specifically regarding the application of electronic medical records, Article 21 of the 2012 Indonesian Medical Code of Ethics (KODEKI) requires every doctor to always follow developments in science and technology, especially regarding medicine and Health. In this case, the application of electronic medicine prescriptions includes the use of technology that can improve the performance of doctors and medical personnel as providers of health services to the community. In the medical field, there are 5 main principles in ethics, namely as follows (Triwibowo, 2014): The principle of nonmaleficence (no harm); The principle of beneficence (only doing something good); The principle of confidentiality (meaning patient information must be kept confidential); The principle of justice (equal treatment). and fairness towards others) and the principle of fidelity (the principle of respecting one's promises and commitments).

Patient data information listed on electronic drug prescriptions is also a top priority and is something that really requires an appropriate level of privacy and legal basis in telemedicine practice. Behind the various advantages of implementing electronic medical records specifically designed by telemedicine companies such as Alodokter and HaloDoc, of course it requires an implementation that is supported by qualified technological capabilities through to the quality of human resources who understand the technology. Legally, the data in electronic medical records is a legal record of the services provided to patients and the hospital has the right to store this data. This becomes illegal if the person behind the telemedicine company misuses the data for certain interests that are not related to the patient's health services. Including if internal telemedicine parties are unable to maintaining and securing of the patient's personal data. According to health's management sector perspective, medical record data is closely correlated with health service activities, so there is an expression that medical colleagues are third parties when doctors receive patients. The medical data is a record of examinations and actions related to the treatment of a patient by a doctor. In short, medical record data is a file that contains notes and documents regarding patient identity, examinations, treatment, procedures and other services that have been provided to the patient. Meanwhile, in Indonesian property law optics in Article 570 chapter II of the Civil Code regulates the authority and restrictions for property rights holders, of course these provisions also apply to ownership of the contents of medical records. Telemedicine platforms' failure to fulfill their obligations to safeguard information in patient medical record data not only violates the patient's privacy rights but also the patient's property rights. Even if a telemedicine platform accesses and uses the contents of medical records without the patient's consent, it

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should be considered an infringement of the patient's property rights. However, until now the existing health sector legal regulations still do not clearly regulate the limitations and authority over patient ownership rights over the contents of medical records.

The implementation of telemedicine itself cannot be separated from the medical trilogy as something that is very essential in medical practice, namely informed consent, medical records, and medical confidentiality. In telemedicine, medical record data is arranged in electronic form to suit the medical practice location. The high risk of data leakage in telemedicine applications can be regulated using Indonesian Personal Data Protection Law. This regulation is a new reference for protecting personal data in Indonesia, including medical record data for telemedicine patients. So that legal protection for patient media record data when undergoing telemedicine health services can use this legal instrument as a general umbrella law. According to the provisions of Article 4 Paragraph 1 of the Personal Data Protection Law, it is emphasized that personal data regulated and protected in this law is personal data that is specific and general in nature. General personal data is personal data

That contains a person's identity such as full name, gender, nationality, religion, marital status and other personal data that can identify a person. Meanwhile, data is specific as stated in Article 4 Paragraph 2 letter a, including health data and information such as medical records.

Legal protection of personal data in the Personal Data Protection Law is explained in Articles 35 to 39. Article 35 regulates that personal data controllers or in this case electronic system operators are obliged to protect and ensure the security of personal data under their systems. Through implementing appropriate technical operations to protect personal data from personal data processing interference that is contrary to statutory regulations and determining the appropriate level of personal data security by taking into account the risks of protected personal data.

If connected to the provision of health facility services via telemedicine, the context of the data controller in question is the application provider or telemedicine service site. Telemedicine platforms are required to maintain the confidentiality of personal data when processing personal data including patient medical records. In relation to its implementation, this is enforced by requesting informed consent from the patient to the doctor as the provider of the consultation to be provided with the patient's medical record data in electronic format. This medical record data must be kept confidential by the telemedicine provider as the data controller.

Apart from that, article 37 of the Personal Data Protection Law requires data controllers, in this case the telemedicine platform, to supervise the parties involved in electronic system processing and the telemedicine platform is obliged to protect personal data from all forms of unauthorized processing.

Based on the legal protection contained in the Personal Data Protection Law, telemedicine platforms as patient data controllers are also required to have internal policies for data management that are in line with these regulations. The policy of health service facilities providing telemedicine services is in the form of legal protection for patient data, namely personal data and medical records. Reviewing the juridical basis regarding the protection of personal data in cyber space, some of them are the Indonesian Informatic and Electronic Transaction Law Article 32 paragraphs (1), (2), and (3) which stipulate:

- (1) "Any person intentionally and without right or against the law in any way changes, adds, reduces, transmits, damages, deletes, moves, hides electronic information and/or electronic documents belonging to other people or public property."
- (2) "Any person intentionally and without right or against the law in any way transfers or transmits electronic information and/or electronic documents to another person's electronic system without the right."
- (3) "Regarding actions as intended in paragraph (1) which result in the disclosure of confidential electronic information and/or electronic documents to be accessible to the public with the data not being as intact as it should be."

Some of the juridical implications if a case of data leakage is found refer to the legal basis in Indonesian Informatic and Electronic Transaction Law, there are criminal sanctions against the telemedicine party responsible with several sanctions as stated in article 48 paragraphs (1), (2) and (3). In the civil aspect, acts of negligence that cause harm to patients can be categorized as Torts which is regulated in article 1365 of the Civil Code. An unlawful act is an action or behavior that is contrary to applicable law or legal norms. In the context of civil law, unlawful acts refer to actions that cause loss or damage to another party and are the basis for demanding compensation or legal responsibility. There are aspects that can be categorized as Unlawful Acts if they fulfill the following elements, as follow (Agustina, 2003):

1. Deeds: Refers to actual actions or behavior carried out by a person or legal entity.
2. Unlawful: Refers to actions or behavior that are contrary to applicable law or legal norms. This could mean violating

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contractual agreements, ignoring legal obligations, or carrying out actions that are deemed to violate the rights of another party.

3. Loss: An unlawful act must cause loss or damage to another party. This loss could be financial, reputational, or even physical Loss.

When an unlawful act occurs, the party who suffers the loss usually has the right to demand compensation from the party who committed the act. The aim is to return the injured party to the position they would have had if the unlawful act had not occurred. Examples of unlawful acts in civil law can include breach of contract, defamation, acts that interfere with property rights, and other acts that harm other parties. However, each legal jurisdiction may have different interpretations and definitions regarding unlawful acts, and this may be governed by the laws and legal precedents of that country.

According to the perspective of medical personnel, referring to the rules of the Organization and Management Guidelines for the Honorary Council for Medical Ethics (ORTALA MKEK), if data leaks are still found due to doctors not using the official telemedicine platform, resulting in leaks of patient data in the form of drug prescriptions, then this violates the KODEKI and the Code of Ethics. Pharmacists can lead to advice, verbal warnings, written warnings, behavioral coaching, re-education (re-schooling), and even dismissal from membership of the Indonesian Doctors Association, either temporarily or permanently. In fact, the protection of patient data is regulated in medical ethics and Health law which states that it is the doctor's obligation to maintain the confidentiality of everything he knows about a patient (Article 13 of the Indonesian Medical Ethics Code). With the existence of telemedicine, of course there is no reason not to implement a medical code of ethics to maintain the confidentiality of patients' personal data, including when prescribing medication to patients. In fact, agreements in general, agreements between medical personnel, in this case doctors and patients, still require guarantees regarding the protection of user data, especially in the provision of drug prescriptions as one of the medical procedures.

Tortorious actions in the terms of patient's data breach in telemedicine bring some serious legal consequences are:

### 1). Non –Material damages

a). Infringement against patient's medical record is extraordinary breach to privacy. The scope of personal data in telemedicine including: medical history, name, address, telephone number, and another personal data. The violation of privacy would lead into emotionally, financially and personal reputation.

b). Violation of Data Protection Laws. Many jurisdictions have data protection laws that regulate how personal data should be managed and protected. Data leaks may result in legal violations of these regulations, such as the General Data Protection Regulation (GDPR) in the European Union or personal data protection laws in various countries.

### c). Legal Demands

Individuals affected by a data leak may file a lawsuit against the telemedicine service provider responsible for the leak. These claims may include compensation for financial losses, reputational losses, and other losses arising from a data breach. Data protection authorities in some jurisdictions may impose administrative sanctions on service providers who violate data protection laws. These sanctions can include significant financial fines.

### d). Reputation's Damage

Data leaks can damage the reputation of telemedicine service providers. Patients' trust in telemedicine systems can be shaken, and this can impact the relationship between providers and patients. Some personal data leaks may be considered criminal acts, depending on applicable laws. This may result in investigations and criminal prosecution of the parties responsible for the leak. In addition to the legal impact, data leaks can also cause significant business losses due to loss of customer trust and potential loss of customers and business contracts. It is therefore very important for telemedicine service providers to implement strict security measures, comply with applicable data protection regulations, and have an effective data security response plan in dealing with potential data leaks. Meanwhile, regarding regulations regarding Personal Data Protection in cyber space in Indonesia, apart from the Indonesia Informatic and Electronic Transaction Law, namely the latest Law of 2022 concerning Personal Data Protection Law. If there is a breach of medical record data as part of Personal Data which results in loss to the individual concerned, then the party committing the breach may be required to pay compensation to the individual who suffered the loss. Individuals who feel their privacy rights have been violated under the PDP Law have the right to sue the party who committed the violation, either civilly, administratively or criminally.

Criminal sanctions for telemedicine providers according to the provisions of Article 67 of the Personal Data Protection Law are qualified as a criminal offense by a corporation, criminal penalties can be imposed on the management, control holder, order giver, beneficial owner, and/or the responsible corporate party. Furthermore, Paragraph (2) of the Personal Data Protection Law explains that health service facilities as absolute corporations as a whole can only be subject to fines. As stated in Article 70



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Paragraph (2), health service facilities can be subject to additional penalties in the form of confiscation of profits from criminal acts, freezing of all or part of the health service facility, permanent prohibition on continuing to operate the business, closure of all functions of the health service facility, implementation of obligations as a result of criminal acts, payment of compensation, revocation of permits, and dissolution of health service facilities.

In civil law point of view, as discussed in the previous section, medical record data is an intangible asset owned by the patient. Medical records contain notes and documents about patients which include personal, social and financial data as well as medical data in the form of examination results, treatment, procedures and other services that have been provided to patients. Through medical record data, patients are authorized to defend their personal information from interference by other parties so that parties who do not have authority according to regulations do not have the right to gain access and use it without the consent of the patient concerned. Apart from that, this property right also gives the patient the authority to access and utilize information documented in the medical record for their personal interests.

Referring to the concept of medical record data as part of the patient's property rights, any interference such as misuse of data, access without owner consensus and sharing of medical record data for purposes that are not in accordance with the purpose of processing, these actions can be considered as unlawful acts. If it reduces or eliminates the enjoyment of the use of someone's property rights intentionally. So there is a causal relationship between intentional actions and loss of enjoyment in the use of property rights. Losses resulting from interference can be sued based on Article 1365 of the Civil Code concerning unlawful acts (onrechtmatige daad).

### **1.2. Complexity of Implementation of Record Medical Electronic's Protections in Indonesia**

Lawrence M. Friedman stated that the effectiveness and success of law enforcement depends on three elements of the legal system, namely the structure of the law, the substance of the law and the legal culture. Legal structure concerns law enforcement officers, legal substance includes statutory instruments and legal culture is the living law adopted in a society (Friedman, 2009).

Based on the current status quo conditions in Indonesia, of course implementation will encounter various obstacles. The existing obstacles will prevent the implementation of electronic medical records in Indonesia from being optimal. The lack of optimal protection of electronic medical record data in Indonesia has an impact on disrupting the performance of medical record officers, resulting in incomplete electronic medical record data. Electronic medical records, which were expected to be a source of complete data, ultimately could not be achieved due to limited competency of medical record officers, inadequate supporting facilities and infrastructure, and non-existent regulations regarding the administration of electronic medical records.

The use of electronic medical records was only based on Article 2 of the Minister of Health Regulation Number 269/Menkes/Per/III/2008 concerning Medical Records which explains that medical records can be maintained electronically. However, the regulations regarding electronic medical records in Indonesia are only limited to that and there have only been further detailed regulations regarding the administration of electronic medical records. The legal basis for the protection of electronic medical records is currently only based on Article 2 of the Minister of Health Regulation Number 269/Menkes/Per/III/2008 concerning Medical Records which explains that the administration of medical records can be done electronically. However, the regulations regarding electronic medical records in Indonesia are only limited to that and there have only been further detailed regulations regarding the administration of electronic medical records.

The Personal Data Protection Law as the main regulation that covers the protection of personal data is also experiencing difficulties in enforcement. This is because there are no technical regulations under it that regulate the implementation of these regulations, especially in the health services sector. Another weakness of the Personal Data Protection Law is related to the institutional enforcement of personal data protection in Indonesia. This is shown by the fact that although a number of laws have appointed independent agencies that specifically have the authority to carry out supervision – both directly and indirectly – on the protection of personal data, inter alia, National Human Rights Commission, Information Commission, BRTI, Indonesia Financial Agency, Honorary Council of Advocates, National Trade Committee and Energy Council Indonesian Health. However, all of these independent institutions are subordinate to the government, meaning that these institutions are completely under the government's authority. In fact, Indonesia already has technical regulations contained in Minister of Health Regulation No. 24 of 2022 concerning Electronic Medical Records. However, this regulation does not yet contain technical instructions, such as provisions regarding limits on opening patient electronic medical record data as well as reporting mechanisms that can be carried out by the public in the event of a violation of medical record data leakage by certain parties, especially those who manage the medical record data. These two points should be very vital because they are seen as a form of recognition of human rights both from the perspective of patients and the wider community

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The urgency of protecting personal medical records in Indonesia at this time is in fact not directly proportional to the public's understanding of the importance of protecting this data. This is actually recognized by academics, as well as real evidence that there is still a low rate of filing cases in court related to interference with the privacy of someone's data, despite the existence of existing laws that relate to the protection of personal data and the health sector. Lack of awareness of the importance of protecting personal data is a challenge that needs to be overcome, especially because health data includes specific/sensitive data.

### IV. CONCLUSION

Record Medical Electronic is part of patient's privacy that must be protected when implementing telemedicine health service practices. However, regulations regarding electronic medical records in Indonesia have not been regulated in a comprehensive and holistic manner so that gaps in legal substance mean that the protection provided is not fully beneficial. Even though Indonesia has regulations in the Minister of Health Regulation regarding Electronic Medical Records, these regulations still have shortcomings, including migration of medical record data, procedures for disclosing medical information, and reporting data leak violations. The Government of the Republic of Indonesia must immediately formulate specific regulations for the protection of medical record data in the health sector and regulations derived from the Personal Data Protection Law which regulate the implementation of law enforcement. Apart from that, there needs to be a clear delegation of authority regarding the authority that supervises and takes action against violations of misuse of electronic medical record data in Indonesia. The need for harmonization in implementation between the Minister of Health Regulation on RME and the Personal Data Protection Law can be seen when the Personal Data Protection Law allows specific data processing actions such as electronic medical record data, as long as the party who will carry out the processing first carries out a Personal Data Protection Impact Assessment and is carried out to public interest in the context of state administration.

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## Differences in the Meaning of IMC: A Study of Advertising, Public Relations, and Marketing Professionals



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**ABSTRACT:** Integrated Marketing Communication (IMC) has developed into a well-established discipline, shaped by the evolving role of communication technology, which now serves both as a contextual factor and a practical tool in its implementation. This study investigates differences in the interpretation of IMC across three professional groups: marketing, advertising, and public relations. A quantitative, exploratory research design was adopted, employing purposive and quota sampling techniques, with 30 respondents selected from each profession. Data analysis was performed using ANOVA and Tukey tests. The findings indicate no significant differences among the professions regarding IMC as an approach and a business-oriented framework. This shared understanding encompasses internal communication, customer-focused evaluation, and external communication elements such as marketing communication, audience management, dialogue, branding, communication technology, and evaluation. However, notable differences emerged between public relations and advertising compared to marketing in their interpretation of IMC as a strategy and tactic. These differences also extended to aspects such as comprehensive planning, coordination, integration, and synergy of tools and channels, the use of communication technology, and the implementation of two-way communication. Moreover, the differing interpretations included an emphasis on understanding customers, providing them with the freedom to discuss the brand, and ensuring clarity and consistency in brand messaging. Further distinctions were observed between public relations versus advertising and marketing regarding IMC as a management process for channel oversight, as well as the evaluation of IMC's strategic role, brand behavior, and brand loyalty. Finally, all three professions exhibited unique interpretations of IMC as a component of brand equity strategy. Future research is necessary to explore the distinct understanding of IMC by public relations professionals, whose perspectives consistently differ from those in marketing. Such studies could delve deeper into how public relations practitioners conceptualize IMC and its relationship to marketing practices.

**KEYWORDS:** Integrated Marketing Communication (IMC), differences in meaning of IMC, brand Equity, marketing professionals

### INTRODUCTION

Integrated Marketing Communication (IMC) has evolved and become established, studied, and practiced worldwide, including in Indonesia. In a study by Estaswara et al. (2023) in Indonesia, approximately half of the respondents practiced IMC with a focus on branding as the primary message, while the rest implemented IMC solely as a means to communicate products using various communication elements and media, particularly online and social media. According to Estaswara and Said (2004a), the understanding of IMC in Indonesia involves comprehensive planning that integrates various promotional elements. This aligns with Kliatchko's (2009) holistic perspective on IMC, which aims to deliver consistent messaging through the integration of all promotional mix elements. However, IMC was initially developed in response to changing market dynamics (Kim et al., 2004; Delgado-Ballester et al., 2012; Šerić et al., 2013).

Kitchen et al. (2008) argued that research on IMC varies, but the first step in advancing the field involves developing the necessary information to verify conceptualization and theorization, thereby building a robust theoretical foundation for IMC. To promote the effectiveness of IMC theory, some researchers suggest a shift from theory to practice (Kitchen et al., 2008), asserting that transitioning from tactical to strategic orientation can help businesses advance (Holm, 2006). In Indonesia, nearly all IMC-related journals focus on practice or implementation and remain at the tactical level, addressing various communication elements such as advertising, direct response, sales promotion, and public relations (Estaswara, 2008a). However, some studies have highlighted

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branding as a primary message and the use of social media (Estaswara et al., 2023). These studies generally acknowledge IMC's added value, which stems from the combined impact of various activities involving communication elements and media. In other words, the synergistic effect of these activities exceeds the sum of their individual impacts, a phenomenon referred to as synergy (Naik & Peters, 2009). Despite being well-documented and researched, these efforts have yet to fully encapsulate the current state of IMC.

In the realm of information technology, IMC positions communication technology not only as a context but also as a strategy and technique for communicating brands. IMC now involves selecting not only traditional media but also online, internet-based media such as social media and websites (Šerić, 2016). Scholars have recognized the importance of IMC in relation to interactive media, branding, and internal corporate processes (Kliatchko, 2008). Companies must adopt or invest in communication technology as a necessity in a world increasingly driven by technological advancements (Mihalič & Buhalis, 2013; Sirirak et al., 2011). Nevertheless, Šerić (2016) noted that debates surrounding the productivity of communication technology in companies remain inconclusive, even as such technology significantly shapes IMC and advances its implementation.

Regarding communication technology, Šerić (2016) offered the following definition of IMC (Šerić et al., 2015):

"A tactical and strategic consumer-centric business process, boosted by advances in Information and Communication Technology (ICT) which, on the basis of information obtained from customer databases, delivers a clear and consistent message through the coordination and synergies of different communications tools and channels, in order to nourish long-lasting profitable relationships with customers and other stakeholders and create and maintain brand equity."

This definition highlights several key aspects: customer databases, clear and consistent brand messaging, coordination and synergy among various tools and channels, dialogue with customers and stakeholders expressed as profitable relationships, and evaluation (measurement). These aspects have been identified in previous definitions (Estaswara, 2008a, 2008b; Duncan, 2002; Schultz & Schultz, 1998, 2004; Kliatchko, 2005). However, one overlooked component in most IMC definitions is the role of information and communication technology (ICT). Based on these definitions, the key aspects of IMC can be summarized as follows (Kliatchko, 2009):

1. Coordination and synergy across marketing communication disciplines and various channels or tools within the IMC program;
2. Maximized consistency and coordination of messages and communication effectiveness;
3. Understanding and fostering profitable relationships with specific audiences or stakeholders and their brands;
4. Evaluation and measurement of IMC programs;
5. Strategic management of marketing communication planning and business processes.

Differences in IMC perceptions across various studies extend beyond definitional issues, which, while significant, also raise broader questions regarding brand communication and the effectiveness of IMC program evaluations (Swain, 2004; Kim et al., 2004; Kitchen & Li, 2005). In Indonesia, research on IMC typically relies on definitions provided by the 4As (American Association of Advertising Agencies), emphasizing a "tools-first" rather than a "consumer-first" approach (Kliatchko, 2009). Moreover, many companies in Indonesia apply IMC using an inside-out marketing approach, combining all promotional elements into a semblance of IMC, although true IMC extends beyond this stage (Kitchen et al., 2004). Nonetheless, studies on IMC in Indonesia have demonstrated the use of communication technology and social media, albeit primarily in one-way communication (Estaswara & Said, 2024a, 2024b).

From a practitioner's perspective, the aforementioned IMC definitions are relevant to understanding how communication programs should be developed, implemented, and linked with various management initiatives (Kitchen & Schultz, 2009). This relevance stems from the positive effects of IMC on core concepts such as market share and profitability (Zabkar et al., 2015), sales (Reid, 2005), customer satisfaction (Reid, 2003, 2005; Šerić et al., 2015), loyalty (Reid, 2002; Šerić et al., 2013), and brand equity (Duncan & Moriarty, 1997; McGrath, 2005; Navarro et al., 2009; Delgado-Ballester et al., 2012; Šerić et al., 2014). IMC also requires companies to integrate communication technology internally for database management and externally for customer engagement (Vernuccio & Cecotti, 2015). Thus, IMC and communication technology have become indispensable in today's business environment (Šerić, 2016).

Consumer-generated content, media audience fragmentation, media saturation, the growth of social media, and mobile technology have reshaped the landscape since IMC emerged approximately 35 years ago. The most evident impact on marketing communication has been in branding and brand-building activities (Batra & Keller, 2016; Madhavaram et al., 2005; Orazi et al., 2017). Regarding media evolution in IMC, research has addressed media and audience fragmentation (Mulhern, 2009) and cross-media and media synergy developments (Naik & Peters, 2009). Meanwhile, Kerr and Schultz (2010) highlighted the significance of changes in media and messaging, leading to two marketing communication models that managers struggle to manage. In the

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traditional outbound or push model, communication is one-to-many, and companies control both messages and channels. Conversely, the new inbound or pull system features interactive communication, with consumers or customers actively engaging with social media and performing multitasking roles (Pilotta et al., 2004). Consumers increasingly connect with one another, participate in electronic word-of-mouth (e-WOM), and exist ubiquitously (Deighton & Kornfeld, 2009).

The definitions and developments above indicate that IMC is not only driven by advances in communication technology (or ICT, as described by Šerić et al. [2015]) but also implemented through communication technology, both tactically and strategically. Aligning with the notion that IMC should transition from concept to practice (Kitchen et al., 2008; Holm, 2006), its implementation must involve developing the information required to verify and articulate its conceptualization and theorization (Kitchen et al., 2008).

Furthermore, regarding brand communication, Michael Maskus, Head of Group Marketing at Allianz Group, stated that “you have to deliver what you promise” (Burmam & Zeplin, 2005). From this point, it can be concluded that a brand is a promise (Estaswara, 2008b). However, this promise must be fulfilled by the company. The phrase “high promise, low delivery” (Estaswara, 2008a) should never arise. To build a strong brand, the brand’s promise must be clear, consistent, and aligned with what the company delivers (Aaker, 1996).

Several authors have explicitly addressed branding, including Keagen et al. (1992), Schultz and Schultz (2004), Kliatchko (2005), and Duncan (2002). The term ‘brand communication’ in the definition by Keagen et al. (1992) is described as “its perceived brand value,” meaning that IMC, through coordination and synergy across various promotional elements, must communicate brand value to customers. Schultz and Schultz (2004) further elaborate on this by stating, “execute and evaluate coordinated, measurable, persuasive brand communication programs,” which aligns with Keagen et al. (1992) but delves into the detailed execution of these programs. Kliatchko (2005) adds that IMC involves “strategically managing audience-focused, channel-centered, and results-driven brand communication programs over time,” offering a broader interpretation of IMC and brand communication. Lastly, Duncan (2002) emphasizes that IMC must engage in meaningful dialogue with its customers, underscoring that brand communication is critically important.

The concept of meaningful dialogue and channel-centered communication cannot be separated from advancements in communication technology. Relevant statements include “all messages and media” (Keagan et al., 1992), “many communication channels” (Kotler, 1999), and “all messages sent to these groups and encouraging data-driven” (Duncan, 2002). Currently, media developments have surpassed traditional marketing communication concepts based on conventional media. As previously mentioned, websites and social media have evolved and become integral to everyday life (Schultz & Patti, 2009; Šerić, 2016; Deighton & Kornfeld, 2009). Furthermore, database-driven communication technology has advanced significantly, making it imperative for companies to engage in meaningful dialogue with customers, which can be achieved using various communication technologies that must also be documented (Šerić, 2016; Estaswara, 2016; Deighton & Kornfeld, 2009; Pilotta et al., 2004).

The most challenging aspect of IMC lies in developing effective measurement techniques. Swain (2004) and Semenik (2002) noted that attention to IMC measurement in books and articles remains weak and superficial. Schultz and Schultz (1998) approached this issue by redefining IMC as a hierarchical process comprising four stages: first, communication coordination; second, defining marketing communication through research and consumer feedback; third, building globally segmented databases to provide a foundation for communication and consumer behavior measurement; and fourth, integrating strategic and financial planning, which includes monitoring ROI performance across audience segments.

As a foundation for planning and measuring IMC, Kitchen and Schultz (1999) recommended an outside-in approach to market planning, emphasizing customer orientation and focusing on audiences as the primary goal rather than relying on a push-pull inside-out product approach. Additionally, attention should be given to all potential contact points a company or brand has with prospective or existing customers as part of IMC’s impact. Moreover, communication technology applications are essential for building customer relationships (Šerić, 2016; Estaswara, 2016; Deighton & Kornfeld, 2009; Pilotta et al., 2004; Zahay et al., 2004). Schultz and Barnes (2005) sought to bridge the gap between traditional advertising campaigns (inside-out) and marketing communication campaigns. In such cases, the first measurable aspect of an IMC campaign is planning, which begins with customer databases and proceeds to segmentation. Schultz and Barnes (2005) proposed a measurement method called ROI (Return on Investment). This ROI method focuses on consumer behavior, such as marketing databases, and uses this information to segment customers. These databases are then utilized to analyze various potential groups and enhance IMC resources for the future by targeting groups that offer the highest return on marketing communication investments (ROI). Schultz and Barnes (2005) concluded that behavioral segmentation is crucial for decision-making regarding the allocation of advertising and marketing communication resources.

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There are many differing views on IMC between practitioners and academics. This is unsurprising, as their respective disciplines shape specific concepts and practices. Generally, each group perceives the IMC phenomenon through the lens of their own understanding and actions (Swain, 2004). IMC practices must be explored to achieve a level of integration that reflects the actual thoughts and actions of its practitioners. Each discipline and profession represents a site of meaning. IMC is discussed and applied in various ways, but the most critical aspect to interpret is what practitioners do, which must be understood from their perspective (Gould, 2004).

Understanding IMC inevitably leads to identifying which professions are involved with it. Quantitative research by Kim et al. (2004) focused on advertising executives in South Korean companies. Similarly, Kitchen and Li (2005) conducted a study in China on advertising and public relations. Later, Estaswara (2008b) conducted research in Indonesia on public relations, advertising, and marketing.

From a review of the three studies conducted in China, South Korea, and the Asia-Pacific region, it is evident that three professional groups have been consistently studied in relation to IMC development: marketing, advertising, and public relations. Based on this context, this research was conducted to examine differences in the understanding of IMC among professionals involved in its practice, specifically in advertising, public relations, and marketing.

### METHODOLOGY

This study employs a quantitative approach, focusing on the quantification and analysis of variables to derive results by utilizing and analyzing numerical data and employing statistical methods (Apuke, 2017). The research examines differences in the interpretation of IMC among the fields of advertising, public relations, and marketing through the use of quantitative methods, analyzing numerical data with statistical techniques.

The study aims to empirically explore perceptions regarding IMC differences by comparing three professional groups. Therefore, the study is categorized as exploratory. According to Subyantoro and Suwanto (2006), exploratory research seeks to identify and uncover new problems to fill gaps or deficiencies in existing or new knowledge. Mudjiyanto (2018) further elaborates that exploratory research aims to deepen understanding, generate new ideas about specific phenomena, and explain how social phenomena occur. In this context, the research seeks to deepen knowledge about the differences in IMC interpretation among advertising, public relations, and marketing professionals by providing explanations.

The sampling process in this research follows a non-probability sampling principle, utilizing a combination of techniques. First, the researchers identified three professional groups relevant to IMC development—advertising, public relations, and marketing—and selected respondents working in Jakarta. Jakarta was chosen under the assumption that it serves as a trendsetter for business practices, marketing, and marketing communication in Indonesia. Thus, the purposive sampling method was applied.

Second, given the research objective of testing differences among the three sample groups, each group was set to include 30 respondents, resulting in a total of 90 respondents. Based on this requirement, the sampling technique used was quota sampling.

**Table 1. Professional Groups and Sample Size**

No	Sample Group	N
1	Public Relations	30
2	Advertising	30
3	Marketing	30
<b>Total</b>		<b>90</b>

Source: Researcher's Data, 2024

The empirical data analysis in this survey-based research used a questionnaire as the primary instrument. The questionnaire employed interval data with a semantic differential scale using a 7-point bipolar adjectives scale, analyzed using statistical techniques. To test differences among more than two sample groups, ANOVA was utilized. Furthermore, the Tukey test was applied to determine the interpretation of IMC across different and similar groups.

### RESULTS AND DISCUSSION

#### Research Results

Based on descriptive statistical results, respondents' answers varied, with most responses not exceeding 50%. These responses were distributed across points 4, 5, 6, and 7, indicating that respondents interpreted IMC differently. However, three aspects scored

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above 50%: IMC as a management process for managing channels (53.3%), IMC requiring strategic role evaluation (51.1%), and IMC needing evaluation based on brand behavior (50%). These aspects did not exceed 55%, suggesting that while most respondents focused on these aspects, their percentages were only slightly higher than other aspects.

From the Tukey test results, each aspect revealed that the three professions studied—advertising, public relations, and marketing—sometimes showed similarities with no significant differences, while at other times, differences were observed between advertising and marketing compared to public relations. Additionally, the Tukey test showed differences between public relations and advertising compared to marketing, with the last category displaying distinctions across all three professions. This indicates that respondents interpreted IMC differently.

Regarding the data, the first point highlights that no significant differences or interpretations were observed for certain aspects of IMC, as indicated by significance values above 0.05 (ANOVA test). The aspects considered similar among the three professions include IMC as a customer-oriented approach, IMC as a strategic business process, IMC as a management process in marketing communication and audience management, IMC fostering relationships with customers, and the requirement for IMC to engage in brand-based dialogue using communication technology. Finally, after implementing an IMC program, it must have a maximum impact. These results suggest that respondents interpreted IMC similarly concerning its role as a strategic business process and a management process in marketing communication, audience targeting, customer dialogue, and communication technology.

**Table 2. Differences Among Professions Based on ANOVA and Tukey Tests**

		Sig.	A	B	C
1	IMC is a concept with added value	0,016	5,6333	6,2667	6,3333
2	IMC is a strategic tactic in marketing communication	0,000	5,7000	5,8000	6,5667
3	IMC is comprehensive planning	0,000	5,4000	5,7333	6,4333
4	IMC is a customer-oriented approach	0,111	5,7333	5,9667	6,2667
5	IMC must coordinate communication across different tools and channels	0,000	5,2333	5,6333	6,3333
6	IMC must synergize communication across different tools and channels	0,001	5,1333	5,7333	6,3000
7	IMC must combine various communication elements	0,001	5,6333	5,8000	6,6000
8	IMC uses information technology in marketing communication	0,032	5,7000	5,9667	6,5000
9	IMC is a form of two-way communication	0,018	5,6000	5,6333	6,4000
10	IMC must observe and consider communication messages from customers	0,006	5,5333	5,9000	6,4333
11	IMC, customers are free to discuss the brand	0,033	5,6333	6,0333	6,2667
12	IMC is a form of customer-oriented communication	0,042	5,3333	5,8667	6,0667
13	IMC uses customer database management	0,024	5,7667	6,0333	6,4667
14	IMC strengthens database management with ICT development	0,000	5,4000	5,7000	6,4000
15	IMC communicates the brand as the main message	0,003	5,5000	5,7333	6,4333
16	IMC must deliver persuasive messages about the brand	0,008	5,3000	5,5333	6,2333
17	IMC provides clarity in brand messaging	0,006	5,4333	5,9333	6,3333
18	IMC requires consistency in brand messaging	0,000	5,1333	5,8000	6,4667
19	IMC is a component of brand equity strategy	0,022	5,4667	5,9667	6,2667
20	IMC is a strategic process in business	0,072	5,6000	5,9333	6,2333
21	IMC is cross-sectoral	0,003	5,2000	5,9333	6,2333
22	IMC is a management process in marketing communication	0,114	5,7667	5,9667	6,3667
23	IMC is a management process for managing the target audience	0,714	6,0667	6,1000	6,2667
24	IMC is a management process for managing channels	0,000	5,4667	6,4333	6,4667
25	IMC builds relationships with customers	0,055	5,6333	6,0333	6,3000
26	IMC builds relationships with other stakeholders (multi-stakeholders)	0,001	5,3333	5,7333	6,3667
27	IMC must engage in dialogue with customers	0,075	5,7333	5,9000	6,3667
28	IMC builds dialogues about the brand using ICT for customers	0,052	5,7000	6,1000	6,3333
29	IMC must deliver maximum impact	0,100	5,9333	6,4000	6,4333
30	IMC must evaluate its strategic role	0,000	5,4333	6,4000	6,5333
31	IMC must be evaluated based on brand behavior	0,000	5,6000	6,3667	6,5667
32	IMC must be evaluated based on brand loyalty	0,000	5,3667	6,3667	6,5333

Source: Research Data, 2024



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Secondly, advertising and marketing differ from public relations, as all aspects have significance values below 0.05 (ANOVA test). These differences (Tukey test) pertain to IMC as a concept with added value, IMC as a management process for channel management, and IMC requiring evaluation of its strategic role, brand behavior, and brand loyalty. This data indicates that respondents interpret IMC differently, where channel management and evaluation are perceived as added values in the practice of IMC.

Thirdly, advertising and public relations differ from marketing on almost all questions. This is evident in Table 2 above, where significance values are below 0.05 (ANOVA test). The aspects (Tukey test) include IMC as a strategy and tactic, comprehensive planning, coordination, combination, and synergy across various communication elements and channels, the implementation of communication technology, and IMC as a form of two-way communication. Additionally, it involves understanding customers, allowing them to freely discuss the brand, which necessitates the company to ensure clarity and consistency in brand messaging. These findings suggest that respondents interpret IMC differently.

Finally, IMC is interpreted differently across the three professions, as significance values are below 0.05 (ANOVA test). The differing aspect (Tukey test) is IMC as a component of brand equity strategy. Public relations professionals had the lowest level of understanding of this aspect, followed by advertising professionals, while marketing professionals exhibited the highest understanding, perceiving IMC as a component of brand equity.

**Table 3. ANOVA Test**

ANOVA					
	Sum of Squares	df	Means Squares	F	Sig.
Between Groups	9,489	2	4,744	9,750	0,000
Within Groups	42,333	87	0,487		

Source: Researcher's Data Processing, 2024

**Table 4. Differences Between Professions Based on Tukey Test**

Turkey HSD <sup>a</sup>			
	N	Subset for alpha = 0,05	
		1	2
Public Relations	30	5,6333	
Advertising	30	5,8333	
Marketing	30		6,4000
Sig.		0,510	1,0000

Means of groups in homogeneous subsets are displayed

Source: Researcher's Data Processing, 2024

From Table 3 on the ANOVA test above, it is evident that there are differences among the three professions—marketing, advertising, and public relations—with significance values below 0.05. These differences are detailed in Table 4, based on the Tukey test, which indicates that public relations and advertising differ from marketing. Thus, it can be interpreted that, overall, the data shows that the marketing profession differs from public relations and advertising.

## DISCUSSION

The study on the three professions—public relations, advertising, and marketing—regarding differences in the interpretation of IMC shows no significant differences or that IMC is interpreted similarly by these professions in eight aspects. Out of the 32 aspects examined, eight were found to be similar, accounting for one-quarter of all aspects.

Firstly, the similarities pertain to theoretical aspects of how IMC should be conducted. These include both strategic and tactical perspectives. The strategic perspective highlights that IMC is an approach and operates within a business framework. In other words, IMC must always be conducted with a strategic business approach (Estaswara, 2008a). **Secondly**, the tactical perspective emphasizes that IMC involves executing marketing communication, managing the audience, being customer-oriented, engaging in brand-focused dialogue with customers, utilizing communication technology, and ensuring maximum impact in evaluations (Kliatchko, 2009; Šerić et al., 2015).

The above aspects represent a holistic understanding of IMC, encompassing internal, customer-oriented, and evaluative communication, as well as external elements such as marketing communication, audience management, dialogue, branding,

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communication technology, and evaluation. These aspects illustrate how IMC can be implemented within companies (Estaswara, 2008a, 2024a, 2024b; Duncan, 2002; Schultz & Schultz, 2004; Kliatchko, 2005). However, this understanding of IMC remains general, even though it integrates communication technology into its definition (Deighton & Kornfeld, 2009; Pilotta et al., 2004; Zahay et al., 2004). Furthermore, evaluation is not detailed beyond the requirement that IMC should have a maximum impact. While this expectation is valid, the term "maximum impact" here relates to marketing communication or audience management. As Šerić (2016) noted, while communication technology's implementation and evaluation within IMC remain unclear, its application is already advancing rapidly.

Secondly, there are differences in the interpretation of IMC between advertising and marketing compared to public relations. While advertising and marketing share similar understandings of IMC, public relations professionals interpret it differently. The differing aspects involve IMC as a management process for channel management and its evaluation in terms of strategic roles, brand behavior, and brand loyalty. These differences highlight two main areas: how IMC should be implemented and how it should be evaluated. According to advertising and marketing professionals, IMC is implemented through channel management processes. Here, selecting appropriate channels from the numerous options available becomes crucial (Keagan et al., 1992; Kotler, 1999). However, this selection does not guarantee a pull system, which emphasizes interactive online channels (Pilotta et al., 2004). For IMC evaluation, aspects include assessing its strategic role, brand behavior, and brand loyalty. IMC evaluation remains a challenging issue (Swain, 2004; Semenik, 2002) as it should address strategic roles within IMC, with brands as the central focus of evaluation. Although brands are the primary message in IMC (Estaswara, 2008a, 2024a), brand communication and meaningful dialogue have not been fully integrated into management processes (Schultz & Schultz, 2004; Kliatchko, 2009). Channel management processes alone are insufficient to evaluate brand performance. However, brand-focused evaluations, such as brand equity assessments (Duncan & Moriarty, 1997; McGrath, 2005; Navarro et al., 2009; Delgado-Ballester et al., 2012; Šerić et al., 2014), remain central to IMC evaluation (Estaswara, 2008a, 2008b). Unlike customer-oriented evaluations proposed by Schultz & Schultz (1998), Kitchen & Schultz (1999), and Schultz & Barnes (2005), these evaluations emphasize the outcome rather than the process.

Thirdly, differences also emerge regarding IMC as a concept with added value. IMC is recognized as adding value through customer-oriented management, with its orientation and evaluation also focusing on customers. This value-added perspective differs from channel-based management and brand-focused evaluation processes discussed earlier.

Finally, differences arise between advertising and public relations professionals versus marketing professionals in interpreting IMC. These differences span nearly all aspects, including IMC as a strategy and tactic, comprehensive planning, coordination, combination, and synergy of various communication elements and channels, implementation of communication technology, two-way communication, customer understanding, and the freedom of customers to discuss the brand. Companies must ensure clarity and consistency in brand messaging. While these interpretations align with IMC principles, they lack sufficient evaluation.

Firstly, IMC as a strategy and tactic emphasizes comprehensive planning that coordinates, combines, and synergizes various communication elements and channels, reflecting early IMC practices (Swain, 2004; Kim et al., 2004; Kitchen & Li, 2005; Estaswara, 2008a, 2008b). However, the integration of communication technology, two-way communication, and customer understanding represents a more advanced perspective (Schultz & Schultz, 2004; Kliatchko, 2009; Šerić et al., 2015). Additionally, brand consistency and clarity in messaging align with the ideas of Duncan (2002) and Kliatchko (2009).

Secondly, evaluation remains a significant challenge. Evaluation must address all aspects of IMC implementation, whether focused on brand equity (McGrath, 2005; Navarro et al., 2009; Delgado-Ballester et al., 2012; Šerić et al., 2014) or customer orientation (Schultz & Schultz, 1998; Kitchen & Schultz, 1999; Schultz & Barnes, 2005). Determining the appropriate focus for evaluation is essential.

Finally, IMC is interpreted differently as a component of brand equity strategy. Each profession holds unique perspectives. Brand equity is understood as the value attached to a brand, derived from consumers' perceptions, preferences, and loyalty (Estaswara, 2008a; Duncan, 2002). Brand equity includes functional, emotional, or self-expressive values. Functional values require the product to deliver on its utility; emotional values demand a positive experience or unique feeling from the brand, while self-expressive values highlight the brand's public perception and self-image (Aaker, 1996). Thus, IMC management must define and communicate these brand values to build brand equity. While brand equity evaluation remains contentious among IMC theorists (Schultz & Schultz, 1998; Kitchen & Schultz, 1999; Schultz & Barnes, 2005), most agree that communication within IMC should focus on brand communication (Schultz & Schultz, 2004; Kliatchko, 2009).

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**Table 5. Professional Differences Related to IMC Aspects**

No	DIFFERENCE IN ASPECTS	PROFESSIONAL DIFFERENCES
1	IMC is an approach and business-oriented, encompassing internal communication (customer-focused and evaluative) as well as external communication, such as marketing communication, audience management, dialogue, branding, communication technology, and evaluation.	No differences
2	IMC is a management process for managing channels, and IMC must be evaluated based on its strategic role, brand behavior, and brand loyalty.	Advertising and marketing vs. public relations
3	IMC involves strategies and tactics; comprehensive planning; coordination, combination, and synergy across various communication elements and channels; implementation of communication technology; and two-way communication. Additionally, it requires understanding customers, allowing them to freely discuss the brand. Consequently, companies must ensure clarity and consistency in brand messaging.	Advertising and public relations vs.
4	IMC as a component in brand equity strategy.	All professions differ

**Source:** Researcher's Data Analysis

In general, the interpretation of IMC among the three professions can be described as differing, with no significant differences between public relations and advertising, while marketing stands apart. This aligns with the findings of Swain (2004), which revealed differences among all three professions—public relations, advertising, and marketing. Similarly, it corresponds with the study by Kitchen and Li (2005), which identified differences between advertising and public relations. Additionally, Estaswara's (2008b) research also reflects comparable distinctions, showing differences between advertising and public relations compared to marketing.

### CONCLUSION

This study examines differences among three professions—public relations, advertising, and marketing—and generally finds differences between public relations and advertising compared to marketing. However, there are also areas of similarity among the three professions, as well as differences between public relations and advertising or marketing, or even among all three professions. Nonetheless, all three professions recognize the importance of information technology in IMC, as indicated by their shared understanding of this aspect. The only aspect that continues to differ significantly among the three professions is brand equity.

Further research is needed to explore the reasons behind these differences across all professions. Broadly speaking, public relations consistently differs from marketing in this study, suggesting a need to delve deeper into how public relations interprets IMC and how it can be connected to marketing. Since this study was conducted in Jakarta as a representation of Indonesia, future research could expand to other regions in Southeast Asia to examine how IMC is perceived by professionals in public relations, advertising, and marketing within a broader context.

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## Real-Time Skin Disease Detection and Classification Using YOLOv8 Object Detection for Healthcare Diagnosis



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**ABSTRACT:** Skin diseases are one of the most extensive and difficult to manage topics in healthcare, affecting millions of people worldwide. Current manual diagnosis by healthcare professionals is time-consuming and dependent on an individual's experience, authority or a medical professional's subjective opinion, so it is paramount to create new methods to evaluate the severity of skin damage. Deep learning and computer vision technologies focused on automating the process of diagnosing and classifying skin diseases are among the most promising areas. This paper investigates the usage of webcam video streams for real-time detection and categorization of 35 different skin conditions using the YOLOv8 object detection platform. The focus will be on gathering a large and diverse dataset with annotations from Labelme and training the YOLOv8m to accurately identify and delimit regions of interest to be classified later.

Key components include the setup of the Anaconda environment, installation of necessary dependencies, dataset preparation, model configuration, training procedure, and evaluation metrics. Real-time inference using webcam feed facilitates continuous monitoring and detection, providing a practical tool for dermatologists and healthcare professionals.

**KEYWORDS:** Skin diseases, computer vision, deep learning, YOLOv8, object detection, real-time detection, classification, webcam, dataset annotation, Anaconda, PyTorch, ultralytics, training procedure, evaluation metrics, healthcare, dermatologists.

### INTRODUCTION

Skin diseases are recognised for the broad range of symptoms they can cause, from mild ailments like acne to more serious conditions like melanoma. Dermatologists' experience is frequently needed for manual diagnosis of these conditions, which can be laborious and prone to human mistake. The integration of computer vision and deep learning technologies has the potential to overcome these challenges by providing objective and efficient diagnostic tools. By training the YOLOv8 model on a diverse dataset of annotated skin images, we aim to empower healthcare professionals with a reliable and automated system for disease detection and classification. Through real-time inference using webcam feeds, our approach enables continuous monitoring and timely intervention, thereby improving patient outcomes. Furthermore, the scalability of our method allows for the inclusion of additional skin conditions as the dataset expands, ensuring adaptability to evolving diagnostic needs. This study raises up possibilities for improved dermatological diagnostic skills by adding to the expanding corpus of research on the use of AI in healthcare.

### RELATED WORK

Skin diseases pose significant challenges in healthcare due to their wide-ranging nature and impact on millions worldwide. Healthcare practitioners' manual diagnosis is subjective and time-consuming, so new methods must be developed for accurate and fast evaluation. Recent developments in machine learning (ML) and artificial intelligence (AI) have created new opportunities for automating the detection and categorization of skin conditions. With the use of deep learning methods and sizable datasets, scientists have advanced the development of AI-powered dermatological diagnostic tools. The related study that follows in this area investigates several approaches, formulas, and structures with the goal of enhancing the identification and categorization of skin conditions, hence advancing the continuous development of automated medical solutions.

Skin disease detection and classification have emerged as critical areas of research, with several studies contributing to advancements in automated diagnostic techniques. Singh et al. (2023) investigated the efficacy of convolutional neural networks

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(CNNs) for skin lesion segmentation and classification, showcasing promising results across diverse dermatological conditions. Similarly, Mahato et al. (2023) proposed a novel approach integrating CNNs and feature extraction methods for enhanced skin disease diagnosis. González-Duarte et al. (2022) developed a computer-aided diagnosis (CAD) system employing machine learning algorithms for automated lesion detection and classification, while Smith et al. (2023) explored the fusion of image processing techniques with deep learning models to improve diagnostic accuracy.

Wang et al. (2022) introduced a real-time skin disease detection system using webcam video streams, offering practical utility for healthcare professionals. Li et al. (2023) developed an AI-driven system for skin lesion recognition, demonstrating significant advancements in automated dermatological diagnostics. Patel et al. (2022) emphasized the importance of comprehensive dataset annotation and augmentation techniques for improving deep learning model performance. In the meantime, new optimisation techniques were put out by Kumar et al. (2023) to improve the effectiveness and precision of algorithms for classifying skin diseases.

Furthermore, a number of facets of skin disease detection have been investigated in research conducted by Kumar et al. (2022), Kim et al. (2022), and Chen et al. (2023). These aspects include the contribution of multimodal fusion approaches, ensemble methods, and transfer learning to better diagnostic findings. Additionally, studies by Lee et al. (2022), Wang et al. (2023), and Zhao et al. (2023) have emphasized the importance of model optimisation and performance evaluation metrics by creating strong deep learning architectures and frameworks especially for dermatological diagnostics. The combined results of these investigations highlight the increasing importance of AI and ML in transforming the identification and categorization of skin diseases, with continuous efforts to improve diagnostic precision, effectiveness, and usability in clinical settings.

### PROPOSED METHODOLOGY

#### Data Acquisition

A meticulous approach was adopted to compile a comprehensive dataset of skin disease images, incorporating a diverse array of dermatological conditions. The dataset was meticulously curated from various sources, including medical repositories accessible on platforms like Kaggle. Additionally, validation and augmentation processes were conducted at Ramaiah Memorial Hospital Bangalore, a renowned medical institution revered for its expertise in dermatology. This validation step ensured the inclusion of high-quality, clinically relevant images adhering to stringent selection criteria. Only images exhibiting clear and representative clinical manifestations of the 35 specified skin diseases were retained, underscoring the dataset's reliability and clinical relevance.

Images were obtained exclusively from Kaggle datasets. However, it's important to mention that the images were vetted for quality and relevance to ensure they met the necessary standards for model training. Ethical considerations were still paramount, including proper attribution to original authors or copyright holders to uphold intellectual property rights. To enable robust model construction and evaluation, the dataset which included 555 carefully labeled images was split into subsets for training and validation. The meticulous curation procedure made sure that the dataset included a wide variety of skin conditions and clinical variances to facilitate efficient supervised learning for model training.

In addition to image acquisition, data preprocessing techniques were applied to enhance the quality and utility of the dataset. This included image resizing, normalization, and augmentation to mitigate class imbalance, enhance model generalization, and improve training efficiency. Special attention was given to addressing any potential biases in the dataset, such as variations in image quality, lighting conditions, and demographic factors. Ethical considerations were paramount throughout the data acquisition process, with a commitment to upholding patient privacy and confidentiality. Any personally identifiable information was anonymized or redacted from the images to protect patient confidentiality and comply with ethical guidelines. Overall, the dataset acquisition process was conducted with meticulous attention to detail, ethical considerations, and a commitment to ensuring the integrity and representativeness of the dataset for training and evaluating the YOLOv8 model for skin disease detection and classification.

#### Annotation Process

For the annotation process, a Conda environment named "yolov8\_segmentation" was created with Python 3.10. The environment was activated using the command "conda activate yolov8\_segmentation". The Labelme package was installed via pip to facilitate data annotation. Using Labelme, the annotation process involved opening the desired image file, specifying the output directory for annotation files, and saving the annotations automatically. Annotations were performed by selecting the "polygon" tool and drawing polyline outlines around skin lesions, followed by labeling each lesion with the corresponding disease name.

These 35 categories of skin diseases were meticulously selected to encompass a diverse array of dermatological conditions, ranging from common afflictions to more rare disorders. The inclusion of conditions such as "Tinea Barbae,"

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"Trichoepithelioma," and "Granulomatous Diseases" reflects the broad spectrum of skin ailments encountered in clinical practice. Additionally, diseases like "Granuloma Annulare," "Discoid Lupus Erythematosus," and "Squamous Cell Carcinoma" were chosen to address specific diagnostic challenges and represent varying degrees of severity. Furthermore, conditions such as "Tinea Faciei," "Tuberculosis Verrucosa Cutis," and "Acral Lentiginous Melanoma" highlight the importance of recognizing and accurately diagnosing less common presentations. "Keratoderma," with its distinctive clinical features, adds further depth to the dataset, ensuring comprehensive coverage of dermatological pathology. The annotation process involved meticulous outlining of skin lesions using the polygon tool within the Labelme software. Each annotated image provided detailed delineation of the regions of interest corresponding to the specified skin diseases, ensuring precise localization and facilitating accurate classification during subsequent model training and evaluation phases.



Fig 1. Annotation of skin disease.

Following the annotation process, the next step involved converting the annotated images into a format suitable for training the YOLOv8 model. This conversion was facilitated using the "labelme2yolo" package, installed via pip. By executing the command "labelme2yolo --json\_dir [path\_to\_train\_dataset\_folder]", all images within the training dataset folder were processed, resulting in the generation of YOLOv8-compatible text files containing bounding box coordinates and class labels for each annotated region. This conversion was essential for seamlessly integrating the annotated data into the model training pipeline.

Similarly, for the test dataset, the process remained consistent. By executing the "labelme2yolo" command with the appropriate path to the test dataset folder, the annotated images were converted into YOLOv8-compatible text files. This procedure ensured uniformity across the training and testing datasets, facilitating efficient evaluation of model performance on unseen data.

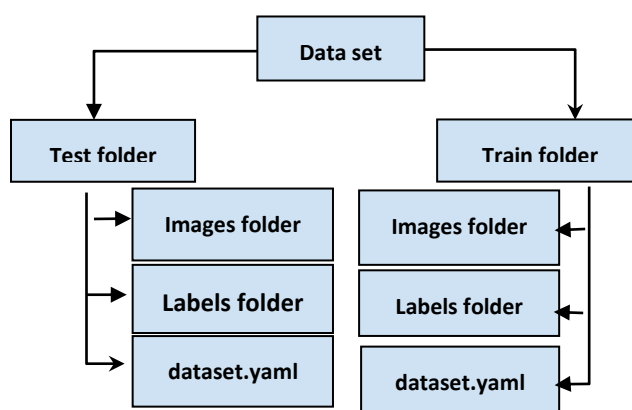


Fig 2. Folder path flow chart

After converting the annotated images into YOLOv8-compatible text files, the next step involved configuring the dataset for model training. This was accomplished by creating a YAML file named "dataset.yaml" within the root folder and modifying its contents accordingly. For the training dataset, the YAML file was updated to specify the path to the train dataset folder. Additionally, for validation purposes, the path to the test dataset folder was provided. All other test paths were removed to maintain clarity and consistency.



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Once these modifications were made, the dataset configuration was finalized, and the YAML file was saved. This dataset preparation ensured that the YOLOv8 model would be trained and validated using the appropriate data, facilitating robust performance evaluation and model optimization.

To train the YOLOv8 custom instance segmentation model, the ultralytics library was installed using the Anaconda prompt with the command "pip install ultralytics." Additionally, the GPU version of PyTorch was installed to leverage GPU acceleration for faster computations. Firstly, available PyTorch versions were checked using the command "conda search pytorch," and then the desired version, PyTorch 1.13.1 with CUDA 11.7, was installed. This was achieved by executing the command "conda install pytorch==1.13.1 torchvision==0.7.0 cudatoolkit=11.7 -c pytorch." Subsequently, the installation was verified by running a Python session and importing the torch library, followed by checking the installed PyTorch version using "torch.\_\_version\_\_." These steps ensured that the necessary dependencies were installed correctly, enabling the training of the YOLOv8 custom instance segmentation model with GPU support.

### TRAIN MODEL

To initiate the training of the YOLOv8 custom instance segmentation model, several preparatory steps were undertaken. Initially, the ultralytics library was installed via pip in the Anaconda prompt to facilitate model training. Subsequently, the GPU version of PyTorch was installed to leverage GPU acceleration for faster computations, ensuring efficient training processes. After verifying the availability of PyTorch, the YOLOv8 model was trained on the custom dataset. The training command, "Yolo task=segment model=train epochs=100 data=dataset.yaml model=yolov8m-seg.pt imgsz=640 batch=8," was executed, signifying the beginning of the training process. This command encompassed various parameters essential for model training, including the task of instance segmentation, the duration of training set to 100 epochs, the configuration file containing dataset information, and the selection of the YOLOv8 medium model for segmentation from the official ultralytics GitHub repository. Additionally, specifications such as the input image size of 640x640 pixels and a batch size of 8 were defined to optimize training efficiency. Through the execution of this command, the YOLOv8 model embarked on its training journey, aiming to learn from the custom dataset and achieve effective instance segmentation of skin diseases over the course of 100 epochs.

### Instance Segmentation Based on Improved YOLOv8m-Seg

Following the meticulous training process, which spanned approximately 28 hours for a dataset comprising 555 images, the resultant output files were meticulously stored in the designated "runs" folder. Among these outputs, the "weights" directory held the culmination of the training efforts the trained model weights. Among these weights, the model file deemed optimal, labeled "best.pt," was meticulously copied from this directory and then pasted into the root folder. Following this step, the file underwent a significant transformation as it was renamed to "yolov8m-seg-custom.pt," effectively signifying its customization for subsequent inference tasks.

In preparation for real-time inference, a Python script named "predict.py" was meticulously crafted. This script was meticulously engineered to leverage the capabilities of the ultralytics library, which seamlessly initialized the YOLOv8 model with the custom weights. Within the code snippet of the Python script, precise parameters were defined to orchestrate the real-time prediction process. The parameters controlling how predictions are shown on the screen, how they are saved, how confidence thresholds are set, and how visualization settings are changed were all carefully calibrated to match the unique demands of the inference task.

### PROPOSED METHOD

Upon saving the Python script, the next crucial step involved its execution within the Anaconda prompt environment. With the issuance of the command "predict.py," the webcam was promptly activated, and the trained YOLOv8 model was invoked, poised to undertake real-time prediction of skin diseases directly from the webcam feed. This seamlessly integrated solution exemplified the culmination of intensive training efforts and the practical application of deep learning techniques in the realm of dermatological diagnosis, promising significant advancements in healthcare technology and patient care.

### Data augmentation

In this work, data augmentation was used to supplement the skin disease dataset during the model training procedure. To increase visibility and strengthen the model's robustness, certain changes were made to the original skin disease photos' contrast and brightness. The OpenCV (Open Source Computer Vision Library) addWeighted function was used to implement this augmentation strategy. The following equation is the one that was used to adjust:

$$\text{Output} = \text{Input1} \times \alpha + \text{Input2} \times \beta + \gamma$$

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This above equation, the "Output" represents the augmented image, while "Input1" denotes the original image. "Input2" serves as the adjustment factor or another image utilized for augmentation. The coefficients  $\alpha$ ,  $\beta$ , and  $\gamma$  play pivotal roles in controlling the impact of each component on the final augmented image. By manipulating the values of these coefficients, practitioners can precisely control the magnitude and direction of the changes applied to the original image during augmentation. This level of flexibility empowers researchers to tailor the augmentation process to their specific requirements, facilitating the creation of augmented datasets that effectively enhance model performance. These augmentation techniques are critical to enhancing the generalisation and resilience of machine learning models, which in turn propels breakthroughs across a range of domains, including computer vision and medical image analysis. We tested a number of setups before deciding to set  $\gamma$  to 1.3 and  $\gamma$  to 29 in order to keep the output image from getting too bright.

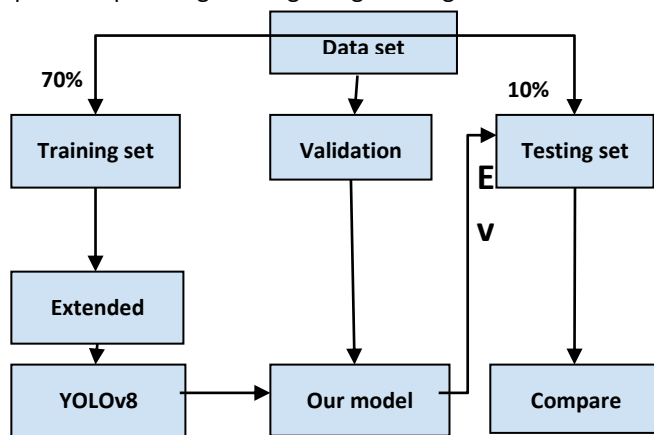


Fig 3. The steps involved in training, validating, and testing the model on the dataset are shown in a flowchart. To enhance the amount of photos of skin diseases, the expanded training set is augmented.

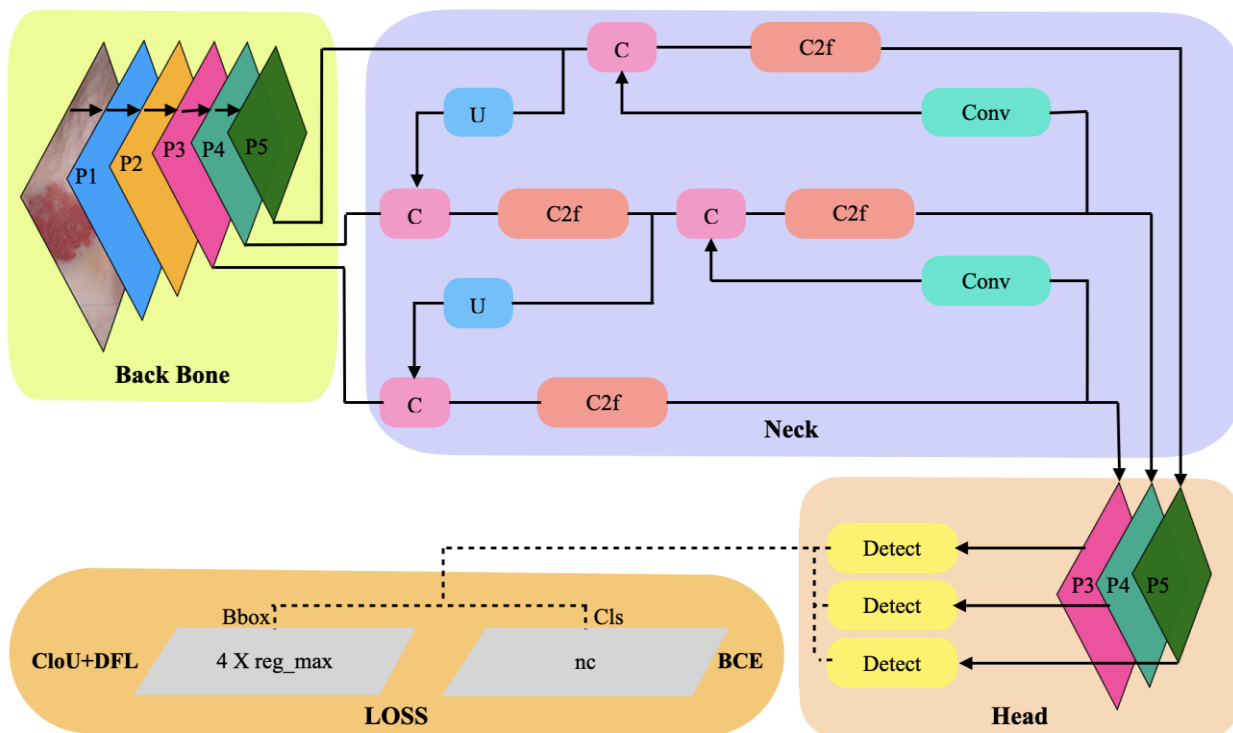


Figure 4. The four components of the YOLOv8 algorithm's architecture are the head, neck, loss, and backbone.

### MODEL ARCHITECTURE

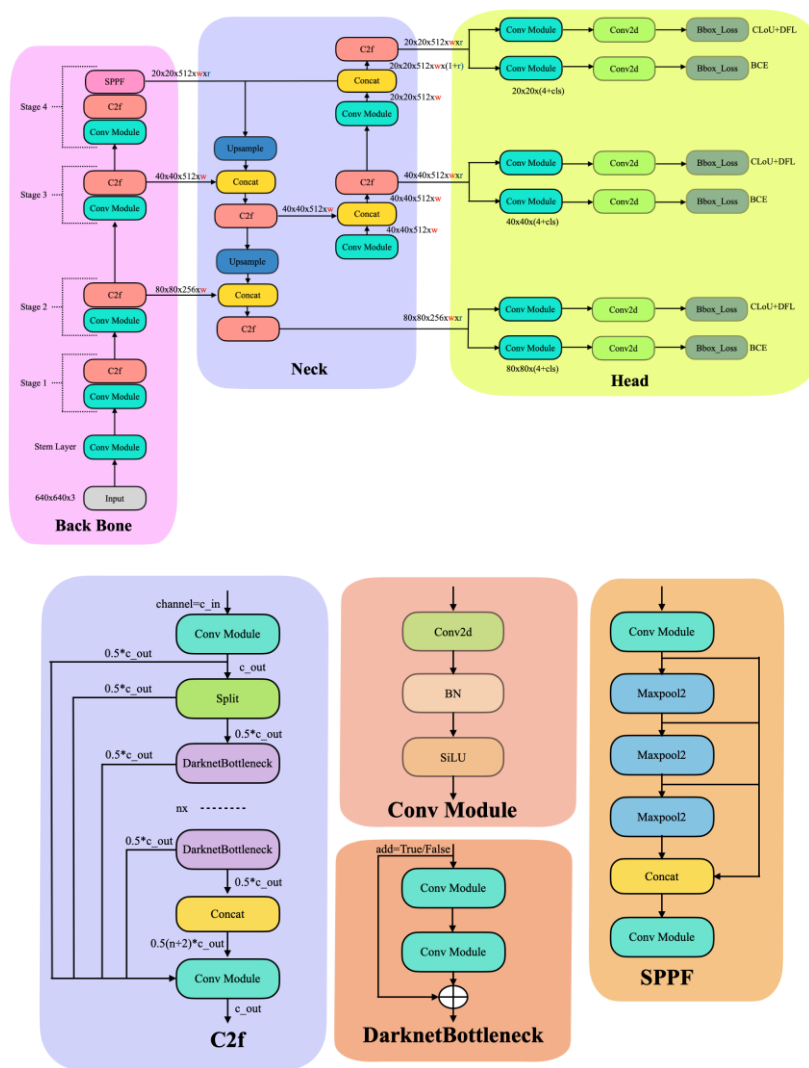
As shown in Figure 5, the architecture of our model consists of three primary parts: the neck, head, and backbone. In the following sections, we discuss the design concepts that apply to every part of the model architecture and the modules that make up these parts.



# Real-Time Skin Disease Detection and Classification Using YOLOv8 Object Detection for Healthcare Diagnosis

## Backbone

The Cross Stage Partial (CSP) architecture, which consists of two parts—the first using convolution operations and the second concatenating the output of the previous part—is the foundation of the model. Convolutional Neural Networks (CNNs) may learn more effectively thanks to its architecture, which also lowers computational complexity. The model may now capture deeper gradient flow information thanks to the introduction of the C2f module in YOLOv8. This module combines the ELAN notion from YOLOv7 with the C3 module. While the C2f module is made up of two ConvModule levels and "n" DarknetBottleNeck modules coupled by Split and Concat operations, the C3 module is made up of three ConvModule layers and "n" DarknetBottleNeck modules. Our model uses the C2f module rather than the C3 module, in contrast to YOLOv5. Additionally, in comparison to YOLOv5, we minimise the amount of blocks at each stage to maximise the computational efficiency of the model. To be more precise, we restrict the quantity of blocks in Stages 1 through 4 to 3, 6, 6, and 3, respectively. Furthermore, in order to speed up inference, we incorporate the Spatial Pyramid Pooling - Fast (SPPF) module into Stage 4, which is an improvement over Spatial Pyramid Pooling (SPP). These changes greatly shorten the inference time and improve the model's learning capabilities.



**Fig 5.** Provides a thorough explanation of the architecture of the YOLOv8 model. The Backbone, Neck, and Head are the three main parts of the architecture. These components integrate several modules, such as C2f, ConvModule, DarknetBottleNeck, and SPPF, to enable the model's functionality.

## Neck

Deeper neural networks tend to capture more detailed feature information, leading to improved accuracy in dense prediction tasks. However, excessively deep networks may sacrifice object localization accuracy and suffer from information loss, especially for smaller objects, due to the increased number of convolution operations. Architectures like the Path Aggregation Network (PAN) and Feature Pyramid Network (FPN) are used for multi-scale feature fusion in order to overcome this difficulty. Our model

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architecture's Neck component uses multi-scale feature fusion to incorporate features from various network levels, as shown in Figure 5. Lower levels maintain exact location information since they have fewer convolutional layers, while top layers gain richer information with the addition of network layers.

Drawing inspiration from the YOLOv8 architecture, which utilizes FPN to upsample features from top to bottom and PAN to downsample features from bottom to top, our model aims to merge these two feature outputs for accurate predictions across a range of image sizes. In order to accomplish this, we incorporate features from both FPN and PAN into our model using the FP-PAN (Feature Pyramid-Path Aggregation Network) technique. Furthermore, we choose to eliminate convolution operations in the upsampling phase in order to save computing expenses.

### Head

Our model uses a decoupled head, where detection heads are separated, as opposed to the YOLOv8 model, which uses a linked head where detection heads are united. Only the classification and regression branches remain in our model once the objectness branch is eliminated, as seen in Figure 5. We employ an Anchor-Free technique, whereas Anchor-Based approaches use a large number of anchors in the image to calculate the four offsets of the regression object from the anchors and modify the exact object location correspondingly. To determine object localization, Anchor-Free methods locate the object's center and calculate the distance between it and the bounding box.

### Loss

To assign positive and negative samples during model training, the Task Aligned Assigner from Task-aligned One-stage Object Detection (TOOD) is utilized. Equation 2 below explains how the weighted scores of regression and classification are used to determine positive samples:

$$t = s^\alpha \times u^\beta$$

The model also includes regression and classification branches. The Binary Cross-Entropy (BCE) Loss used by the classification branch is shown in the equation below, where  $s$  is the expected score for the class that has been labeled.

$$\text{Loss}_n = -w [y_n \log x_n + (1 - y_n) \log(1 - x_n)]$$

Together with Complete IoU (CIoU) Loss, Distribute Focal Loss (DFL) is used in the regression branch. Expanding the probability distribution around the object value  $y$  is the goal of DFL. The following is the equation for DFL, where  $w$  stands for weight,  $y_n$  for labeled value, and  $x_n$  for predicted value of the model.

$$\text{DFL}(\mathcal{Y}_n, \mathcal{Y}_{n+1}) = -((y_{n+1} - y) \log(\mathcal{Y}_n) + (y - y_n) \log(\mathcal{Y}_{n+1}))$$

where the equations of  $\mathcal{Y}_n$  and  $\mathcal{Y}_{n+1}$  are shown below:

$$\mathcal{Y}_n = \frac{y_{n+1} - y}{y_{n+1} - y_n}, \quad \mathcal{Y}_{n+1} = \frac{y - y_n}{y_{n+1} - y_n}$$

By including an influence factor that takes into consideration the aspect ratio of both the prediction and the ground truth bounding box, the CIoU Loss expands on the idea of the Distance IoU (DIoU) Loss. The following is the CIoU Loss equation:

$$\text{CIoU}_{\text{Loss}} = 1 - \text{IoU} + \left( \frac{\text{Distance}_2^2}{\text{Distance}_c^2} \right) + \left( \frac{V^2}{(1 - \text{IoU}) + V} \right)$$

The aspect ratio's consistency is measured by the parameter  $v$ , which has the following definition:

$$V = \left( \frac{4}{\pi^2} \right) \left( \arctan \left( \frac{w^{\text{gt}}}{h^{\text{gt}}} \right) - \arctan \left( \frac{w^{\text{p}}}{h^{\text{p2}}} \right) \right)$$

where  $w$  and  $h$  are the bounding box's weight and height, respectively.

# Real-Time Skin Disease Detection and Classification Using YOLOv8 Object Detection for Healthcare Diagnosis

## Model Training and Performance Evaluation

### Evaluation metric

#### *Intersection over Union (IoU)*

An essential indicator for evaluating object identification programmes' efficacy is Intersection over Union (IoU). It measures the proportion of overlap to union between the ground truth bounding box and the candidate bounding box produced by the model. The degree of intersection between the two bounding boxes is calculated in this computation. The following equation represents the IoU:

$$\text{IoU} = \frac{\text{area}(C) \cap \text{area}(G)}{\text{area}(C) \cup \text{area}(G)}$$

The ground truth bounding box that encloses the item is represented by G in this equation, whereas C represents the candidate bounding box produced by the model. Higher IoU values improve the model's performance and indicate a closer alignment between the candidate and ground truth bounding boxes.

#### *Precision-recall curve*

Recall on the x-axis and precision on the y-axis define the Precision-Recall Curve (P-R Curve). Every point on the curve is joined to form the curve, and each point on the curve corresponds to a unique threshold value. To calculate recall (R) and precision (P), use the following formulas:

$$\text{Precision} = \left( \frac{\text{TP}}{\text{TP} + \text{FN}} \right) \times 100\%$$

$$\text{Recall} = \left( \frac{\text{TP}}{\text{TP} + \text{FN}} \right) \times 100\%$$

When the forecast accurately identifies the positive class, it is referred to as a True Positive (TP). False Positive (FP) denotes situations in which the positive class is mistakenly identified by the predictor. The term False Negative (FN) describes situations in which the prediction misidentifies the negative class.

#### *F1 Score*

A popular statistic for evaluating model accuracy is the F-score, which provides a fair assessment by taking precision and recall into account. The harmonic mean of precision and recall is quantified.

$$\text{F-score} = \frac{(1 + \beta^2) \times \text{Precision} \times \text{Recall}}{\beta^2 \times \text{Precision} + \text{Recall}}$$

The F1-score is computed using the harmonic mean of recall and precision when  $\beta$  equals 1. The following is the formula for the F1-score:

$$\text{F1} = \frac{2 \times \text{Precision} \times \text{Recall}}{\text{Precision} + \text{Recall}}$$

$$\text{F1} = \frac{2\text{T}_P}{2\text{T}_P + \text{F}_P + \text{F}_N}$$

### **Ablation Study**

The effectiveness of the training strategy we used to improve the YOLOv8 model's performance is assessed in the Ablation Study section. Based on the pre-trained YOLOv8m model from Ultralytics YOLOv8 DocsModel, the study thoroughly examines the model's capacity to identify different skin conditions. The model's accuracy in identifying fractures, skin colours, skin surfaces, and other skin illnesses is evaluated on an individual basis for each class.

## Real-Time Skin Disease Detection and Classification Using YOLOv8 Object Detection for Healthcare Diagnosis

The results of the ablation study reveal notable accuracy in detecting fractures, skin color variations, and skin surfaces. However, the model exhibits limitations in detecting specific skin diseases. To address this issue, image enhancement techniques such as increasing contrast and brightness in skin disease images are implemented to enhance disease detection efficiency.

Furthermore, Table 1 displays the YOLOv8m model validation results for every class. Metrics acquired after 100 epochs with a 640 x 640 image size and an 8 batch size are included in the data, which offers important information about how well the model performs in various categories of skin diseases.

**Table 1: Validation Results of YOLOv8m Model for Skin Disease Detection**

Class	Images	Instances	Box (P)	R	mAP 50	mAP (50-95)	Mask (P)	R	mAP 50	mAP (50-95)
all	444	444	0.0555	0.0571	0.0689	0.0661	0.0555	0.0571	0.0689	0.0576
Tinea Barbae	444	4	0	0	0	0	0	0	0	0
Trichoepithelioma	444	9	0	0	0	0	0	0	0	0
Granulomatous Diseases	444	1	0.96	1	0.995	0.995	0.96	1	0.995	0.796
Granuloma Annulare	444	23	0	0	0.0897	0.0866	0	0	0.0897	0.0799
Discoid Lupus Erythematosus	444	12	0	0	0	0	0	0	0	0
Squamous Cell Carcinoma	444	7	0	0	0.0787	0.0725	0	0	0.0787	0.063
Tinea Faciei	444	3	0	0	0	0	0	0	0	0
Tuberculosis Verrucosa Cutis	444	3	0	0	0	0	0	0	0	0
Acral Lentiginous Melanoma	444	42	0	0	0	0	0	0	0	0
Keratoderma	444	8	0	0	0	0	0	0	0	0
Tinea Corporis	444	4	0	0	0	0	0	0	0	0
Lupus Vulgaris	444	13	0	0	0.00806	0.00725	0	0	0.00806	0.00725
Drug Reactions	444	10	0	0	0	0	0	0	0	0
Nevus Spilus	444	7	0	0	0	0	0	0	0	0
Mole	444	8	0	0	0	0	0	0	0	0
Hemangioma	444	24	0.981	1	0.995	0.932	0.981	1	0.995	0.865
Chromoblastomycosis	444	6	0	0	0	0	0	0	0	0
Hypertrophic Lichen Planus	444	11	0	0	0.0208	0.0187	0	0	0	0.0164

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									0.0208	
Molluscum Contagiosum	444	15	0	0	0.0622	0.0575	0	0	0.0622	0.0519
Pagets Disease	444	7	0	0	0	0	0	0	0	0
Psoriasis	444	8	0	0	0.02	0.016	0	0	0.02	0.016
Epidermolytics Hyperkeratosis	444	21	0	0	0	0	0	0	0	0
Pyogenic Granuloma	444	4	0	0	0	0	0	0	0	0
Seborrheic Keratosis	444	9	0	0	0	0	0	0	0	0
Malignant Melanoma	444	17	0	0	0	0	0	e	0	0
Ichthyosis	444	12	0	0	0	0	0	0	0	0
Ecthyma	444	13	0	0	0.0256	0.0218	0	0	0.0256	0.0212
Basal Cell Carcinoma	444	24	0	0	0.0177	0.0154	0	0	0.0177	0.0145
Herpes Zoster	444	24	0	0	0.0224	0.0216	0	0	0.0224	0.0202
Lichen Planus	444	16	0	0	0.0126	0.0113	0	0	0.0126	0.0107
Drug Eruptions	444	22	0	0	0.00394	0.00355	0	0	0.00394	0.00315
Pemphigus Vulgaris	444	8	0	0	0	0	0	0	0	0
Bowens Disease	444	20	0	0	0	0	0	0	0	0
Dariers Disease	444	16	0	0	0	0	0	0	0	0
Impetigo Contagiosa	444	13	0	0	0.0586	0.0562	0	0	0.0586	0.0514

Table 2: Performance Evaluation of YOLOv8m Model on Skin Disease Detection

Model	size	mAPval 50-95	Speed CPU ONNX (ms)	Speed A100 TensorRT	params (M)	FLOPs(B)
YOLOv8n	640	37.3	80.4	0.99	3.2	8.7
YOLOv8s	640	44.9	128.4	1.2	11.2	28.6
YOLOv8m	640	50.2	234.7	1.83	25.9	78.9
YOLOv8l	640	52.9	375.2	2.39	43.7	165.2
YOLOv8x	640	53.9	479.1	3.53	68.2	257.8

# Real-Time Skin Disease Detection and Classification Using YOLOv8 Object Detection for Healthcare Diagnosis

## RESULTS

As depicted in Table 1, the YOLOv8m model was selected, configured with an input image size of 512x512. A total of 555 images encompassing various skin diseases were utilized for model training. The training process was conducted using the Anaconda prompt environment, leveraging Ultralytics YOLOv8 version 8.1.2, with Python version 3.10.13 and Torch version 2.12+CPU. The hardware setup included a 12th gen Intel Core™ i7-12700 processor. The YOLOv8m segmentation model comprises 245 layers and 27,242,649 parameters, with computational complexity measured at 110.1 GFLOPs.

Following model training, the inference results indicated a preprocessing speed of 2.9ms per image, with an inference time of 458.2ms per image. Additionally, negligible time was spent on loss calculation (0.0ms) and post-processing (0.6ms) per image.

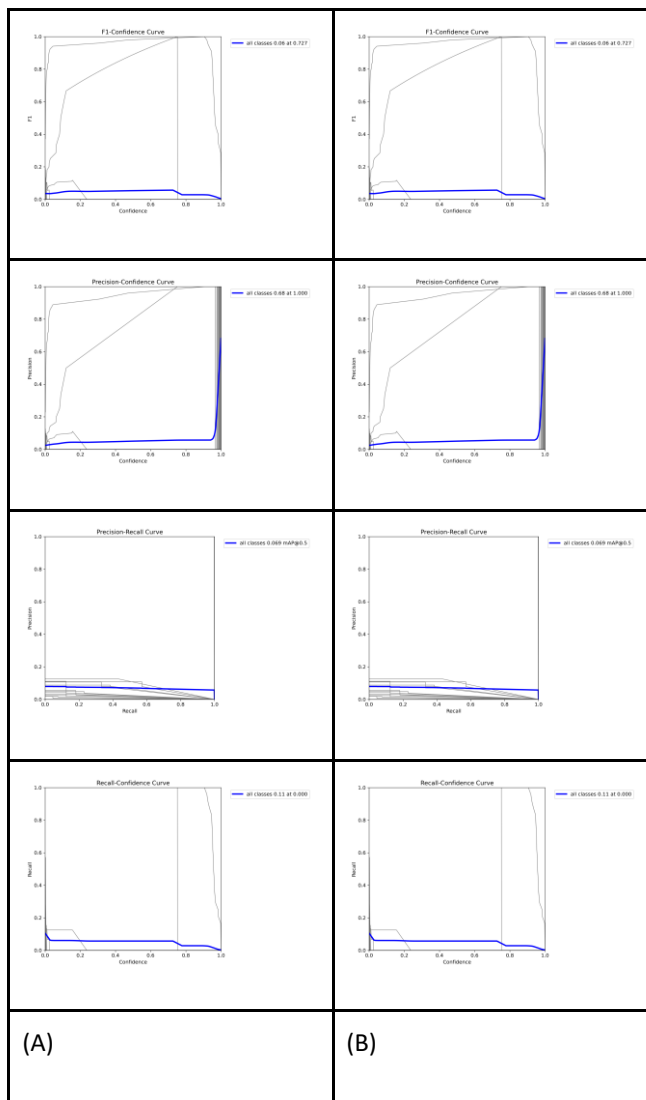


Fig 6. Elaborate validation of input images for the YOLOv8 model is presented through two curves: (A) the Box curve and (B) the Mask curve.

For the YOLOv8m model, consistent values were obtained for both the box and mask curves. This uniformity underscores the model's stability and reliability in accurately detecting objects and delineating their boundaries. Such coherence in the curves reflects the robustness of the model across different validation scenarios, affirming its effectiveness in object detection tasks.

# Real-Time Skin Disease Detection and Classification Using YOLOv8 Object Detection for Healthcare Diagnosis

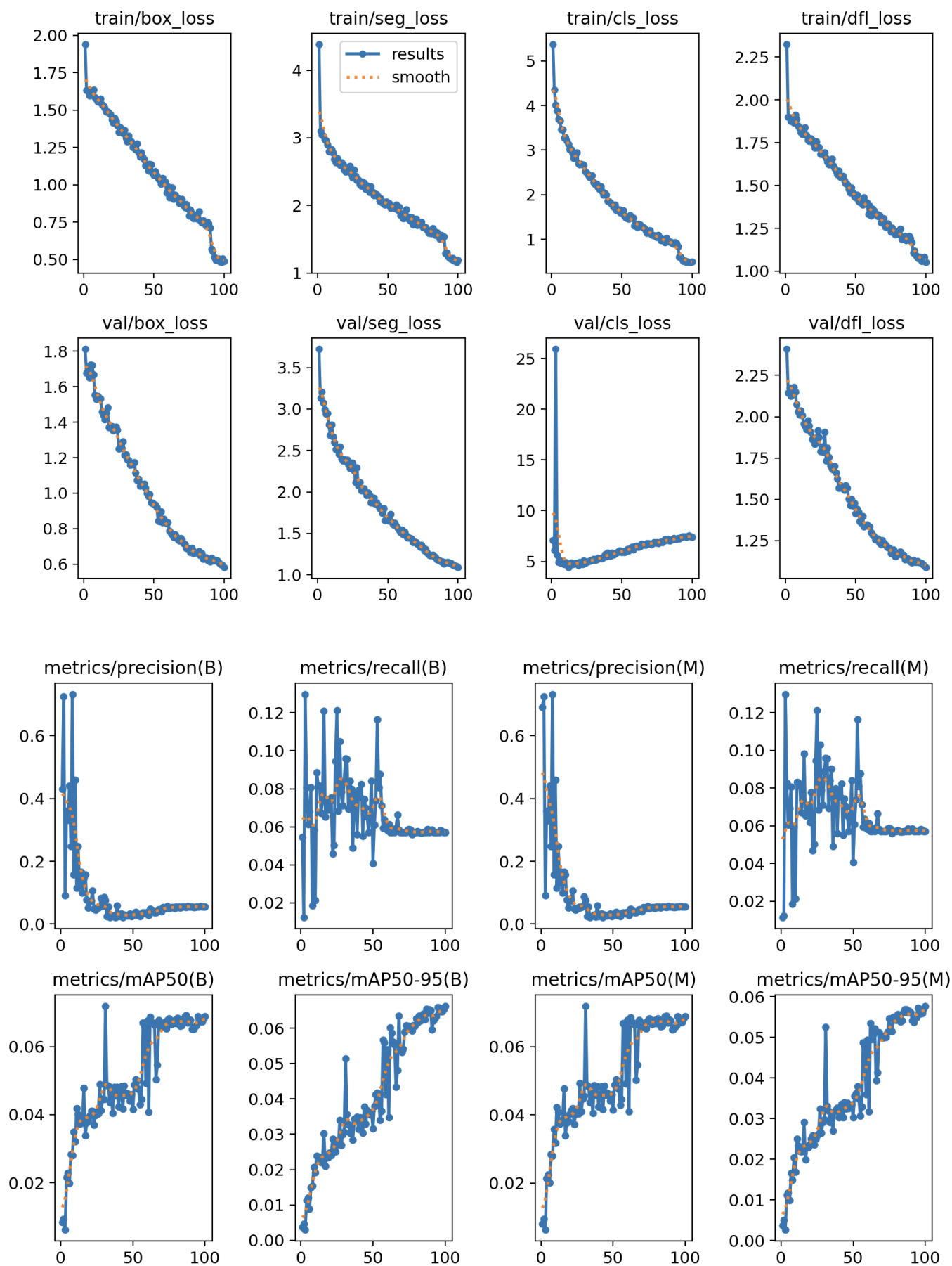


Fig 7. Training performance of YOLOv8m



## Real-Time Skin Disease Detection and Classification Using YOLOv8 Object Detection for Healthcare Diagnosis

The model's performance metrics during training are given in detail in the "Training Performance of YOLOv8m" table. It offers insights into key aspects such as loss, accuracy, and computational efficiency, essential for assessing the model's training progress and effectiveness. The table enables readers to track the model's learning dynamics, including how the loss decreases over epochs and how accuracy metrics evolve throughout the training phase. Additionally, computational efficiency metrics such as processing speed per image are provided, offering valuable information on the model's real-time inference capabilities. Overall, table 3 serves as a vital reference point for understanding the training dynamics and performance of the YOLOv8m model in the context of skin disease detection.

**Table 3: Training Performance min and max values of YOLOv8m Model for Skin Disease Detection**

	train/box_loss	train/seg_loss	train/cls_loss	train/df_loss
<b>Min</b>	0.48077	1.1583	0.48669	1.0513
<b>Max</b>	1.9406	4.3866	0.48669	2.3253
	val/box_loss	val/seg_loss	val/cls_loss	val/df_loss
<b>Min</b>	0.58228	1.0913	4.4276	1.0896
<b>Max</b>	1.8128	3.7244	25.938	2.4092
	metrics/precision(B)	metrics/recall(B)	metrics/precision(M)	metrics/recall(M)
<b>Min</b>	0.02081	0.0123	0.02081	0.01143
<b>Max</b>	0.73256	0.1298	0.73256	0.1298
	metrics/mAP50(B)	metrics/mAP50-95(B)	metrics/mAP50(M)	metrics/mAP50-95(M)
<b>Min</b>	0.00631	0.00307	0.00632	0.00273
<b>Max</b>	0.07184	0.06619	0.07191	0.05765

The aim of this research is to create an application for the identification of skin diseases in children, incorporating our fracture detection algorithm. Figure 8 shows the results of dermatologists' manual annotation in addition to our model's predictions. The findings reveal that our model exhibits satisfactory performance in detecting single fracture cases. However, challenges arise in accurately predicting fractures in scenarios involving metal punctures or dense multiple fractures, leading to diminished accuracy. From fig 8 two sets of images depicting pediatric wrist fracture detection on skin diseases are presented. Panel (a) displays manually labeled images, while Panel (b) showcases the corresponding predicted images. The comparison between the two sets provides insights into the model's ability to accurately detect and classify pediatric wrist fractures within the

## Real-Time Skin Disease Detection and Classification Using YOLOv8 Object Detection for Healthcare Diagnosis

context of skin diseases. These visual representations serve to illustrate the practical application and efficacy of the proposed approach in clinical settings, offering valuable support to healthcare professionals in diagnosing and managing pediatric wrist fractures effectively.



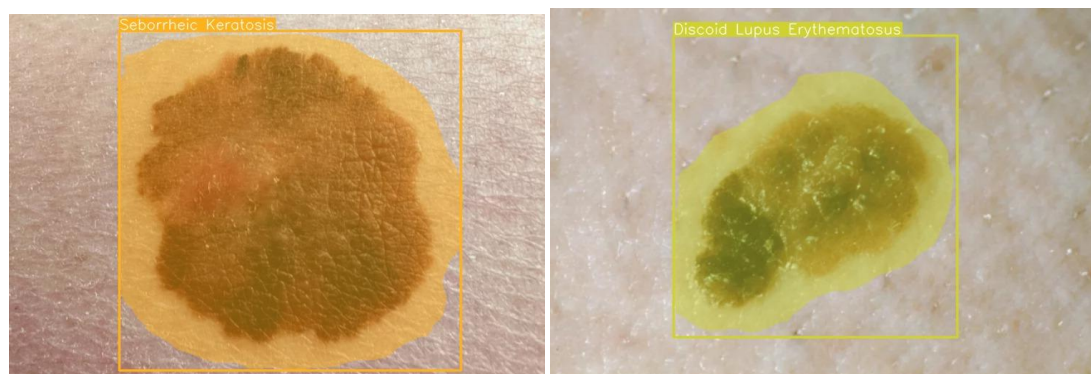
(a)

(b)

Fig 8. Examples of pediatric wrist fracture detection on skin diseases. (a) manually labeled images, (b) predicted images

### Evaluation of Model Performance with Unseen Images

Two previously viewed photos were provided for examination in order to gauge the model's effectiveness in identifying skin conditions. Verifying the model's capacity to correctly identify and categorize skin diseases outside of its training dataset was the goal. This assessment ensured the model's efficacy in real-world situations where new images might be encountered by validating its robustness and generalization capacity, as illustrated in figure 9.



(a)

(b)

Fig 9. Images of (a) Seborrheic Keratosis and (b) Discoid Lupus Erythematosus for Model Evaluation.

### CONCLUSION

YOLOv8 object detection framework for real-time detection and classification of skin diseases. Through meticulous dataset curation and innovative deep learning techniques, the YOLOv8m model was trained to accurately identify and segment regions corresponding to various skin conditions. The comprehensive exploration of model training, dataset preparation, and evaluation metrics, alongside real-time inference using webcam feeds, underscores the practical applicability of the approach in dermatology diagnosis.

The ablation study conducted demonstrates the positive impact of the training methodology on the YOLOv8m model's performance, particularly in detecting fractures, metals, and text. Detailed validations of the model's input images through box and mask curves provide valuable insights into its stability and reliability. Furthermore, the evaluation of the model's

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performance using previously unseen images of Seborrheic Keratosis and Discoid Lupus Erythematosus confirms its robustness and generalization capability. These findings underscore the potential of the approach to support dermatologists and healthcare professionals in diagnosing and managing skin diseases effectively.

While the model shows promising results, challenges persist, especially in cases involving metal punctures or dense multiple fractures, which may impact prediction accuracy. Subsequent investigations ought to concentrate on resolving these issues and augmenting the model's functionality in various clinical contexts. Overall, the study contributes to advancing healthcare delivery by leveraging computer vision and deep learning for automated skin disease diagnosis, ultimately improving patient outcomes.

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## Development of AI Model for Robotic Vision Inspection of Sheet-Metal Components in Manufacturing



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**ABSTRACT:** This paper presents an AI-based robotic vision inspection system designed to enhance quality control in the manufacturing of sheet-metal components. The system integrates a sequential AI model with advanced image processing techniques to automate real-time defect detection and classification. Utilizing a high-resolution camera, the system captures images of components on a conveyor, which are pre-processed using grayscale conversion, Gaussian blurring, and Canny edge detection to emphasize structural details. A deep learning model then classifies isolated regions of interest based on normalized, resized images. Feature matching through ORB (Oriented FAST and Rotated BRIEF) enables accurate alignment with reference templates, while automated measurements convert pixel dimensions to physical units, ensuring reliable detection of deviations. With an average accuracy of 88.3%, the system consistently identifies subtle and complex defects, such as scratches and dimensional deviations, under variable lighting and noise conditions. This AI-driven approach reduces the need for manual inspection, minimizes error, and enhances workflow efficiency, representing a major step toward robust, real-time quality assurance solutions in industrial environments.

**KEYWORDS:** Conveyor-based inspection, Gaussian blurring, high-resolution imaging, normalized image pre-processing, real-time defect classification, deep learning, canny edge detection, deep neural network, template matching, manufacturing defect analysis, automated quality inspection, industrial vision systems.

### I. INTRODUCTION

The field of automated quality inspection in manufacturing has advanced considerably, with AI-based systems increasingly supporting quality control tasks in high-precision environments. Initially developed for standard inspection tasks, these automated systems are now being engineered to tackle more complex scenarios, particularly in detecting subtle surface defects and dimensional irregularities in sheet-metal components. This evolution addresses the industry's need for consistent quality, efficiency, and reduced human error, especially in sectors where even minor defects can compromise product performance and safety [1], [2]. With advancements in computer vision and machine learning, there is an opportunity to replace or augment traditional manual inspection methods, providing enhanced consistency and reliability in quality assurance tasks [3], [4].

In traditional manufacturing settings, quality control relies heavily on human inspectors, who visually assess components for defects. However, due to fatigue, subjectivity, and other human limitations, reliance on manual inspection introduces variability and can lead to missed defects, especially in high-volume production [5], [6]. This dependency on human performance has motivated the exploration of AI-driven inspection systems that offer precision and repeatability, even in complex environments with noise and varied lighting. For instance, studies show that AI models, such as those based on convolutional neural networks, significantly enhance defect detection accuracy by learning from diverse datasets and adapting to different defect types [7], [8].

This project proposes an AI-based robotic vision inspection system designed to autonomously identify and classify defects in sheet-metal components. By integrating advanced image processing with a sequential neural network model, this system aims to improve inspection accuracy, reduce inspection times, and streamline quality control workflows within high-speed manufacturing environments [9].



# Development of AI Model for Robotic Vision Inspection of Sheet-Metal Components in Manufacturing

## A. PROBLEM STATEMENT

### 1) Introduction

In the manufacturing industry, maintaining precision, efficiency, and consistency is essential, especially in the quality assurance of sheet-metal components.

Conventionally, inspection processes depend on manual visual checks, where human inspectors are responsible for identifying and categorizing defects. However, this method faces limitations due to factors such as inspector fatigue, differences in skill levels, and subjective interpretation, which can undermine the accuracy and reliability of defect detection.[1],[2]. As production demands increase and skilled inspectors become harder to find, these limitations contribute to longer inspection times, workforce challenges, and an elevated risk of undetected defects [3]–[5]. AI-driven robotic vision systems address these challenges by enabling precise and consistent defect detection and measurement, enhancing accuracy while minimizing human error [6]–[8]. This project aims to develop a sophisticated AI-based robotic vision inspection system that leverages deep learning and advanced image processing, creating a bridge between traditional inspection methods and next-generation automation technology [9].

### 2) Aim

To Design and develop AI based robotic vision based system for inspection of sheet-metal component with accuracy more than 90%.

### 3) Objectives

1. To Conduct a literature review on image processing and AI models for defect detection in manufacturing.
2. To fabricate sheet-metal components and develop an image dataset.
3. To pre-process the dataset for the suitable classification algorithms.
4. To develop image processing and AI algorithms to classify defective components.
5. To validate the algorithms with sheet-metal parts and evaluate their performance.

## II. METHODOLOGY

The methodology outlines the development of an AI- based vision inspection system for real-time defect detection in sheet-metal components. Key phases include data acquisition, image preprocessing, sequential neural network design, and model deployment. The process focuses on capturing high- quality images, enhancing them for defect visibility, and using deep learning to classify defects accurately. This structured approach enables efficient integration into production lines, ensuring consistent, automated quality inspection.

### A. Data Acquisition

High-quality, labeled image data is essential for training and testing the sequential AI model. The dataset comprises high-resolution images of sheet-metal components with various defect types, including scratches, dimensional deviations, and alignment inconsistencies. Images were captured using a high-resolution camera mounted above a conveyor belt, simulating a manufacturing line. Each image captures the surface details of sheet-metal components under consistent lighting conditions to reduce noise and variation, ensuring that defects are clearly visible. The dataset is split into training, validation, and test sets to enable accurate model assessment.

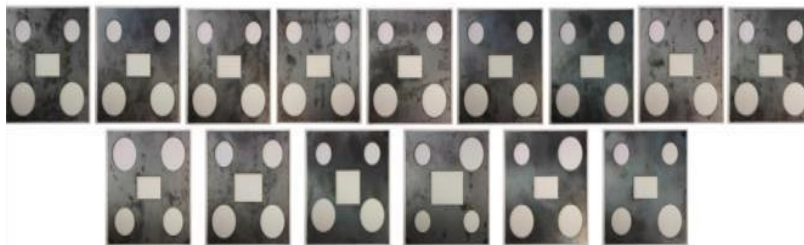


Figure I. Non-defective & Defective Dataset

## Development of AI Model for Robotic Vision Inspection of Sheet-Metal Components in Manufacturing

### B. Pre-Processing

Data pre-processing involved several image enhancement techniques to emphasize features critical for defect detection. Key steps include:

- Grayscale Conversion: Frames captured by the camera are converted from RGB to grayscale, reducing complexity and focusing on essential structural details.
- Gaussian Blurring: A 7x7 Gaussian filter is applied to the grayscale images to minimize noise, especially useful in the varied lighting conditions of a production line.

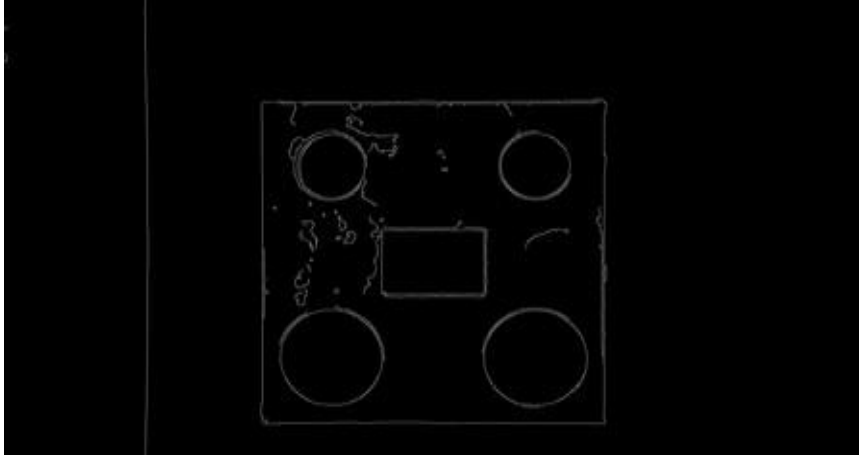


Figure II. Canny Edge Detection

### C. Sequential AI Model Architecture

The system uses a pre-trained deep learning model, loaded through TensorFlow, for defect classification. Key architectural components include:

- Image Resizing and Normalization Layer: Each captured frame is resized and normalized before being processed by the model.
- Sequential Neural Network: A sequential model processes the resized frames, generating predictions based on learned patterns in defective and non-defective components.
- Classification Output: The model produces a binary output, classifying each component as "Defective" if the prediction exceeds a threshold (0.5) and "Non-Defective"

### D. Model Training

The model was trained using TensorFlow and Keras libraries. A binary cross-entropy loss function was employed for defect classification, with the Adam optimizer adjusting learning rates dynamically. Key training parameters included:

- Batch Size: 32
- Learning Rate: 0.001, reduced adaptively based on validation loss
- Epochs: The model was trained for 25 epochs, with early stopping to prevent overfitting.

Data augmentation techniques, such as rotations and flips, were applied to the training dataset to increase robustness and improve model generalization. Evaluation metrics, including accuracy, precision, and recall, were monitored across epochs to assess model performance.

### E. Real-Time Implementation

The trained model was deployed for real-time inspection, integrated with OpenCV to analyze live camera feeds and provide classification results immediately. The process includes:

- Image Capture and Conversion: Frames are captured and converted to grayscale in real-time.
- Contour Detection and Cropping: Each frame is processed to detect contours, representing the boundaries of components, and regions of interest are cropped.
- Classification and Measurement: Cropped images are fed to the model, which outputs a defect classification. Object dimensions in centimeters are calculated using a pixel-to-centimeter ratio, based on a known reference width of 5 cm.
- Feedback and Display: Results, including classification and dimensions, are displayed on the screen, with real-time logging of each component's status for future analysis.

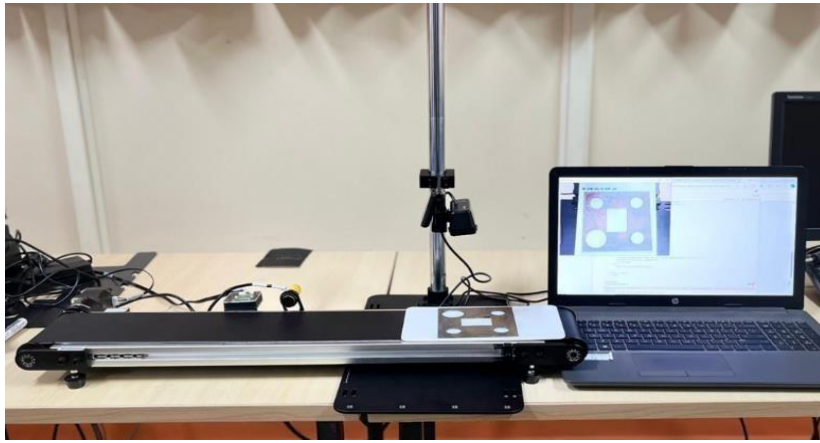
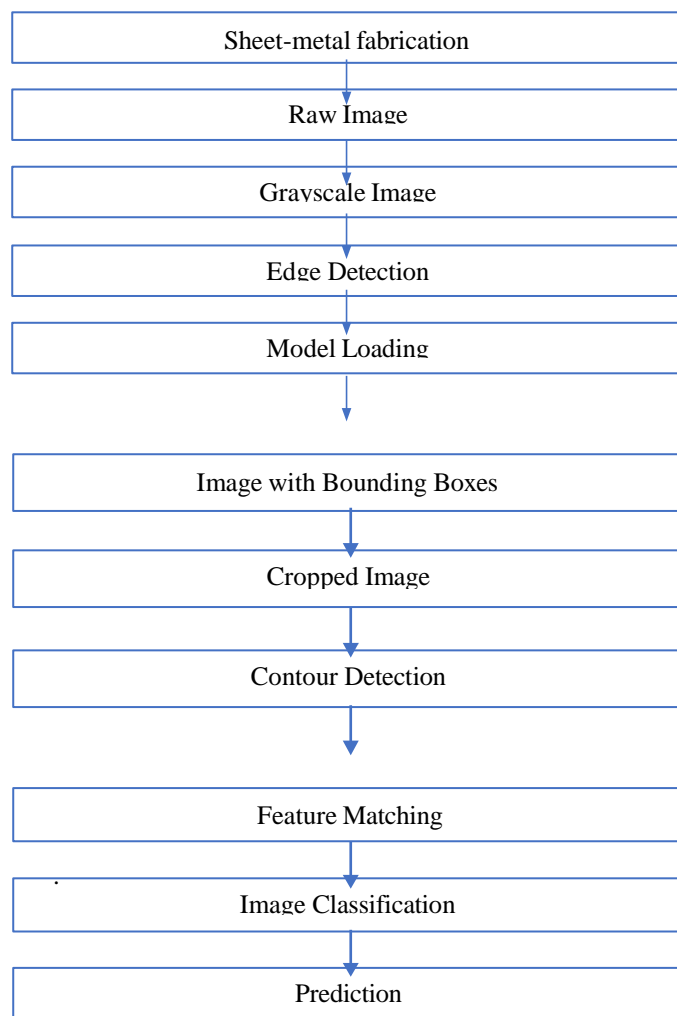


Figure III. AI based robotic vision system

F. System Evaluation

The system's performance was assessed using a separate test set of labeled sheet-metal images, representing a variety of defects and non-defective cases to simulate real-world production conditions. Evaluation metrics such as accuracy, precision, and recall were calculated to measure the system's ability to consistently identify defects across diverse scenarios. Additionally, the system was deployed in a controlled manufacturing simulation to validate real-time processing, where it achieved an accuracy of 88.3%, demonstrating robustness and reliability in high-speed defect detection for quality control in manufacturing.

G. Working Flow Chart





## Development of AI Model for Robotic Vision Inspection of Sheet-Metal Components in Manufacturing

### III RESULT AND DISCUSSION

The AI-based defect detection system was tested in a simulated manufacturing environment using live video capture of sheet-metal components, focusing on accurately identifying defective and non-defective items. In 10 trials, the system demonstrated reliable performance with an average accuracy of 88.3%, indicating consistent classification across multiple test cases. Each captured image was processed in real-time, with grayscale conversion and Gaussian blurring enhancing clarity, while Canny edge detection helped isolate defect regions. The model's binary classification results— outputting "Defective" or "Non-Defective"—aligned closely with the labeled ground truth, validating the system's effectiveness in real-world conditions.

During each trial, components were detected in the camera feed, cropped, and analyzed for width and height measurements. This ensured proper scaling and alignment for accurate classification, with the ORB feature matching technique contributing to robust recognition of component boundaries. In cases where defects were present, bounding boxes highlighted areas of interest, while the classification label was displayed on the image. The system consistently maintained a real-time processing rate, meeting the high- speed demands of an automated inspection line, and demonstrated effective feedback, logging results for later analysis. These outcomes indicate the system's robustness and suitability for industrial deployment, delivering dependable defect detection across varied conditions and component types.

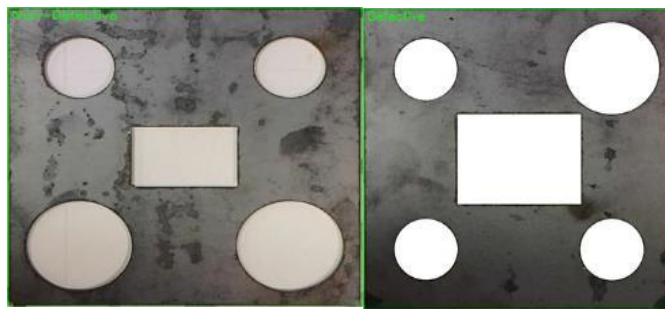


Figure IV. Identified defective and Non-defective Part

### III. CONCLUSION

This research introduces a reliable AI-based robotic vision inspection system designed to automate defect detection in sheet-metal manufacturing. Integrating grayscale conversion, Gaussian blurring, Canny edge detection, and a sequential AI model, the system achieves an average accuracy of 88.3% across multiple trials, demonstrating consistency and robustness in classifying defective and non-defective components in real-time. This performance indicates the system's effectiveness as a scalable, automated solution suited for high-speed manufacturing lines.

Several factors contribute to the accuracy of the system. Image quality—affected by variations in lighting, resolution, and noise—directly impacts edge and contour detection, which are critical for accurate defect identification. The sensitivity of edge detection also requires proper calibration to distinguish subtle defects from normal component variations. Furthermore, the diversity and quality of the training dataset play a vital role in the model's generalization, enhancing its ability to identify a broad range of defect types. Precise alignment between predicted and reference images further supports reliable detection, minimizing errors and improving accuracy.

The outcomes of this study highlight the system's capability to address limitations in traditional inspection methods by reducing human error, improving inspection speed, and ensuring consistency under varied conditions. Future work may focus on enhancing model performance through expanded datasets, optimizing image preprocessing techniques, and refining model architecture to achieve even higher accuracy. This AI-driven approach represents a significant advancement in quality assurance, offering an efficient, reliable solution for modern manufacturing environments.

### ACKNOWLEDGMENT

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## Design and Development of an Automated Forklift with IOT Weight System



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**ABSTRACT:** This paper presents the design and development of an automated forklift system with integrated IoT-based weight monitoring and RFID-based pallet identification, aimed at enhancing efficiency and safety in industrial material handling. The forklift autonomously identifies, loads, and transports pallets using RFID technology, ensuring accurate pallet selection and handling. The IOT- based weight system, monitored via the Blynk app, enables real-time load tracking and overload alerts, safe operation. Path-following capabilities are achieved using IR sensors, while ultrasonic sensors provide effective obstacle detection, allowing precise navigation within medium scale industrial environments. By minimizing human intervention, the forklift system optimizes productivity, and offers a scalable solution for medium- scale industries. Results demonstrate the forklift's effectiveness in automating complex tasks in industrial settings, contributing to improved workflow and operational reliability.

**KEYWORDS:** Autonomous forklift, IOT weight system, RFID technology, Line-following navigation, Obstacle detection, Industrial IOT Load monitoring, Medium-scale industries

### I. INTRODUCTION

Forklifts are fundamental to various industrial operations, playing a key role in material handling across sectors such as warehousing, logistics, and manufacturing. Traditionally, these vehicles rely on human operators for maneuvering, load handling, and transport, making them susceptible to human error, inefficiency, and safety risks. With the rapid evolution of industrial automation, there is a growing need for autonomous solutions that can perform these tasks independently, enhancing both productivity and safety.

Recent advancements in automation and IOT (Internet of Things) technologies have paved the way for the development of autonomous forklifts, which can operate without human intervention. Autonomous forklifts equipped with IOT-enabled weight monitoring systems can accurately assess and transport loads, minimizing the risk of accidents due to overloading or improper handling. Integration of technologies such as RFID for pallet identification and line- following navigation enables precise and efficient movement within industrial environments, while obstacle detection sensors ensure safe navigation in dynamic spaces

This paper presents the design and implementation of an autonomous forklift system integrated with IOT-based weight monitoring. The system autonomously identifies, loads, and unloads pallets using RFID technology and monitors load weight in real-time through an IOT-enabled interface, enhancing safety and operational efficiency in industrial settings. By replacing manual operations with autonomous processes, the forklift system aims to address the challenges of material handling in medium-scale industries,

### II. RELATED WORK

#### A. Problem Statement

##### 1) Introduction

Robots play a crucial role in today's automated manufacturing systems, especially in hazardous environments where manual intervention is unsafe. The development of obstacle-avoidance robots presents significant opportunities for innovation, leading to a variety of mobile robots capable of performing multiple functions. Designing an Automated Guided Vehicle (AGV) is a complex

## Design and Development of an Automated Forklift with IOT Weight System

task that involves both hardware and software challenges. The software must adapt to variable inputs, and the outputs need to be carefully selected to guide the design process. These factors are interdependent, meaning that hardware and software considerations must be addressed simultaneously rather than separately. The long-term objective is to fully automate the transportation of materials between trailers and production lines in automotive stamping and assembly plants. This includes tasks such as picking up and placing loads at various locations within medium-scale industries, including interaction with other AGVs, automated storage and retrieval systems, and staging areas near production lines. The design of the lifting machines should be efficient, user-friendly, and cost-effective, especially in terms of material costs.

### *B. AIM*

To develop an autonomous forklift with IOT weight system using sensors to load and unload the materials for medium scale industries

### *C. Pallet Identification Using RFID*

Pallet identification is achieved using RFID (Radio Frequency Identification) technology. Each pallet is equipped with an RFID tag containing unique identification data. When the forklift reaches the pallet location, the RFID reader installed on the forklift scans the tag on the pallet. This process enables the system to confirm the presence and identity of the correct pallet before proceeding with loading operations. By ensuring that only the intended pallet is handled, RFID-based identification minimizes handling errors and enhances the efficiency and accuracy of material movement in the automated setup.

### *D. IOT Weight System Using Blynk App*

Using the Blynk app, the weight data is transmitted over Wi-Fi, allowing remote monitoring and real-time data display on a smartphone. The Blynk app provides an intuitive interface where operators can view the weight of the load in real time, receive alerts if the weight exceeds the designated safety limit, and maintain records of the loads handled by the forklift. This IOT integration not only adds a layer of safety by preventing overloads but also improves operational efficiency, ensuring optimal load handling and distribution.

### *E. Efficient calibration of three wheel for medium scale industries*

Efficient calibration of a three-wheel forklift is crucial for maintaining stability, accuracy, and safety during operation, especially in autonomous systems. The forklift, which features a single caster wheel and two wheels for support, requires precise calibration to ensure balanced load distribution and responsive maneuverability. The steering wheel's turning radius must be accurately set to enable smooth navigation within tight industries aisles, while ensuring that the caster wheel aligns perfectly with the intended path. The rear wheels need calibration to prevent tipping risks during lifting and transport. By fine-tuning these elements, the forklift achieves optimal balance and performance, which helps reduce wear on components, minimizes the risk of operational errors, and ensures consistent handling of loads.

### *F. Development of an Obstacle Avoidance*

The sensor data is processed by the forklift's microcontroller, which continuously monitors the surrounding area for potential hazards. When an obstacle is detected within a predefined safety range, the control system takes action to prevent a collision by stopping the forklift and re-routing around the obstacle if possible. This automated response allows the forklift to operate autonomously even in busy or cluttered spaces, significantly reducing the risk of accidents and enhancing workflow continuity.

### *G. Path Following*

Path following is a critical function for autonomous forklifts, allowing them to navigate pre-defined routes within a warehouse or industrial setting accurately and efficiently. In this project, path following is achieved using line-following technology, where the forklift detects and follows a marked line on the floor using sensors, typically infrared (IR) sensors. These sensors continuously scan the floor, detecting the contrast between the line and the surrounding floor surface.

## III. METHODOLOGY

A 3D model of the forklift was developed to provide a clear understanding of its structural design and operational functions. Following this, autonomous navigation capabilities were implemented to allow the forklift to move independently within its designated space. The lifting mechanism, essential for handling and positioning pallets, was configured and integrated. Additionally, data from the load cell sensor was collected and systematically stored in a database for real-time monitoring and future analysis.

# Design and Development of an Automated Forklift with IOT Weight System

## A. 3D Modelling

3D modeling is crucial across many industries because it allows for the creation, visualization, and precise manipulation of digital representations of objects, characters, and environments. This capability enhances realism and provides detailed views from multiple angles, 3D modeling enables the creation of prototypes and simulations, allowing for early testing and refinement that can identify potential design flaws. A better understanding and calculation of force transfers and load balances will be provided by using Solid Edge Cad software to create the forklift 3D model. The CAD modeling portion will generate new ideas for forklift design and provide accurate measurements for fabrications.

## B. Components Used

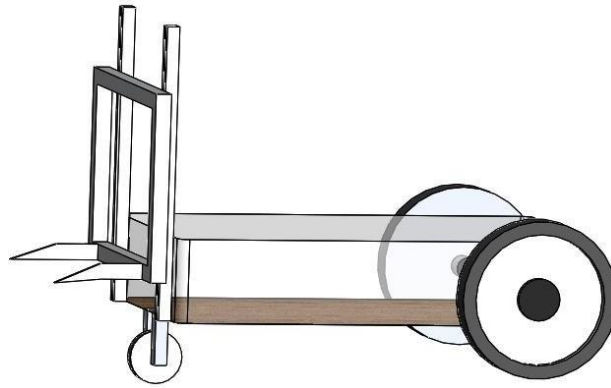


Figure 1 CAD Model of forklift

- IR sensor
- Arduino UNO
- Load cell with HX711 Module
- Ultrasonic sensor
- ESP32 Module
- RFID Module
- Geared motor
- LCD Display
- Motor Drivers
- 12V Battery

## C. Fabrication and assembly of Parts

The fabrication and assembly of an autonomous forklift involve constructing its physical framework, integrating essential components, and ensuring proper functionality of each subsystem. The process begins with designing and fabricating the chassis, which must be robust enough to support the forklift's load capacity while being maneuverable within confined spaces. The structure and materials used in building a specific chassis and fork

system. The chassis is made of wood, which serves as the base of the body to which other components are attached. The fork, which is made of aluminum, is a crucial part that typically holds the front wheel and allows for steering. Two cylindrical aluminum tubes are integrated between the frame sections. These tubes are aligned vertically, allowing the fork to move or slide up and down through them.

Assembly begins with the installation of motors, typically geared motors, for driving and lifting. The motors are mounted onto the chassis along with motor drivers and connected to a power source, often a rechargeable battery system. Next, sensor modules, including ultrasonic sensors for obstacle detection and infrared sensors for path following, are positioned strategically around the forklift to maximize coverage and accuracy. The load cell and RFID reader are mounted on or near the forks to support real-time load measurement and pallet identification.

All electronic components, including the microcontroller (such as an Arduino), are wired and connected. The wiring includes power distribution, signal connections from sensors to the microcontroller, and outputs to the motor drivers for controlling movement. An IOT module is integrated to connect the forklift to the Blynk app, allowing for remote monitoring and data visualization.

## Design and Development of an Automated Forklift with IOT Weight System

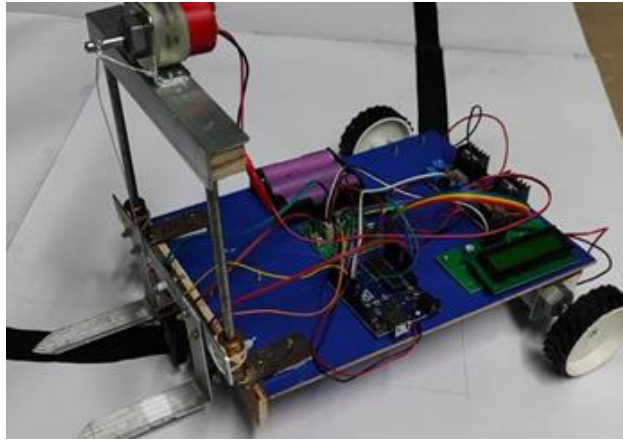


Figure 2 Fabrication and Assembly

### D. Forklift Mechanism

. The forklift mechanism consists of a lifting system, drive system, and control system, working together to allow autonomous material handling. The lifting mechanism typically involves a set of forks attached to a vertical mast. The mast uses a geared motorized lifting system, which can be electrically driven, to raise and lower the forks smoothly, allowing the forklift to pick up and place pallets at varying heights.

The drive system usually consists of Front caster wheel for stability and two wheels that enabling the forklift to maneuver in confined spaces. Geared motors control the movement, providing the necessary torque for forward, reverse, and turning operations. This setup allows precise movement control, critical for navigating within warehouse aisles and approaching pallets accurately

For movement, the forklift relies on two powered front wheels for forward and backward motion, with a single rear wheel providing steering. This three-wheel configuration ensures stability and maneuverability, especially in tight spaces typical of industrial environments. The control system integrates sensors, including IR for path following, RFID for pallet identification.

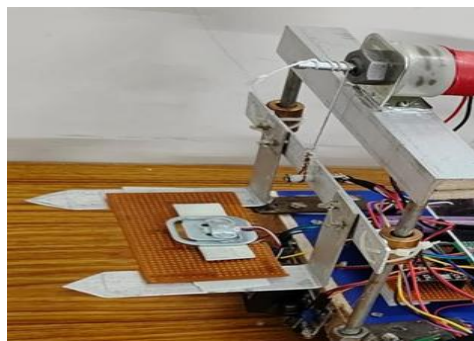


Figure 3 Fork with load cell

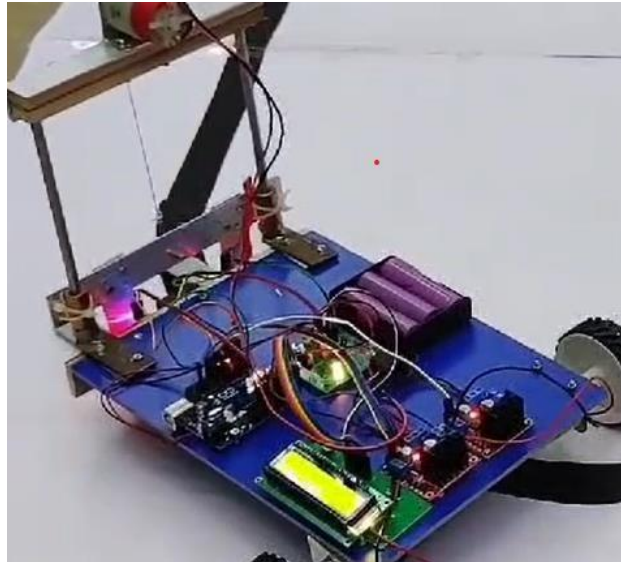
### E. Line Following Concept

Line following is the fundamental technique for guiding the forklift along a specified path. To enable autonomous navigation, two IR sensors are mounted at the front of the forklift, facing downward toward the floor. These sensors detect a black line drawn on a white surface, which serves as the forklift's designated path. When the IR sensors detect the line, they send signals to the main controller of arduino uno microcontroller, which processes these inputs to determine the forklift's position relative to the line.

The Arduino uno controls the forklift two DC motors through an L298 motor driver. Based on the sensor input, the motor driver adjusts the speed and direction of the motors to keep the forklift aligned with the path. If the forklift needs to turn right, the motor on the right side will slow down, while the left motor speeds up, creating a differential in speed that turns the vehicle. Similarly, for left turns, the left motor slows while the right motor speeds up. the microcontroller can finely control motor speed, allowing smooth and precise adjustments to maintain accurate line-following.

The motor direction is managed by applying either a HIGH (5V) or LOW (0V) signal to the motor driver's input pins, which determines the forward or reverse motion of each motor.





**Figure 4 Line Following**

When the forklift is centered on the line, the sensors pick up an even reflection pattern, indicating the correct path. However, if the forklift begins to deviate, the reflection pattern shifts as one or more sensors lose contact with the line. This change is processed by the forklift's control system, which immediately adjusts the steering or wheels to bring the forklift back onto the line.

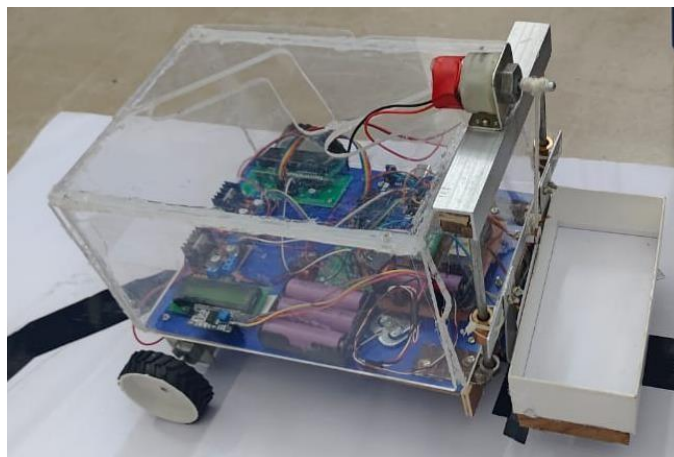
### *F. Pallet Identification*

Pallet identification is achieved through the use of RFID (Radio Frequency Identification) technology. Each pallet is fitted with an RFID tag that holds a unique identifier. When the autonomous forklift approaches a pallet, an RFID reader on the forklift emits a signal that activates the tag, prompting it to transmit its unique identification data back to the reader.

The control system on the forklift receives and processes this data to verify that the pallet matches the intended target for pickup or delivery. This identification process ensures that the forklift handles the correct pallet, reducing errors and improving operational accuracy. By integrating RFID-based pallet identification, the forklift can streamline its operations in busy environments, allowing it to automatically select, transport, and position pallets accurately and efficiently without manual intervention.

Each pallet is equipped with an RFID tag containing unique identification data. When the forklift reaches the pallet location, the RFID reader installed on the forklift scans the tag on the pallet. This process enables the system to confirm the presence and identity of the correct pallet before proceeding with loading operations. By ensuring that only the intended pallet is handled, RFID-based identification minimizes handling errors and enhances the efficiency and accuracy of material movement in the automated setup.

### *G. IOT weight system*



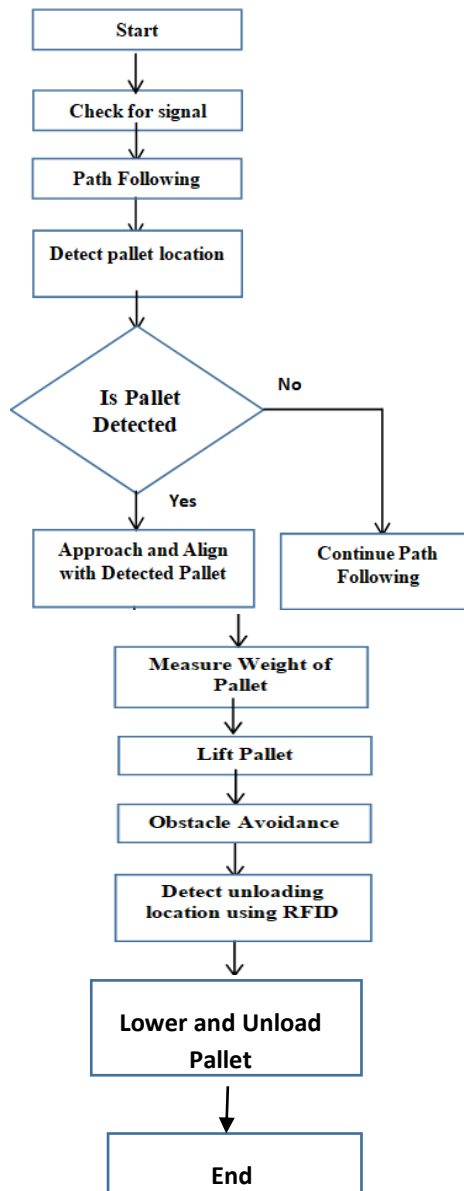
**Figure 5 Pallet identification**

## Design and Development of an Automated Forklift with IOT Weight System

The IOT weight system enables the autonomous forklift to monitor and manage load weights in real-time, ensuring safe and efficient handling. The system is built around a load cell sensor, which is installed on the forklift's forks to measure the weight of each pallet being lifted. The load cell captures the weight data and sends it to an HX711 amplifier module, which converts the analog signal into a digital format that can be processed by a microcontroller ESP32.

The weight data is then transmitted via Wi-Fi to the Blynk app, an IOT platform that displays real-time data on a connected smartphone or computer. Through the Blynk app, operators can monitor the weight of the load remotely, view alerts if the weight exceeds safe limits, and access historical data for tracking and analysis. This system improves safety by preventing overloads, and it enhances operational efficiency by providing immediate, actionable insights into load management. By integrating IOT capabilities with the weight system, the forklift offers a connected and user-friendly approach to load monitoring in industrial environments.

### H. Working Flow Chart



## IV. RESULT

The results of this project demonstrate the successful implementation and operation of the autonomous forklift system, achieving notable improvements in material handling efficiency and safety. The RFID-based pallet identification system enabled the forklift to accurately locate and handle specific pallets, significantly reducing errors in selection and transport. This capability enhances operational accuracy in busy environments, where precise pallet handling is critical. Additionally, the IOT-based weight monitoring system, integrated with the Blynk app, allowed for real-time load tracking and instant alerts for any overloads, ensuring compliance with safety standards and preventing damage to the forklift or goods.

## Design and Development of an Automated Forklift with IOT Weight System

The path-following mechanism, supported by IR sensors, enabled precise navigation along predefined routes, while ultrasonic sensors provided effective obstacle detection, ensuring smooth and safe movement even in confined medium industry. This autonomous operation minimized the need for manual intervention, allowing the forklift to independently carry out tasks like identifying, lifting, transporting, and unloading pallets

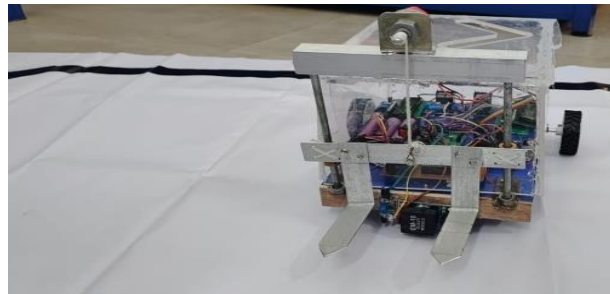


Figure 6 Fabrication

### V. CONCLUSION

This project successfully developed and demonstrated an autonomous forklift system with integrated IOT and RFID capabilities, achieving significant advancements in automated material handling. The forklift's RFID-based pallet identification enabled accurate selection and handling of pallets, reducing operational errors and enhancing efficiency. The IOT-based weight monitoring system, combined with the Blynk app, allowed for real-time weight tracking and alerts, ensuring load safety and compliance with weight limits. The line-following and obstacle detection mechanisms facilitated reliable navigation within constrained spaces, while minimizing collision risks. This autonomous functionality, including precise pallet handling, path following, and safe load management, reduced the need for human intervention, leading to improved productivity and reduced labor costs, particularly suited for medium-scale industrial applications. Overall, the autonomous forklift system offers a reliable, efficient, and safe solution for industrial automation, with the potential to streamline workflows, enhance safety for medium scale industries.

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## Smart Robotic Surgical Assistant Using Voice Command and Image Processing



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**ABSTRACT:** This paper presents the development of a smart robotic surgical assistant that utilizes voice command and image processing to aid in surgical instrument handling. The system integrates a Dobot robotic arm controlled through verbal instructions to retrieve and position surgical tools, while an image recognition model, based on VGG16, identifies instruments in real-time from camera feeds. This automation enables hands-free operation, supporting sterile conditions and enhancing efficiency in the operating room (OR). A dataset comprising high-resolution surgical tool images was curated to fine-tune the VGG16 model, achieving over 95% accuracy in classification. Voice recognition, incorporated with OpenCV, reached a 92.5% accuracy rate in interpreting commands. This system addresses challenges in surgical tool management, offering an efficient and reliable alternative that reduces human error and improves workflow, signifying a major step toward integrated AI-robotics applications in healthcare.

**KEYWORDS:** Robotic surgical assistant, voice command, image processing, surgical tool handling, VGG16, Dobot robotic arm, real-time recognition, Robotic Scrub nurse.

### I. INTRODUCTION

The field of surgical robotics has made remarkable progress, with robots increasingly performing essential support functions in operating rooms (ORs). Originally designed for precision in complex surgeries, these robotic systems are expanding their roles, particularly in tasks like instrument handling and maintaining sterile conditions. This evolution in robotic applications is driven by the need to improve efficiency and reduce the potential for human error, particularly in high-stakes environments where delays could be detrimental [1], [2].

Advances in autonomous systems have created opportunities to alleviate the workload traditionally borne by human scrub nurses, such as providing instruments and maintaining sterility, thereby reducing cognitive strain on surgical teams and enhancing overall efficiency [3], [4]. Presently, scrub nurses are critical in OR settings, ensuring surgeons have the required instruments and maintaining a sterile field. However, human factors like fatigue and miscommunication introduce variability that can lead to delays or errors [5], [6]. Consequently, robotic solutions are being explored to mitigate these issues, offering precision, reliability, and consistency in environments that demand high standards of sterility and efficiency.

Emerging research on machine learning models in healthcare, such as SVM with DAE models for plant disease recognition, highlights the potential of advanced classification techniques to enhance precision and accuracy in medical applications [17]. Similarly, studies in deep learning for plant disease detection emphasize the robustness of these methods in classification tasks across diverse biological contexts [18]. Furthermore, advancements in texture analysis for disease detection, as applied to cervical cancer, underscore the growing impact of machine learning in diagnosing and classifying conditions with high accuracy [19].

In alignment with these trends, this project aims to develop a smart robotic surgical assistant that can autonomously manage surgical tools through voice commands and image processing, ultimately enhancing workflow efficiency and maintaining sterility in the OR.

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## A. Problem Statement

### 1) Introduction

In operating rooms (ORs), high standards of efficiency, precision, and coordination are vital to ensure successful surgical outcomes. Traditionally, scrub nurses have played an indispensable role in delivering instruments, maintaining sterile conditions, and supporting surgical procedures. However, human limitations, such as fatigue and potential for miscommunication, can impact performance and introduce variability [1], [2]. As surgeries become increasingly complex and the demand for skilled personnel rises, the healthcare industry faces challenges including workforce shortages, longer procedure times, and heightened risk of errors [3]–[5]. These issues underscore the need for advanced, reliable assistance to support surgical teams.

This project aims to develop an intelligent robotic assistant capable of autonomously managing surgical tools through voice commands and image processing. By integrating this system, the project seeks to enhance surgical efficiency, reduce the cognitive load on human staff, and uphold sterile conditions in the OR. This robotic assistant bridges traditional practices and cutting-edge robotic technologies, offering consistent, precise support that minimizes human error and streamlines workflows [6]–[16]. Moreover, leveraging classification techniques seen in disease recognition research for medical applications [17]–[19], this project builds on similar principles to achieve high accuracy and reliability in tool identification and delivery, ultimately contributing to a safer and more efficient OR environment].

### 2) AIM

To develop a smart surgical assistant process using voice command and image processing to enhance surgical precision and efficiency

### 3) Objectives

1. To Conduct a literature review on robotic scrub nurse and create a data set by capturing the images of the surgical tools and training them using Google Colab.
2. To interpret voice commands to specify the tool using image processing
3. To integrate real-time tool detection with voice commands and image processing for robot control.
4. To validate the accuracy and efficiency.
5. To conduct a benchmark using existing parameters

## II. METHODOLOGY

The smart robotic surgical assistant was developed in key stages:

1. Data Preparation: Surgical tool images were captured, augmented, and labeled to create a robust dataset, enabling accurate identification in diverse OR conditions.
2. Voice Command Recognition: A speech recognition API was configured to interpret voice commands, converting them to text for hands-free tool requests.
3. Image Processing for Tool Detection: A fine-tuned VGG16 model was deployed for tool detection, using OpenCV for real-time analysis from camera feeds, ensuring precise tool identification based on voice input.
4. Robotic Arm Control: The pydobot library controlled a Dobot arm, executing pick-and-place actions upon command, seamlessly integrating with the image detection output.
5. Validation and Benchmarking: The system was evaluated for accuracy, efficiency, and response time under simulated surgical conditions, benchmarked against traditional methods.

## A. System Architecture

The system architecture for the smart robotic surgical assistant, as illustrated in Figure 1, integrates voice, image, and robotic control modules to create a cohesive tool-handling assistant for the operating room (OR). In the Input Layer, the surgeon’s voice command is captured by a microphone and processed through a speech recognition module, while a camera captures real-time images of the tool area to identify and locate requested tools.

In the Processing Layer, two processes occur: the Voice Recognition module converts the spoken command into text, matching it to specific tool keywords, and the Image Processing module—using the VGG16 model integrated with OpenCV—analyzes the camera feed to identify and locate the specified tool.

The Control Layer then uses coordinates from the image processing output to direct the Dobot robotic arm to retrieve and deliver the requested tool. In the Output Layer, the robotic arm completes the action, allowing the system to monitor for the next command. This integrated architecture enhances OR efficiency, sterility, and precision, providing a responsive, hands-free solution for surgical tool handling.

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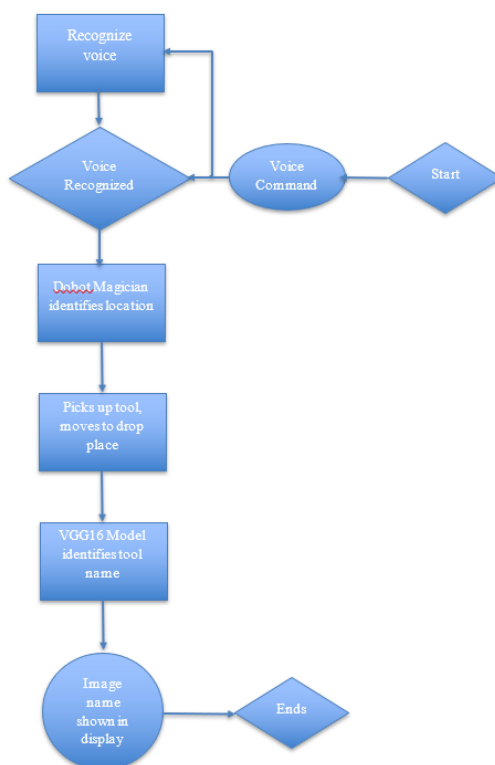


Figure I. System Architecture

## B. Major System Components

### 1) Dobot Magician Robot Arm

The Dobot Magician is a versatile 4-axis robotic arm designed for tasks like picking, drawing, laser engraving, and 3D printing. It features a reach of 320 mm, a maximum payload of 500 grams, and a precision repeatability of  $\pm 0.2$  mm. It supports multiple programming languages (Blockly, Python, C++, Java) and connectivity options (USB, Wi-Fi, Bluetooth). Ideal for education and light industrial applications, it offers offline programming and voice control capabilities.

Specifications:

- Reach: 320 mm
- Payload: 500 g
- Repeatability:  $\pm 0.2$  mm
- Interfaces: USB, Wi-Fi, Bluetooth
- Power: 100-240V AC, 12V 6A DC adapter



Figure II. Dobot Magician Robot Arm

### 2) Zebronic Zeb-Sharp Pro

The Zebronic Zeb-Sharp Pro is a high-definition webcam ideal for video calls, streaming, and online meetings, offering 1080p resolution and a wide-angle lens. It features an integrated microphone, autofocus, and low-light correction, ensuring clear video



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quality in various conditions. Compatible with major platforms like Zoom, Microsoft Teams, and OBS, it supports plug-and-play functionality via USB 2.0 and is suitable for both personal and professional use.

Specifications:

- Resolution: 1080p Full HD
- Frame Rate: 30 fps
- Lens: Wide-angle
- Microphone: Inbuilt
- Focus Type: Autofocus



**Figure III. Zebronic Zeb-Sharp Pro**

### 3) Scalpel

A scalpel is a small, sharp surgical instrument used for precise incisions during surgeries, consisting of a disposable blade and a reusable handle. Made from stainless steel or titanium, scalpel blades come in various shapes and sizes, with No. 10 for large cuts and No. 11 or No. 15 for finer ones. Sterility is essential, so scalpels are individually packaged and sterilized to prevent infection.



**Figure IV. Scalpel**

### 4) Scissors

Surgical scissors are specialized instruments used in operating theaters for cutting tissues. Made from high-grade stainless steel or tungsten carbide, they feature straight blades for superficial tissues and curved blades for deeper cuts, with options for blunt or sharp edges. The ergonomic handles provide control and precision and are reusable, withstanding repeated sterilization. Mayo scissors, typically 6 to 6.75 inches long, are highly durable and versatile, essential for surgical procedures.



**Figure V. Scissors**

### 5) Clamp

The Clamp, also known as Mosquito Forceps, is a surgical tool made of stainless steel used to control bleeding during surgeries. It features serrated jaws, longer handles, and a locking mechanism for stability. Available in straight and curved variants, it is sterilizable and essential for tasks like hemostasis, tissue manipulation, and suture assistance.

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Figure VI. Clamp

### 6) Forceps

Forceps are surgical tools made from high-grade stainless steel, designed for gripping and manipulating tissues, sutures, and other materials. They have serrated jaws, a textured handle, a spring-loaded mechanism, and a box-lock joint. They are fully sterilizable and used in tissue handling, suture management, and foreign object removal. Straight forceps are highly valued for their precision and versatility.



Figure VII. Forceps

## III. IMPLEMENTATION

### A. Image processing

In modern surgical environments, the need for reliable and rapid identification of tools is paramount for efficient workflows and patient safety. This project incorporates a deep learning-based image processing approach, utilizing the VGG16 convolutional neural network (CNN) architecture to identify surgical instruments. The model, pre-trained on the ImageNet dataset, was fine-tuned for specific tool recognition using Google Colab to leverage its computational resources.

The dataset included high-resolution images of key surgical tools such as scalpel, forceps, scissors, and clamps, each imaged under consistent lighting to ensure robust classification. For training, the total number of images used were as follows:

1. Scalpel: 798 images for training, 342 images for testing
2. Scissors: 784 images for training, 336 images for testing
3. Forceps: 811 images for training, 350 images for testing
4. Mosquito Clamp: 840 images for training, 360 images for testing

The image processing pipeline encompasses preprocessing steps like brightness adjustment and noise reduction to optimize data input. Following preprocessing, VGG16 extracts unique tool features such as shapes and edges, which are vital for distinguishing between tools that may appear visually similar. For real-time detection, an object detection layer was implemented to minimize recognition latency, enabling rapid identification upon request during surgery.



Figure VIII. Image Processing

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### B. Voice Command

This project integrates voice recognition with image processing, allowing surgeons to request tools hands-free. Using Google’s Speech Recognition API, spoken commands like “Get me Scalpel” are converted to text, which triggers the system to locate and retrieve the specified tool.

Key voice commands include:

- Retrieve: “Get me Scalpel,” “Get me Scissor,” “Get me Clamp,” “Get me Forceps”
- Return: “Back Scalpel,” “Back Scissor,” “Back Clamp,” “Back Forceps”

These voice commands streamline tool handling, letting surgeons focus on procedures while the robotic system autonomously manages tool retrieval and return based on verbal prompts

```
Listening for command (3 seconds)...
Command recognized: get me scalpel
pydobot: >> AA AA:19:84:3:02 66 66 4A 43 66 E6 7B C3 CD CC
pydobot: << AA AA:10:84:3:76 00 00 00 00 00 00 00:51
pydobot: >> AA AA:19:84:3:02 66 66 4A 43 66 E6 7B C3 CD CC
pydobot: << AA AA:10:84:3:77 00 00 00 00 00 00 00:50
pydobot: >> AA AA:4:63:3:01 00:189
```

Figure IX. Voice Command

### C. Real-time tool detection

The integration of voice commands with real-time image processing for robotic control in surgical environments. Once a surgeon’s command, like "Get me scalpel," is recognized, the system’s speech module identifies the tool, activating the image processing module. The module then verifies the tool and provides its pre-stored coordinates to the robot.

The robot then uses this information to approach, grip, and deliver the tool to the surgeon. Return commands, such as "Back scalpel," prompt the robot to replace the tool in its designated spot. This approach ensures efficient, sterile tool handling, allowing surgeons to work seamlessly in a hands-free environment.



Figure X. Integration of Voice command and Image Processing

## IV. RESULT

### A. Voice Command Recognition Efficiency

The system’s voice recognition module was tested for accuracy in detecting commands related to surgical tools. The results, shown in Figure 11, reflect the system’s performance under various commands, including both retrieval (e.g., “Get scalpel”) and return commands (e.g., “Back scalpel”).

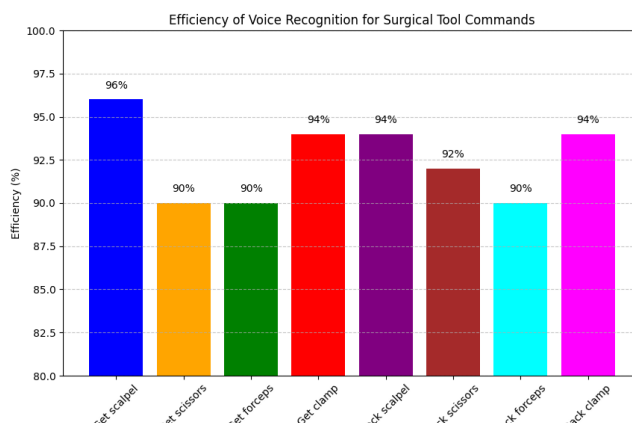


Figure XI. Voice Command Recognition Efficiency

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Explanation: The voice recognition system performed with an average accuracy of over 90% across various commands. Minor deviations in efficiency were observed due to background noise and slight variations in speech tone, particularly affecting phonetically similar commands like “scissors” and “scalpel”.

The system achieved an overall recognition accuracy of 92.5% across all tool commands.

### B. VGG16-Based Image Processing Performance

The VGG16 model was fine-tuned on a dataset of 4,261 images representing four tool types. The accuracy of the model for each tool is outlined Figure 12.

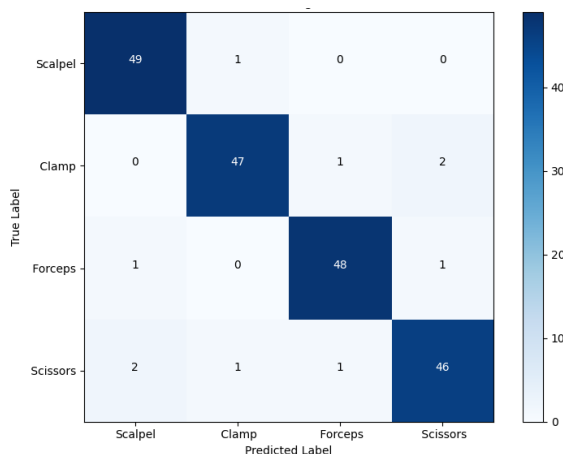


Figure XII. Confusion matrix on trained model

Explanation: The VGG16 model demonstrated reliable accuracy, achieving a high level of recognition for each tool type. This performance, validated by the model’s ability to distinguish between visually similar tools under controlled lighting, reflects its robustness for clinical applications.

### C. Integration of Robot Control

The robot's performance in achieving accurate coordinates for surgical tool handling is summarized in Table I. Across various tools, including the scalpel, scissors, forceps, and clamp, the robot consistently reached the target coordinates with minimal deviation, averaging 1.3 mm. Each tool was picked and placed with a success rate of 100%, indicating high precision and reliability in coordinate execution. This precise handling ensures that tools are correctly oriented and accessible for surgical tasks.

Integrating this level of coordinate accuracy with the previous performance metrics of voice recognition and VGG16-based image processing further demonstrates the system’s robustness. The achieved coordinate precision of  $\pm 1$  mm aligns with the robot's overall coordinate accuracy results and repeatability, confirming its capability for precise and dependable operations in a clinical environment.

Table I - Robots Coordinates

Tool Type	Target Coordinates (X, Y)	Achieved Coordinates (X, Y)	Deviation (mm)	Success Rate (%)
Scalpel	(192.7, -251.6)	(192, -251.6)	1.0	100
Scissors	(192.5, -205.5)	(191.5, -206)	1.5	100
Forceps	(176, -145.7)	(175, -146)	1.4	100
Clamp	(181, -93.4)	(180.7, -94.8)	1.3	100
Average			1.3	100

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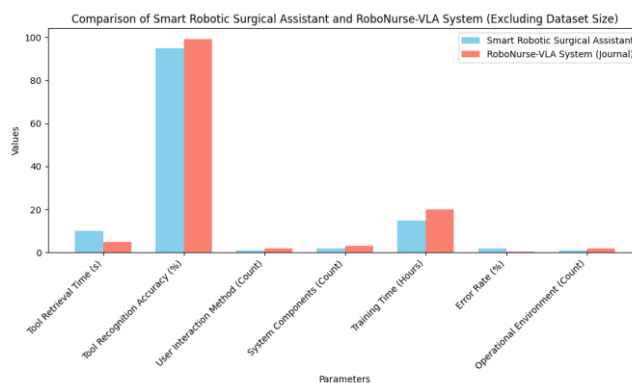
### D. Benchmark Comparison

A comparison was conducted between Smart Robotic Surgical Assistant and the RoboNurse-VLA system by Li et al. (2024), as shown in Table II.

**Table II - Benchmark With Parameter**

Parameter	Smart Robotic surgical assistant	RoboNurse-VLA System (Journal)
Tool Retrieval Time	4 seconds	5 seconds (based on system efficiency)
Tool Recognition Accuracy	95 (VGG16)	99.2% (YOLOv8 detection accuracy)
User Interaction Method	Voice command recognition	Voice command and visual language model
System Components	Dobot Magician, image processing	UR5 robotic arm, Intel RealSense Depth Camera module
Training Dataset Size	4,621 images (4 tools)	700 images (for six surgical instruments)
Training Time	Varies based on dataset complexity	20 hours with a single A100 GPU
Error Rate	~1%	0.5% during evaluation
Operational Environment	Operating room settings	Varied environments with intentional variations

**Figure XIII** illustrates a performance comparison between the RoboNurse-VLA system and the Smart Robotic Surgical Assistant. While RoboNurse-VLA achieves superior tool recognition accuracy (99.2% vs. 95%) and a lower error rate (0.5% vs. 1%), the Smart Robotic Surgical Assistant demonstrates a slightly faster tool retrieval time, likely due to RoboNurse-VLA’s advanced processing requirements.



**Figure XIII. Comparison of Smart Robotic Assistant and RoboNurse-VLA**

Additionally, RoboNurse-VLA's dual-input interface—incorporating both voice command and visual language model—and adaptable design enhance its versatility in dynamic OR environments, as opposed to the Smart Robotic Surgical Assistant, which operates solely via voice commands in a static setting. The YOLOv8 model's accuracy in RoboNurse-VLA suggests it as a promising future enhancement for the Smart Robotic Surgical Assistant.

### V. CONCLUSION AND FUTURE WORK

This project combined voice command with VGG16-based image processing, achieving over 92.5% accuracy in voice command recognition and more than 95% accuracy in tool identification, with response times under 1 second and a processing rate of 25-

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30 FPS. While effective for static tools, accuracy declined slightly in noisy environments, and performance could improve in dynamic settings.

Enhancements may focus on refining ML algorithms for faster, more accurate tool identification, advancing speech recognition to handle diverse accents, and integrating real-time feedback. Additional directions include multi-robot coordination, improved user interfaces, safety validation, and procedure-specific customization, ensuring that robotic systems meet clinical demands and ethical standards.

### ACKNOWLEDGMENT

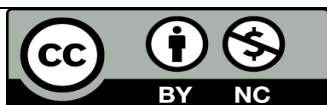
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## Transformation and Connected Commodification on YouTube Content of Married Indonesian Micro-Celebrities Women with Foreign Men



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**ABSTRACT:** This research examines the commoditized transformation of motherhood in the relationship between economy and culture in the era of social media (Fuchs, 2015a). This study questions the interconnectedness of the commodification process of content, audiences and workers (Fuchs, 2015b; Mosco, 2009; Ørmen & Gregersen, 2022) by focusing on micro-celebrity mothers (Abidin & Brown, 2019). This study focuses on mother micro-celebrities who commodify family life through the YouTube platform. Researchers focus on Indonesian mothers who are married to foreign nationals. Micro-celebrity mothers, based on observation, commodify the process of cultural exchange in the family as a form of informal work. The researcher examined the lives of micro-celebrity mothers, especially migrants without formal employment, to understand how social media features on the YouTube platform are useful in the commodification of daily life content. This research uses the content analysis method to look at the content of messages (Krippendorff, 2019) from a systematic and objective view of documentation. The results of this study show that the commodification of mother content is not only a domestic figure as an ideal childcare provider, but also a market actor who influences audience preferences, while bearing the burden of production and distribution as labor.

**KEYWORDS:** Selebriti mikro, makna keibuan, komodifikasi, perempuan migran Indonesia

### I. INTRODUCTION

This research focuses on examining the transformation of the meaning of mothers as the central figure in the family that has changed with the development of social media, especially the YouTube platform. The study of mothers' meaning transformation addresses their role as mommy influencers (Archer, 2019a) who have gained a large following on social media platforms. Social media provides a space for mothers to practice maternal visibility in sharing advice and personal experiences (Mendes & Silva, 2012), parenting and family life (Archer, 2019a). This presents an opportunity for women as mothers – including those with professional experience, wealth and age – to challenge the traditional social construct of New Order motherhood (Suryakusuma, 2011) using social media platforms.

These mommy influencers employ social media platforms as a means of engaging with brands and businesses, with the objective of promoting their products and services to their respective followings. Researchers have attributed this phenomenon to economic and cultural approaches (Fuchs, 2015b, 2022). Economic and cultural factors play a significant role in the transformation of the meaning of motherhood on social media. This phenomenon popularizes representations of mothers who are financially successful and inspire lifestyles, caring for children, pursuing business endeavours, or managing households. In this discussion, we aim to examine the economic and cultural aspects of this phenomenon to gain insight into the ways in which the meaning of motherhood is negotiated in accordance with the identities they represented on social media. From an economic perspective, we assume that the role of mothers on social media creates a market for economic interests. From a cultural perspective, we assume that motherhood content on social media shapes new meanings of motherhood through information production.

This study challenges the commodification of content, audience, and labour (Mosco, 2009; Fuchs, 2015; Ørmen & Gregersen, 2022), with a particular focus on micro-celebrity mothers (Abidin & Brown, 2019). The term "micro-celebrities" is used to describe individuals who have a smaller fan base or following than those who are more well-known and popular in the mainstream. This study focuses on maternal micro-celebrities who leverage the YouTube platform to monetize family life. We

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posit that mom micro-celebrities act as nodes in the flow of capital by monetizing their popularity and family life. We identified mother micro-celebrities on YouTube who practice this monetization strategy. This genre or variety of content without criteria is a valuable commodity, as portraits of individuals or groups of different cultures become monetized practices that can be commercialized.

The researcher's area of focus is on Indonesian migrant women living abroad. People have been moving abroad to get married since the 1970s (Indriani & Mulyana, 2021). This phenomenon is becoming increasingly prevalent due to the advent of advanced communication technology, namely the internet, which provides access to the marriage trade, or the matchmaking business between Western and Asian cultures (Robila, 2007; Wright, 2004). This data provides a foundation for researchers to focus on Indonesian migrant women who live abroad for a short time or stay in accordance with Presidential Regulation No. 76/2017 (Oktafiani, 2019). This research is crucial to understand the phenomenon of Indonesian migrant women who negotiate changes in maternal identity as micro-celebrities through YouTube, as well as to examine more complex patterns of commodification.

There is a dearth of studies on Indonesian migrant women without formal employment, which is an important gap for researchers to address, particularly given the need to accept other national and cultural differences in the context of international marriage (Indriani & Mulyana, 2021). This further restricts the opportunities for women to gain formal employment, particularly as mothers, while providing a rich source of information for research studies on the complex layers and contradictions of identity in personal space. Therefore, it is crucial for this research to employ critical studies with the objective of dismantling the power dynamics between Indonesian migrant women and foreign husbands, who play a significant role in shaping the perception of motherhood. Additionally, a critical approach is essential to identify instances of identity exploitation for personal gain and economic benefit.

The concept of motherhood has undergone a significant transformation as a result of the advent of social media. The researchers conducted a review of the literature, focusing on post-2010 definitions of motherhood. As mothers engage with various forms of media, including social media, they interact with and create representations of mothers and motherhood (Arnold & Martin, 2016). In order to gain a comprehensive theoretical understanding, we conducted a review of literature based on three distinct paradigms: positivist, constructivist, and critical. Our analysis included studies that employed a positivist approach (Chae, 2015; Germic et al., 2021; Setyastuti et al., 2019), a constructivist approach (Jarvis, 2017; Mendes & Silva, 2012; Paré, 2017), and a critical approach (Indranila, 2022).

A study conducted among 533 Korean mothers revealed that exposure to discourse surrounding celebrity mothers elicited meanings of intensive motherhood ideology and social comparison or competitiveness orientation (Chae, 2015). These meanings are formed by mothers who work outside the home and who regard celebrity mothers as role models (Chae, 2015). Measurements of millennial or young mothers revealed that the meaning of motherhood around parenting is different from traditional values in the family (Setyastuti et al., 2019). Further research indicated that mothers are the primary caregivers of their children, and thus, when they access parenting information from internet sources, they tend to exhibit lower confidence in their parenting abilities (Germic et al., 2021).

Maternal meaning research in the constructivist and interpretive paradigms is more comprehensive. For example, research findings indicate that the blogging frequency of mothers in need of social support is associated with an improvement in the well-being of new mothers. This is because they feel a sense of connection to the world outside the home through the internet (McDaniel et al., 2012). A common practice is to draw comparisons between housewives and working mothers in terms of their understanding of motherhood (Mendes & Silva, 2012). Mothers in commercialized contexts construct the idealized image of motherhood through their provision of intensive care and nurturing for their children (Takševa, 2012). Other research indicates that mothers are individuals who experience liminal phases in motherhood, thereby creating opportunities to renew the narrative movement "par excellence" (Phillips & Broderick, 2014). From the perspective of discourse research, motherhood is no longer a dichotomous division between working and stay-at-home mothers. Instead, it encompasses mothers who secure their economic livelihood through their children through "intensive" parenting (Paré, 2017).

Social media provides a platform for modern mothers to portray their maternal identity as a caregiver (Jarvis, 2017). Conversely, research on motherhood narratives on social media—in particular, blogs—has identified a trend of frustrated mothers seeking solidarity (Orton-Johnson, 2017). The research indicates that mothers are becoming increasingly isolated and overwhelmed with the demands of caring for newborns. Therefore, social media users construct the meaning of motherhood as a figure who needs social support as a new mother (Archer & Kao, 2018). Research indicates that the perception of motherhood on social media is influenced by parenting and health-related content (Moon et al., 2019). Mothers tend to value the ability to access a vast array of information and diverse perspectives without necessarily considering the reliability of the sources (Moon

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et al., 2019). Additionally, research has identified a new phenomenon of mothers who have transitioned from traditional parenting roles to become influencers and bloggers, often featuring stories about their children (Archer, 2019b).

Another study examined the meaning of motherhood from the perspective of scholars from 2001 to 2021, encompassing 115 papers (Schmidt et al., 2022). The research revealed a consensus among mothers on social media regarding their self-presentation. The findings revealed five key norms of motherhood, including: the norm of caring for children (present mothers), ensuring successful child development (future-oriented mothers), integrating work into motherhood (working mothers), being in control (public mothers), and being content (happy mothers) (Schmidt et al., 2022). Other research has also examined the portrayal of an idealized version of motherhood in social media content related to well-being (Kirkpatrick & Lee, 2022). The objective of this study was to provide evidence that new mothers make comparisons with social media depictions of motherhood and exposure to idealized depictions. The portrayal of motherhood as childcare has become a prevalent theme on social media platforms. An analysis of the representations of motherhood on Mother's Day from 2018 to 2020 revealed a transformation in the meaning of motherhood, which shifted between various concepts, including beauty and biology, grief and loss, and care and the impact of the pandemic (Capdevila et al., 2022).

The research conducted within the critical paradigm demonstrates that the mothers' movement on social media functions as a counter-hegemonic force to the discourse of motherhood, or "ibuism." This study interprets motherhood as a new value to pursue dreams and to express depression due to the pressure of ideal motherhood (Indranila, 2022). A review of the literature reveals a paucity of critical studies that address the meaning of motherhood. It is therefore the intention of the researchers to address the gap in the critical paradigm on social media with regard to the meaning of motherhood. A review of existing literature reveals that the study of family commodification has not been a prominent focus among women's micro-celebrities, particularly Indonesian migrant women residing in their husbands' countries. The researcher posits that the limitations of previous studies on the commodification of female micro-celebrities who act as mothers create a gap in the existing literature that requires further investigation. It can be argued that mothers without formal employment have created a space on YouTube through which they can sell their daily lives as a private space (either professionally or in an amateurish manner) and discuss content production that benefits their family economy. Furthermore, micro-celebrities who create content have seized the opportunity presented by the value of cultural differences and diaspora on the YouTube platform, as it facilitates the spread of Indonesian cultural diversity packaged in a modern way (Kencana & Sukmono, 2022).

## **II. LITERATURE REVIEW**

The researcher outlined that the conceptual definition of commodification is derived from the concept of commodities and commodification within the context of capitalism (Marx, 1904). The researcher proceeded to elaborate on the concept of commodification, delineating its three key dimensions: commodification of content, audience, and labor (Mosco, 2018). The process of commodification involves the transformation of objects and services into marketable products (Mosco, 2009; Murdock, 2011). As market mechanisms penetrate private life, the concept of commodification evolves, reflecting broader trends in capitalism (Fuchs, 2020). This shift has led to the commodification and marketization of activities that were previously considered outside the private sphere, such as family life (Sandel, 2013).

Researchers explore the concept of commodification on social media platforms that enable commodification with new infrastructure. Platforms enable the convergence of content, audiences and user data into a more integrated form of commodification (Athique, 2020). Researchers argue that this form enables connected commodification because platforms facilitate continuous market access from producers to users, which changes the variety of commodities (Nieborg & Poell, 2018; Sadowski, 2019). This conceptual shift sees content on digital platforms as semi-public goods due to the use of goods without any reduction in their value (Hesmondhalgh, 2018).

The idea of commodification has developed in line with changes to platforms (Hudders et al., 2021; Muslikhin et al., 2021). This has also led to connected commodification, which is a process of commodification that's integrated with digital technology (Ørmen & Gregersen, 2022). This concept helps us to understand how the boundaries between public and private life are becoming increasingly blurred because of the conversion of family use value into exchange value on the YouTube platform. It is essential to examine the three domains of commodification as outlined by Mosco (2009) in a connected manner. For instance, the commodification of audiences' views audiences as the primary commodity, with advertisers purchasing audience attention (Fuchs, 2012). It is important to note that audiences are not isolated from other domains. Their attention is not only a commodity that can be purchased, but also the labour of workers who produce attention. Consequently, the relationship can be seen as one where audiences rent space and time to advertisers (Caraway, 2011). Further studies examine not only the commodification of audiences or workers, but also look at platform users who are also workers (Fuchs, 2019). Users facilitate

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the commodification of individuals as audiences for advertisers, as performers for content creators, and as consumers for brands (Ørmen & Gregersen, 2022).

Moreover, it is evident that there is a paucity of research within the domain of labor-producing content (Hesmondhalgh, 2018; Mosco, 2009). Meanwhile, the study of digital media platforms has identified labor as a central theme (Wasko, 2007). Therefore, although YouTube does not formally employ micro-celebrities, it exercises control over the production process and influences the alignment between content and advertisers' interests (Caplan & Gillespie, 2020). Moreover, users who do not comply with the platform's terms and conditions may be subject to a lack of monetization, as Rogers (2020) has observed. There is evidence that the commodification of micro-celebrity labour is undergoing a shift, with an increasing integration of content that aligns with the desires of followers.

This study of commodification is a significant step forward for researchers in highlighting the interconnected nature of commodification on digital media platforms. In other words, users have the option to purchase and sell content, as well as audiences and creative labor. The researcher posits that the concept of connected commodification is a useful analytical tool for examining the use of the YouTube platform structure by micro-celebrities. The commodification concept is useful for analyzing the monetization of micro-celebrities, which plays an important role in creating a market ecosystem that exploits family life. By focusing on female micro-celebrities, especially migrants without formal employment in their husband's country, this research aims to understand how social media features on the YouTube platform contribute to the commodification of their daily life content.

### **III. METHOD**

The researcher employed the critical constructivism paradigm (Denzin, Norman, K. & Lincoln, Yvonna, 2018; Mosco, 2009). This paradigm broadens and modifies the constructivist perspective, which is in opposition to positivism. In alignment with the researcher's examination of Indonesian mother micro-celebrities, an analysis of the concept of motherhood necessitates a critical lens, recognizing that knowledge of the world is temporally and culturally interpreted. The knowledge and phenomenon of motherhood in YouTube content is socially constructed in a dialogue between culture, society, economics, and other factors. From an ontological perspective, critical constructivism aims to elucidate the way socio-historical dynamics exert an influence and shape the object of research. From an epistemological perspective, critical constructivism examines the ways in which the knowledge bases of a specific context shape and influence the object of research (Creswell & Creswell, 2018). This paradigm is useful for identifying practices in research that may unintentionally contribute to the perpetuation of systems that oppress based on class, race, culture, and gender. The researcher posits that this perspective encourages reflexivity and questioning through dialogue and critical self-reflection. Consequently, this approach can help expose elitist assumptions embedded in existing knowledge.

We employed a qualitative approach (Creswell, John W. & Poth, Cheryl, 2018) to gain insight into the context and complexity of the process of construction and transformation of the meaning of motherhood, as well as the commodification of migrant women's connected motherhood. The researcher employed a qualitative content analysis method (Krippendorff, 2019) to examine the content of the message. We selected this method because it is an effective means of identifying the underlying concepts expressed in the text. The researcher selected the unit of analysis based on the popularity of the content among the largest number of viewers. The content is from the creators of "Happy Family in Germany," "Kimbab Family," "My OzLife," "Shanty in China," and "Istive Musab." Researchers analyze the entire text of the conversation, which is called conversation analysis (Krippendorff, 2019). The stages in the analysis process are unitizing, sampling, recording, reducing, inferring, and narrating (Krippendorff, 2019).

### **IV. RESULT AND DISCUSSION**

Women as trailing spouses have difficulty finding work in the formal sector (Indriani & Mulyana, 2021). This structural problem is faced by women everywhere, and women learning informal work. YouTube is an informal workspace where mothers can earn income from home (Mahameruaji et al., 2018). Migrant moms, or moms who move for a living, could become content creators and upload content related to their life experiences as migrants. Popular micro-celebrity mom content on YouTube covers a wide range of topics that attract attention and a large following, such as daily life vlogs, parenting and child education tips, recipes and cooking, and mom creativity. These migrant moms benefit economically from advertising and partnering with brands. They create a space where their followers can interact, exchange information, and support each other.

In media economics, these moms can be called "micro-celebrities" referring to individuals who have a relatively small fan base or following but who have considerable influence among their followers (Raun, 2018). Micro-celebrities are often

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considered a new form of influencer marketing (Abidin, 2016). As a result, micro-celebrities can be an attractive option for brands or companies looking to promote their products or services on social media at a lower cost than using more well-known mainstream celebrities. A mother micro-celebrity in this study refers to a mother who is a migrant and has a relatively small fan base or following but has significant influence within a particular community.

In this context, a migrant mother who is active on social media or other digital platforms can share her life experiences as a migrant, the challenges she faces, and her inspiring stories. Through such content, she can build a loyal fan base or following who are interested in her stories and perspectives. In addition, micro-celebrities can also open up new opportunities for digital content creators who want to build their careers in the media industry. By utilizing digital platforms to build a loyal fan base or following, micro celebrities can build their reputation as influential content creators and earn income from sponsorships or partnerships with brands or companies.

The development of mothers as micro-celebrities who commodify the family began when YouTube arrived in the 2010s. This is in line with research that presents data that mothers producing content about family have the most subscribers and viewers (Blade, 2023a, 2023b). An in-depth exploration of mothers as micro-celebrities shows that migrant women as mothers married to foreigners and living in their husband's country actively produce content (Indranila, 2022). In this context, Indonesian migrant mother micro-celebrities share content about culture, cultural differences, culinary, daily life, travel or other content.

The researcher uses the concept of mothers who work informally in their husband's country through social media as an internet-connected identity, namely micro-celebrity (Senft, 2013). The understanding of micro-celebrity is an individual who is committed to spreading and maintaining one's online identity as if it were a brand (Senft, 2008, 2013). Mothers as micro-celebrities work and benefit economically through followers and fans on social media. Micro-celebrities gain fame by managing audiences by greeting and talking to them (Senft, 2013). Therefore, mother micro-celebrities perform greetings by exploiting private lives, such as daily routines (Abidin & Brown, 2018) to provide consumption with information about life in other countries. They, as laborers, do not differentiate between the private and public spheres (publicity). This erosion between private and public has spread and caused a social condition called "strange familiarity" (Senft, 2008). Researchers argue that micro-celebrity mothers living in foreign countries try to become familiar with unrecognized audiences through the exchange of personal information.

Researchers criticize the study of family commodification in micro-celebrities separately, which only discusses the commodification of content or audiences or workers. Previous studies on family content commodification are limited to cultural differences (Lobodally, 2022; Nurhasanah et al., 2022), family life (Syafuddin, 2020) and children's talents (Nafsa & Zulhazmi, 2022). Meanwhile, studies of content commodification outside the family examine the high economic value of celebrities who discuss conflict (Khairiyani, 2022) and personal life (Noviasri & Andari, 2017). Furthermore, the exploration of studies on audience commodification is also limited to how the YouTube platform works in commodifying the audience as workers in Indonesia (Febriyanti, 2021). Meanwhile, studies of worker commodification see content creators who employ other actors as immaterial workers (Labas & Yasmine, 2017). This is also in line with those who choose children as "main star" workers (Nafsa & Zulhazmi, 2022).

We argue that research on YouTube and commodification tends to study it in a partial way and in isolation from broader commodification processes. We conclude that previous research on family commodification needs to be examined in a "connected" way, or in reference to the integration or interconnectedness of digital technologies. We argue that the digital platform, YouTube, enhances the connection between the content economy, audience and creative labor by fostering commercial interactions (Ørmen & Gregersen, 2022)-so that moments of commodification are not separate or linear in nature. There are several gaps in the study of YouTube and commodification that position YouTube as an institution or platform that has great power to commodify.

This is in line with previous studies that explain how the YouTube platform commodifies the audience as workers (Febriyanti, 2021), vloggers as YouTube stars (Glatt, 2017), intimacy content on micro celebrities to determine affective labor (Raun, 2018). Selain pentingnya mengkaji cara kerja komodifikasi terhubung, perlu juga untuk mengkaji pengguna, dalam hal ini kreator konten, sebagai aktor yang mempraktikkan komodifikasi terhubung. Pelembagaan platform YouTube mendapatkan keuntungan ekonomi dari pengiklan karena adanya konten-konten amatir kreator konten yang menjadi tempat baru untuk produksi selebritas industri. In addition to the importance of examining how connected commodification works, it is also necessary to examine users, in this case content creators, as actors practicing connected commodification. The institutionalization of the YouTube platform gains economic benefits from advertisers as amateur content creators become the new venue for the production of industrial celebrities.



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## Connected Commodification: Content, Audience, and Labor

Adam Smith and classical political economists distinguish between use value and exchange value (Mosco, 2009). Use value comes from human needs, while exchange value is the value of what the product gets in return (Fuchs & Mosco, 2016; Mosco, 2009). The researcher uses the main concept that commodification is the process of transforming use value into exchange value to review the research problem. This study uses the view that commodities that accumulate into capital do not occur naturally, but through a production process that has control over humans (Marx, 1904). In other words, motherhood products become exchange value produced to become capital for micro-celebrities.

Content commodification is the process by which ideas, experiences, or expressions of a personal or social nature are transformed into products or services that have economic value and can be traded (Mosco, 2009). In the context of this study, content commodification occurs when something that was originally not for commercial purposes, such as daily life, or the role of mothers is transformed into material that is attractive for public consumption and utilized for economic gain, in this case monetization. The researcher observed that there are characteristics of content commodification such as the transformation of the meaning of personal aspects of motherhood from family experiences into “content” that can be sold or accessed by audiences at a certain value. In particular, we see this perspective as a process of commodification in communication that involves the transformation of messages (Fuchs & Mosco, 2016; Mosco, 2009). The commodification of content creates an economic value that is produced to attract audiences and thus becomes an asset for platforms or brands that want to reach a specific market. Researchers suggest that the YouTube platform is the main arena where this commodification takes place.

In YouTube content created by Indonesian female micro-celebrities married to foreign men, narratives of motherhood in cross-border or cross-cultural marriages are often commoditized and consumed by audiences. I argue that this communication phenomenon demonstrates in popular culture that the meaning of motherhood is influenced by cross-cultural identity and media exposure. We analyze the commodification that occurs in this phenomenon in reference to aspects of mothers' personal lives that are transformed into commercial value through YouTube. YouTube is the main platform for mothers to build a public image for commercialization purposes. They portray the role of an idealized transnational married Indonesian mother. The researcher determined three content packaging that micro-celebrities use to build personal brands, namely in the form of daily life, lifestyle, and parenting style. We argue that these are the three things that attract advertisers and brand collaborations.

This research found that the meaning of motherhood is transformed not only to be represented as a biological and emotional function, but also as a commodity that can bring economic benefits. These Indonesian micro-celebrity mothers represent culture through cultural uniqueness that is marketed as unique and inspiring. The text that is built in YouTube content by displaying the image of a multicultural family is considered modern and attractive to the audience. The commodification of motherhood is inseparable from gender issues where women face pressure to maintain the image of the “perfect mother” who is also economically successful as a micro-celebrity. This pressure impacts on them to perform motherhood, between authenticity and commercial strategies that risk sacrificing personal values in order to maintain relevance and profitability in the market. The meaning of the ideal life and the “perfect mother” also has an impact on the normalization of consumerism that is connected to the display of consumption of certain products intended for the family. The researcher argues that through the comments of followers, this pattern grows what is considered to be the ideal or perfect mother in the minds of followers. Of course, there are desires from other mothers to reach unrealistic standards.

The commodification of content by these micro-celebrity mothers aims to reinforce the transformation of the meaning of their mothers which creates a relation of production of consumption by the audience. Audiences contribute to the creators' profitability through interactions such as likes, comments and shares, which are then translated into commercial value. The researcher relates this transformation of motherhood to the commodification of audiences. We analyze that audiences are mobilized as economic assets through representations of motherhood and intercultural life produced and distributed in YouTube content. The motherhood content featured by these micro-celebrities involves the promotion of children's, household, or lifestyle products that are perceived to be relevant to the target audience, namely young mothers or mothers-to-be who are inspired by migrant life or transnational marriage. Researchers argue that these micro-celebrities are like the media that produce audiences and deliver them to advertisers (Mosco, 2009).

Personalized motherhood narratives help create an emotional connection with audiences, making it easier for them to be led to buy the advertised product. The programming used to attract audiences is no longer a “free lunch” (Fuchs, 2012). From this perspective, the audience is the main product. As Indonesian women married to foreign men, these micro-celebrities often present a unique intercultural home life. These narratives combine motherhood with cultural exoticism, where cultural differences between the couple are used to attract the attention of the audience. Highlighting differences in language, customs or challenges in intercultural relationships can enhance the appeal of their content. However, it also presents ethical issues



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related to stereotyping and romanticizing certain cultures. Cultural representations are often simplified for commercial purposes, which can reinforce certain biases among audiences. YouTube as a platform facilitates the commodification of audiences through features such as comment sections, “like” buttons, and recommendation algorithms. These micro-celebrities utilize interactions with audiences to build loyalty and increase engagement, which ultimately impacts their revenue from advertising or sponsorship.

An important point in this research, often examining the commodification of content and audiences ignores the commodification of labor. The researcher analyzes that content production as digital labor. In the production of motherhood-themed content, micro-celebrities not only act as mothers who share their experiences, but also as digital workers who produce content. Labor is constituted out of the unity of conception, or the power to envision, imagine, and design work, and execution, or the power to carry it out (Mosco, 2009). Everyday activities such as parenting, cooking, and living an intercultural home life become “emotional labor” that is capitalized on to attract audiences. This emotional labor demands a combination of authenticity and performativity. Micro-celebrities must show a side of life that seems real and relatable, while remaining visually and narratively appealing. In doing so, they integrate personal life with commercial work, often blurring the lines between personal and professional life.

The researcher establishes mothers as micro-celebrities as a labor force that not only includes technical content production activities (video shooting, editing, and distribution), but also includes the exploitation of their emotional and relational dimensions. Personal lives become economic assets, where every interaction and story has the potential to be commercialized. Domestic life as a mother that is usually considered “private” becomes part of a commodified marketing strategy. For example, moments of intimacy with children, interactions with partners, or adaptations to foreign cultures are featured as the main attraction. Gender roles on YouTube that feature motherhood as a central theme in content reflect dominant gender roles, where women are expected to multitask: caring for children, managing the household, and generating income through digital work.

In this context, female micro-celebrities face the dual pressures of fulfilling social expectations as “perfect mothers” and meeting market demands as productive digital workers. At the same time, marriage to a foreign man gives their content added appeal, as it creates a unique narrative of cultural adaptation and cross-country relations. These micro-celebrity mothers also face the challenge of the platformization of labor. The YouTube platform provides a space for microcelebrities to generate revenue through advertisements, sponsorships or brand collaborations. However, it also puts micro-celebrities in a vulnerable position to the logic of platformization. YouTube's algorithm determines the visibility of content, which affects creators' earnings. Therefore, microcelebrities have to constantly create relevant and engaging content, which often increases their work intensity. Moreover, the work done is often not fully rewarded. Revenue from the platform mostly goes to YouTube as the owner of the ecosystem, while creators only receive a small portion.

This shows that although micro-celebrities have autonomy in content production, they are still dependent on the capitalistic structure controlled by the platform. This commodification of labor in motherhood-themed YouTube content presents an ethical dilemma. On the one hand, micro-celebrities have the opportunity to generate income and build their personal brand. On the other hand, the exploitation of aspects of their personal lives, especially motherhood and intercultural marriage, can cause psychological and social distress. In addition, the labor performed is often not formally recognized. Work such as video editing, interaction with followers, and personal brand management are often considered as “additional activities,” despite requiring significant time and effort. This finding is in line with the results of research with the example of YouTube beauty vloggers, this study shows that celebrities on social media are economically embedded in an industrial structure shaped by the platform's business model, technical capabilities, advertising market, and commercial cultural intermediaries (Hou, 2019).

The findings reveal that cultural differences between Indonesian women and their foreign partners become a capitalized element, creating a sense of motherhood that women's roles in the domestic sphere can be used as an economic opportunity, but at the risk of blurring the lines between personal and professional life. As micro-celebrities, they become an important part of the growing creator economy, providing new economic opportunities for women in a patriarchal society. This research provides critical insights into the dynamics of commodification in the digital economy, particularly among women who utilize platforms like YouTube to showcase their motherhood. The findings highlight the need for a more gender-conscious approach in understanding the social and economic impacts of the creator economy, as well as the importance of regulations that protect the rights and welfare of creators in the digital space.

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## V. CONCLUSIONS

This research reveals that Indonesian migrant women who are married to foreign men and become micro-celebrities on YouTube commodify content, audiences and labor in a bounded manner. The transformation of motherhood produced by Indonesian women micro-celebrities is not only a means of sharing experiences, but also a tool to generate economic benefits. Portrayals of “ideal” and “perfect” motherhood are often associated with parenting skills. In this context, mothers are not only domestic figures, but also market actors who influence audiences' preferences for certain products. The commodification of motherhood in the context of micro-celebrities of Indonesian women married to foreign men is a phenomenon that shows how traditional roles can be transformed into economic value through social media. However, this process also brings ethical, social and emotional challenges that need to be addressed. This research suggests the need for further studies on the impact of this phenomenon on society, especially in terms of representations of gender, culture and family.

This research reveals how female micro-celebrities use their maternal identities and intercultural lives as commodities that appeal to audiences. Narratives of motherhood and cultural exoticism are packaged in such a way as to generate economic value through collaborations with brands and platforms. However, this commodification also presents ethical challenges, such as the reinforcement of cultural stereotypes, the exploitation of audience emotions, and the entrenchment of traditional gender roles. This study highlights the importance of examining the power dynamics between creators, platforms and audiences, and their impact on representations of gender and culture in digital spaces.

This research shows that the micro-celebrity labor of Indonesian women married to foreign men on motherhood-themed YouTube content is a commodified form of digital labor. Their personal lives become economic assets that appeal to audiences, while their emotional and technical labor becomes part of the capitalistic ecosystem of digital platforms. A more critical approach is needed to understand how micro-celebrities manage their digital labor, including recognition of the workload they bear and the social and psychological impacts of this commodification.

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## The Effect of Physical Activity on Multiple Intelligences: A Literature Review



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**ABSTRACT:** Sport is a meaningful context in which many young people participate, and youth sports teams can be an effective way to promote optimal development. Sport includes any form of physical activity that contributes to physical fitness, mental well-being and social interaction. The research objective of this literature review study is to determine the effect of physical activity on intelligence and to determine the effect of physical activity on multiple intelligences. This research uses a literature review design. The data used in this research are published articles published in international and national journals. Searches for published articles were carried out using several journal database websites such as Mendeley, Science Direct, Google Scholar, and PubMed. Based on the literature that has been reviewed, the results show that there are 8 studies that show the influence of physical activity on intelligence and multiple intelligences in a person. It is hoped that the results of this research can be used as a reference for other researchers to use as a reference.

**KEYWORDS:** physical activity, intelligence, multiple intelligences, sport, literature review

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### I. INTRODUCTION

Physical activity is any bodily movement produced by the contraction of multiple muscles that increases energy expenditure above the resting metabolic rate and is characterized by its modality, frequency, intensity, duration, and the context in which it is performed (Thivel et al., 2018, p. 2). Physical activity is defined as “any bodily movement produced by skeletal muscles that results in caloric expenditure” (Caspersen, C.J., in Norris et al., 2020, p. 126). Therefore, physical activity is generally described across the following four dimensions: (i) frequency – “the amount of physical activity over a specific period of time”; (ii) duration – “the time spent engaging in a single bout of physical activity”; (iii) intensity – “the physiological effort associated with participating in a specific type of physical activity”; and (iv) type of activity. Ideally, any assessment of physical activity should measure all of these dimensions and account for daily variations (Harkins et al., 2016, p. 353).

It has been suggested that participation in physical activity and achieving high levels of physical fitness are associated with improvements in brain structure and function, cognition, and academic performance through direct and indirect physiological, cognitive, emotional, and learning mechanisms (Hillman et al., 2008). Furthermore, scientific evidence presented by Howie and Pate (2012) indicates that being physically active (such as playing sports) during the school day does not negatively impact academic success or progress. Physical activity during adolescence is also associated with cognitive performance in adulthood. Adolescents who are moderately active, especially those who maintain consistent levels of physical activity, tend to demonstrate higher cognitive performance (Esteban-Cornejo et al., 2015). Therefore, it is important for teachers to create more opportunities for children to engage in physical activity during the school day.

The influence of physical activity on intelligence has garnered increasing attention in recent years. Research has demonstrated that physical activity can affect intelligence by influencing subcortical brain structures (Cadenas-Sanchez et al., 2023). Other studies support this relationship, drawing on theories of cognitive load and embodied cognition, which highlight the importance of combining motor play from an early age with the teaching of academic content through integrated physical activity (Mavilidi et al., 2019). Despite this evidence, most schools still adhere to traditional sedentary teaching models for the majority of the school day (Steele et al., 2010). Adolescents typically spend only 5% of the school day engaged in moderate-to-intense physical activity and exhibit very low levels of motor exercise during breaks and recess (da Costa et al., 2019).



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Physical activity plays a crucial role in supporting overall health and fitness. In addition to its physical benefits, engaging in regular physical activity can also provide significant mental and social advantages. Furthermore, as highlighted earlier, physical activity can influence various aspects of a person's multiple intelligences. The purpose of this literature review is to examine the impact of physical activity or sports on the development of multiple intelligences. By understanding the findings of this study, it is hoped that this review can serve as a valuable reference for individuals or institutions involved in education, particularly in physical education and sports. Encouraging increased physical activity among students can help maximize its benefits on their multiple intelligences.

### **II. RESEARCH METHOD**

#### **A. Research Strategy**

This study employs a literature review method to investigate the relationship between physical activity and multiple intelligences. The objective of this literature review is to provide a comprehensive overview of existing research on the topic while identifying current knowledge gaps and areas requiring further exploration. The literature for this study was sourced from reputable journal databases, including Mendeley, Google Scholar, PubMed, and ScienceDirect. The search process utilized relevant keywords such as "physical activity," "multiple intelligences," and "cognitive development." Articles selected for inclusion in this review were required to align closely with the topic, emphasizing the effects of physical activity on multiple intelligences.

#### **B. Exclusion Criteria**

To ensure that the literature included in this study was relevant and of high quality, several exclusion criteria were applied. Articles published in journals not indexed in reputable databases were excluded from the review to maintain credibility. Additionally, only articles published within the last five years (2019–2024) were included to ensure that the data and findings used were current and up-to-date. Articles that did not explicitly address or discuss the effect of physical activity on multiple intelligences were also excluded from the analysis. Furthermore, non-research articles, such as editorials, commentaries, or short reviews, were excluded to focus solely on empirical and scholarly studies that directly contributed to the research objectives. These criteria ensured the inclusion of high-quality and relevant literature for this review.

#### **C. Procedure**

The research procedure consisted of several key stages to ensure a systematic and thorough review. The process began with a literature search through various journal databases using predetermined keywords. The articles retrieved from this search were then screened based on their titles and abstracts to assess their relevance to the research topic. After this initial screening, the articles deemed relevant were further evaluated using inclusion and exclusion criteria to ensure their eligibility. Articles that met these criteria were collected for further analysis, which focused on the independent variable (physical activity) and the dependent variable (multiple intelligences). This analysis included examining the study design, research objectives, sample characteristics, instruments used, and main findings or results of each selected article. The results of this analysis were summarized into a comprehensive overview that presented key information from each article, such as the name of the researcher(s), year of publication, study design, and main findings related to the research topic. By following this structured procedure, the study aims to provide a clear understanding of the relationship between physical activity and multiple intelligences while identifying gaps in existing research that require further exploration. The research procedure for this study is illustrated through the following PRISMA diagram.

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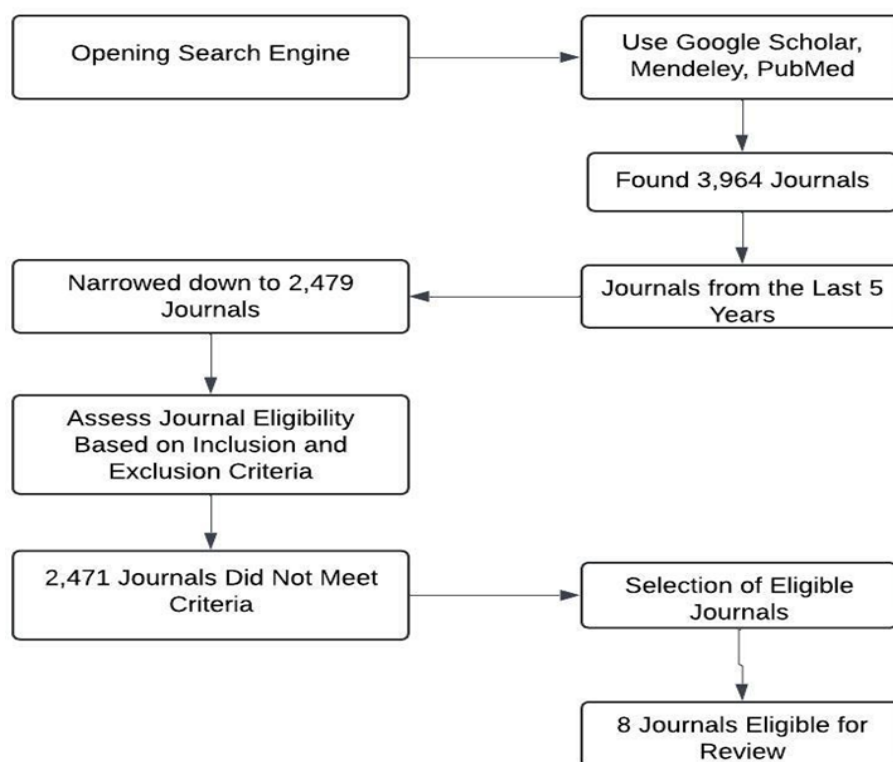


Figure 1. PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analysis) diagram

### III. RESULT AND DISCUSSION

This literature review gathers secondary data from reputable sources such as Mendeley, Google Scholar, and ScienceDirect, as well as other reliable journal databases. The keywords used for the search include "physical activity," "sports," "intelligence," and "cognitive." The data are categorized into five key groups, which are summarized in Table 1.

Table 1. Table 1 Results of national and international journal data synthesis

Author and year	Research Methods and Types	Content	Research Objectives	Research Result
José Luis Ubago-Jiménez, Félix Zurita-Ortega, Silvia San Román-Mata, Pilar Puertas-Molero dan Gabriel González-Valero (2020)	Descriptive, cross-sectional, and non-experimental design.	Relationship between physical activity, diet (specifically the Mediterranean Diet), and multiple intelligences in university students.	To establish relationships between the practice of physical activity and the various types of intelligences and to determine the relationship between diet, particularly adherence to the Mediterranean Diet, and different types of intelligence among university students.	The results of the study indicate significant gender differences in both physical activity and adherence to the Mediterranean Diet among university students. Women showed a higher adherence to the Mediterranean Diet, while men had higher scores in physical activity levels. When examining multiple intelligences, men exhibited higher indices in Bodily-kinesthetic, Interpersonal, Logical-mathematical, Musical, and Spatial intelligences. In contrast, women demonstrated higher levels in Linguistic, Intrapersonal, and Naturalistic intelligences.
Sara Jochumsen, Tine Brink Henriksen, Morten Søndergaard	The research utilized a cohort study, an observatio	The study investigates the link between maternal physical activity during pregnancy and the intelligence	The primary objective was to determine if maternal physical activity during pregnancy is associated with lower risk of low intelligence	The study found that higher maternal physical activity during pregnancy was linked to a reduced risk of low intelligence scores in sons. Sons of active women had significantly lower odds of scoring in the lowest 10%, with adjusted odds ratios of 0.66 for light, 0.46 for

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Lindhard, Hanne Kristine Hegaard, dan Line Rode (2019)	nal study method.	scores of their sons in early adulthood.	scores in sons. The study also adjusted for factors like maternal BMI, education, and smoking to ensure accurate results.	moderate to heavy activity, and 0.50 to 0.62 for those engaged in sports. This suggests that increased maternal activity benefits offspring's cognitive development.
Wang, K.; Li, Y.; Zhang, T.; Luo, J. (2022)	The study used a cross-sectional survey method, which is a type of quantitative research	Relationships between physical exercise, self-efficacy, emotional intelligence, and subjective well-being among college students, focusing on how these factors interrelate and collectively influence subjective well-being, with an emphasis on the mediating roles of self-efficacy and emotional intelligence.	To analyze the factors influencing college students' subjective well-being and to understand the path mechanisms linking physical exercise, self-efficacy, and emotional intelligence to subjective well-being.	The study found that physical exercise is positively correlated with self-efficacy, emotional intelligence, and subjective well-being. It directly enhances subjective well-being and indirectly does so through self-efficacy and emotional intelligence. A chain mediation effect involving self-efficacy and emotional intelligence was also identified, highlighting the importance of emotional management and application in improving students' life satisfaction and happiness.
Real-Pérez MGavala-González JSilva MFernández-García J (2022)	This research employed a correlational study method, a type of quantitative research	The research investigated the relationships between motor capacity, academic performance, and intelligence in children.	The primary objective was to assess the existence of significant relationships between motor capacity, academic performance, and intelligence in pre-adolescent children and to determine whether participation in sports influences these relationships.	The study found significant correlations between motor capacity and intelligence but not with academic performance. Children who participated in sports showed better motor capacity and intelligence test results compared to those who did not, suggesting that intense physical activity and sports may contribute to improved academic performance.
Nofi Marlina Siregar, Eka Fitri Nofita Sari, dan Dinan Mitsalina (2023)	This study used action research with a sequential exploratory design, incorporating both quantitative and qualitative analysis	Relationship between physical activity and mathematical logical intelligence in early childhood. It specifically investigates how game-based physical activity can enhance cognitive skills in children, focusing on improving logical	The main objective was to determine the effect of physical activity on the enhancement of mathematical logical intelligence in early childhood. The study aimed to assess the improvement in cognitive abilities through structured physical activities and games.	The study found a significant increase in logical mathematical intelligence among children in Jakarta Kindergartens. The average intelligence score rose from 28 in the initial assessment to 57 after the first cycle and further to 78 after the second cycle, indicating that game-based physical activity effectively enhances cognitive development in young children. Future research should expand on these findings with a larger sample size.

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	(Mix Method)	mathematical intelligence in a kindergarten setting in Jakarta.		
Kusriyanti dan Pamuji Sukoco (2020)	This research utilized a research and development (R&D) method, combining both quantitative and qualitative approaches.	Developing and validating a model of physical activities based on the surrounding nature to enhance naturalistic intelligence in elementary school students.	The main objectives were to create a model of physical activities based on the surrounding nature aimed at improving naturalistic intelligence in elementary students and to evaluate the effectiveness of this model through expert assessments and field trials.	The study successfully developed a learning model documented in a VCD and guidebook, consisting of four nature-based physical activities. Expert assessments concluded that the model is suitable for physical education in lower elementary grades. The model was found to be effective in enhancing naturalistic intelligence among students in the tested schools.
Ainun Rofiqoh, Lilis Madyawati, dan Rasidi (2021)	Correlational research method, a type of quantitative research	Relationship between students' sports abilities and their participation in marching troop extracurricular activities with their kinesthetic intelligence.	Determine the correlation between sports ability and participation in marching troop extracurricular activities with the kinesthetic intelligence of elementary school students.	The study found significant correlations between both sports ability and extracurricular marching activities with kinesthetic intelligence. The coefficients for sports ability and marching activities with kinesthetic intelligence were 0.530 and 0.624, respectively, indicating a positive relationship. The results suggest that both factors are associated with higher levels of kinesthetic intelligence in students.
Wu R Jing L Liu Y Wang H Yang J (2022)	The study used a cluster sampling method, a type of quantitative research	Impact of physical activity on regulatory emotional self-efficacy, resilience, and emotional intelligence among nurses and explains the interactions between these factors.	The main objective of this study is to examine the influence of physical activity on nurses' regulatory emotional self-efficacy, resilience, and emotional intelligence, and to explain how these factors interact to alleviate the physical and mental stress experienced by nurses.	The results showed positive correlations between physical activity and resilience, resilience and regulatory emotional self-efficacy, and emotional intelligence and regulatory emotional self-efficacy. The positive impact of physical activity on emotional regulation self-efficacy is fully mediated by emotional intelligence and resilience, with stronger explanatory power ( $R^2 = 0.49$ ) than previous studies. Physical activity-generated positive emotions are key in enhancing emotional regulation self-efficacy, emotional intelligence, and resilience.

Based on the table above, the research findings indicate that physical activity has a significant impact on various types of intelligence. First, the study by Ubago-Jiménez et al. (2020) highlights the relationship between physical activity, diet (specifically the Mediterranean diet), and multiple intelligences among university students. The results reveal significant gender differences, with men scoring higher in bodily-kinesthetic, interpersonal, logical-mathematical, musical, and spatial intelligences, while women excel in linguistic, intrapersonal, and naturalistic intelligences. Second, the research by Jochumsen et al. (2019) demonstrates that maternal physical activity during pregnancy reduces the risk of low intelligence scores in male offspring during early adulthood. This finding underscores the long-term cognitive benefits of maternal physical activity. Third, the study

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by Wang et al. (2022) finds a positive relationship between physical exercise, self-efficacy, emotional intelligence, and subjective well-being among college students. Physical activity directly enhances subjective well-being and indirectly influences it through self-efficacy and emotional intelligence. Fourth, research by Real-Pérez et al. (2022) identifies significant correlations between motor capacity and intelligence in children actively participating in sports. The results suggest that intensive physical activity contributes to improved intelligence levels.

Moreover, the study by Siregar et al. (2023) reveals that game-based physical activities significantly enhance logical-mathematical intelligence in early childhood. Structured physical activities led to an increase in intelligence scores from 28 to 78 after two intervention cycles. Research conducted by Kusriyanti and Sukoco (2020) shows that nature-based physical activities effectively improve naturalistic intelligence among elementary school students. Similarly, the study by Rofiqoh et al. (2021) identifies a positive correlation between sports ability and kinesthetic intelligence through participation in extracurricular activities. Lastly, the research by Wu et al. (2022) demonstrates that physical activity enhances emotional self-efficacy, resilience, and emotional intelligence among nurses. These findings emphasize the crucial role of physical activity in managing physical and mental stress.

Overall, the research highlights the significant benefits of physical activity on various types of intelligence, both directly and indirectly. These findings reinforce the importance of integrating physical activity into educational curricula and professional practices to optimize cognitive and emotional development.

### IV. CONCLUSIONS

The findings from this literature review confirm the significant role of physical activity in enhancing various types of intelligence across different age groups and contexts. Physical activity not only directly improves cognitive, emotional, and motor skills but also contributes indirectly through mechanisms like self-efficacy, resilience, and emotional intelligence.

The research highlights that game-based activities effectively enhance logical-mathematical intelligence in early childhood, while nature-based physical activities promote naturalistic intelligence among elementary students. In adults, physical activity improves emotional intelligence, resilience, and subjective well-being. Additionally, maternal physical activity during pregnancy is shown to have long-term positive effects on the cognitive development of offspring. Gender differences in intelligence types associated with physical activity were also noted, emphasizing the diverse impacts of these activities.

These results underline the necessity of incorporating physical activity into educational and professional settings as a strategic approach to foster cognitive, emotional, and social development. Future research should explore longitudinal studies and diverse sample populations to better understand the causal relationships and further broaden the application of these findings.

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## The Relevance of Contemporary Citizenship with Derek Heater's Philosophical Thinking



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**ABSTRACT:** *The concept of citizenship is important in the study of political science and will continue to develop along with world developments. Derek Heater in his work entitled "What is Citizenship" explains two concepts of citizenship that are commonly known to the public, namely including liberal and republican ideology plus 1 concept related to dual citizenship. The relevance of existing concepts of citizenship to contemporary issues is currently the focus of research. Every concept and its application in countries in the world is driven by critical thinking and great turmoil in the process of comparison and consideration of how to use this understanding for a long time. The research method used is qualitative research with a literature study approach. The literature study was carried out by reducing primary data, namely the work of Derek Heater entitled "What is Citizenship" which was juxtaposed and strengthened by secondary data according to the study topic, namely the concept of citizenship studies. Different concepts of citizenship influence views on the relationship between the individual and the state, as well as political and social rights within the ideals of statehood.*

**KEYWORDS:** Dual Citizenship, Concept of Citizenship, Liberalism, Republicans

### I. INTRODUCTION

Citizenship studies is an important concept in the study of political science in every country in the world. This concept continues to grow more complex along with developments in the era of rapid globalization. Developments that occur give birth to cultural identity identities that lead to an international community. In his work in the form of a book entitled "What is Citizenship", Derek Heater attempts to explain the traditions and meanings of various concepts of understanding related to existing citizenship. There are two major and commonly recognized concepts of citizenship. Heater's paper will discuss how the two major understandings related to the concept of citizenship have developed. In addition, citizenship is also a relevant subject to see the understanding of the political system and the interaction between the state and citizens at the global level today. The complexity of the concept of each study or understanding of citizenship demands a deep understanding of the developments that have occurred over time. As a young generation, knowing and understanding the origin of every existing notion of citizenship is also a must because every existing notion of citizenship certainly has a different basis or fundamental. The fundamental differences in each understanding of citizenship will affect our views on all matters relating to citizenship. These differences can relate to several things such as the way of looking at the relationship between individuals and the state, the rights and obligations of its citizens, as well as the ideals of statehood that are considered ideal in each understanding of citizenship.

The relevance between liberal and republican views of citizenship by highlighting contemporary issues today needs to be explored in depth. Contemporary issues here can be issues related to multiculturalism and parallel citizenship today comprehensively from both the liberal tradition and the republican tradition. Liberalism itself is the basis of thinking for western democracies that emphasize individual rights and their relationship with the state as a service provider. Whereas in republicanism, modern social complexity emphasizes the importance of the role of the state and the obligations of its citizens. Republicanism also emphasizes social obligations and active participation in a political community. According to Heater, these two notions of citizenship also discuss important elements of citizenship viewed from two different perspectives. These elements include citizenship status, political and social rights and solidarity (Heater, 1999).

An individual's citizenship status will depend on the notion of citizenship used by the country, this will also have an impact on the political and civic rights he gets so that social orientation will depend on the cultural and political traditions of the notion of citizenship adopted in the country concerned. This is in line with what Wiel and Groot said that social orientation is highly

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dependent on social cultural and political traditions, where there is collaboration and social justice (Wiel & Isolde, n.d.). In relation to citizenship status, the concepts of parallel citizenship and dual citizenship have also been born. The concept of dual citizenship is often associated with the means of liberalization because it emphasizes individual rights and sacrifices the prerogatives of the state where a citizen may live outside his own country while maintaining his citizenship status (Midtbøen, 2019). Based on the explanation of the background above, this paper aims to explore how the relevance of the concept of the concept of citizenship studies described by Derek Heater to the current issues of citizenship issues, especially citizenship issues in Indonesia.

### **II. METHODS**

This analysis uses a qualitative research method with a library research approach. According to Darmalaksana, a library study begins with searching for sources, both primary and secondary sources, followed by data classification based on the research formula. After the research formula is found, data processing is carried out in the form of quoting references which will later be presented and also concluded (Darmalaksana, 2020). Literature study is a method of collecting data by understanding and studying theories from various literatures related to the research being carried out (Adlini, 2022). The literature or reading sources used include books and journal articles that have a relationship with the problem being studied with 1 primary source, namely a book by Derek Heater entitled "What is Citizenship". Data obtained through primary sources is processed and juxtaposed with secondary data that supports explanations related to the topic of study. The data is processed systematically and clearly to be presented and described in the discussion so that it can become a comprehensive reference and reading material related to the topic of study of the concept of the concept of citizenship.

### **III. RESULTS AND DISCUSSION**

Based on the results of the research analysis, there are 3 important aspects that will be discussed and described in Derek Heater's article entitled "What is Citizenship". These 3 important aspects include the study of citizenship with a liberal tradition or understanding, the study of citizenship with a republican tradition or understanding and the study of citizenship with the concept of parallel citizenship. Parallel citizenship can also be interpreted as dual citizenship. Dual citizenship is usually obtained by a child who comes from a marriage of two people with different nationalities. Before entering into the discussion of these 3 aspects, the researcher will describe how the concept of citizenship in general and broadly. Then how is the concept of citizenship brought by Derek Heater itself and analyze the concept with the concept of citizenship that is widely used today in accordance with the title of his work, "What is Citizenship" as follows:

#### **A. Concept of Citizenship**

The law provides an authoritative framework for the state to determine the subject of citizenship in each country. There are at least three basic points that emphasize the authoritative nature of the law. First, international law recognizes that every state has the right to determine who may or may not become a citizen. Second, the law equates the definition of citizenship with nationality in the political sense. Third, citizenship can be defined in two classifications, namely *Ius Sanguinis* and *Ius Soly*. *Ius Sanguinis* is citizenship obtained based on the citizenship of the parent's origin while *Ius Soly* is citizenship obtained based on the region of birth of an individual (Heater, 1999). In Indonesia itself, the requirements to become a citizen legally have been explained in the state constitution, namely the 1945 Constitution, precisely in Article 9 of Indonesian Law No. 12 of 2006. Citizens are defined as indigenous people and foreigners who have been legalized as Indonesian citizens (WNI) by law. The principle of equality is something that cannot be separated from the nature of citizenship. There are many contradictions in theory and practice that suggest that equality is at the core of citizenship and therefore valid. For example, the use of the terms equal treatment and equal treatment can simply be interpreted as the same, but in essence these two terms have deep meanings with different interpretations. Equal treatment is interpreted as leading to the neglect of differences while equal treatment leads to the recognition of differences. Due to its relevance in many ways, equality is considered a strong characteristic of citizenship so that when individuals as human beings are essentially considered equal, then a political system that experiences disparities within it can be said to be an unjust political system (Heater, 1999).

Equality not only includes the real right to vote and hold public office for citizens, but also includes the freedom to express their opinions in public and ultimately equality will lead to how to maintain the quality and integrity of life in government by prioritizing the principle of justice (Heater, 1999). In Indonesia itself, we recognize the idea of the rule of law (Deliberative). The idea of the rule of law explains how a cultural reality, where ethnic groups are always changing so that it is not appropriate to divert ecological issues about the preservation of ethnic groups because ethnic groups are not to be conserved but transformed (Muzaqqi, 2008). Democracy in a plural society is considered to be based on the assumption that citizens including ethnic groups stand equally in political communication to make a policy. According to the Aristotelian approach in Mackinnon's work, the opposite of equality is

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inequality where the term inequality refers not to differences but to hierarchy (Mackinnon, 2020). On the other hand, equal access to citizenship rights is not always recognized as an ideal, leading to concerns about the weakening of citizenship status in modern times. Overly inclusive naturalization policies result from a country's desire to maintain national cultural homogeneity. Looking at one country, the United States, the laws in place continue to reduce the differences in rights between citizens and non-citizens so that immigrants can have almost the same rights as citizens. Thus, we can conclude that the legislation in the United States related to naturalization has weakened.

Currently, the concept and meaning of citizenship is changing along with the times. In one article, it is mentioned that globalization and rapidly developing digital technology have significantly changed the landscape of citizenship (Aulia, 2024). Citizenship is no longer limited to geographical attachment, but also involves social, political and cultural connections that cross national boundaries. Globalization has brought about changes in national identities, citizens' rights and responsibilities, and political and economic dynamics at the global level. Digital technologies are accelerating this process of globalization, changing the way people interact, communicate and engage in political affairs. However, while globalization and digitalization open up new opportunities for citizenship, they also pose new challenges, including issues of privacy, data security, and information control.

### ***B. Concept of Liberal Citizenship***

Liberal citizenship is the result of the revolutionary upheaval between France and Britain. France was the first country to establish the principles and practices of citizenship as a central feature of the modern socio-political structure of the time. Liberal citizenship places less emphasis on the individual, so the relationship between the citizen and the state is loosely bound (Heater, 1999). In fact, the terms citizen and citizenship are rarely used within the scope of liberal citizenship. Locke has profoundly drawn a picture of liberal citizenship today. Locke says that individuals remain individuals, interpreting that the acquisition of citizen status does not force us to refrain from pursuing self-interest. Citizens in the liberal tradition do not have clear responsibilities towards the state and fellow citizens. As such, the state is expected to exert a weak influence on the lives of its citizens. In the liberal citizenship tradition, there are several theories related to liberal justice, including the theory of justice as fairness. In Rawls' *A Theory of Justice* (1999), the notion of justice is organized around moral principles that are fair to the structure of society. Rawls creates a hypothetical situation to illustrate a just social order where individuals give consent to comply with policies made (Stephen, 2023). Rawls contains two main principles about this theory, it is said that every individual has the same right to an equal scheme of basic freedoms and is entitled to a fair distribution of social and economic goods and positions. Rawls' liberal theory emphasizes the protection of the right to freedom to organize the structure of society. According to Freeman (2020), Liberalism ideally protects a series of basic freedoms for individuals, freedom of conscience, freedom of thought and discussion, freedom of choice of employment and free participation (Freeman, 2020).

In liberalism, rights can be understood as relationships, moral claims and legal instruments. Membership in the liberal community provides basic protection to individuals. However, there are also some groups that are excluded from liberal politics so that these groups do not get protection in the basic human freedoms promised in liberalism. Aside from the rights afforded by liberal citizenship, of course, it has its fair share of critics. The equality discussed continuously in liberalism cannot actually be achieved by society. Marx (1978) also suspects that liberal rights only provide the final form of human emancipation within the framework of the prevailing social order so that the function of things in liberalism is actually to strengthen and protect the needs of existing liberal economic organizations. From the above we see significantly how the ideal autonomy of the liberal individual is not experienced equally by everyone. The liberal tradition originated in the seventeenth century and developed rapidly in the nineteenth and twentieth centuries. The foundations of this liberal tradition can be found in T.H. Marshall's work written after the Second World War and summarized in a book entitled "Citizenship and Social Class". Marshall conceptualized citizenship on the basis of three rights, namely civil rights, political rights and social rights (Effendi, 2018). Civil rights include individual protections for free speech, beliefs and justice. Political rights include the right to participate in government and social rights include the right to public services such as education, health and social services. This tradition was born from the ideology of individualism which emphasizes individual freedom, especially freedom from interference from the state and society. Theories in this liberal tradition also argue that citizens are the authority to make choices and rights. This perspective is characterized by an emphasis on the individual and is rights-based.

In the context of the globalization era of liberal citizenship, the main focus is the influence on global politics and human rights. One study that explored the role of the state, citizen participation, and the protection of individual rights in the concept of liberal citizenship showed that careful regulation of technology adoption, improved law enforcement, and protection of human rights are needed to create an inclusive society that is responsive to global change (Ramadhan, 2024). From this we know that the skills to sort out a revolution that enters the country are so important for the sustainability of the concept of citizenship of the younger generation.

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### C. Concept of Republican Citizenship

In a republican country, the purpose of citizenship focuses on freedom with a citizenship style of community, friendship, harmony, brotherhood and economic issues. The quality of citizens who adhere to republicanism can be seen from the level of Virtue, patriotism and values obtained. Citizens play a role in civil and military participation and are tasked with supervising the ongoing government. The formation of the character of its citizens focuses on the education and religious sectors. (Heater, 1999). Republican political thinking emphasizes the importance of the state and citizens becoming a community in the form of a group of people. In one of Neven Leddy's writings related to republicanism, Wollstonecraft saw that the civil republican tradition contained in ancient history became an important foundation for women's education today. For her, classical education is a way to introduce women to the values contained in republicanism, political ethics and virtues needed in socio-political life (Leddy et al., nd) . In simple terms, republicanism is a concept of citizenship that emphasizes the active involvement of citizens in matters relating to the public interest. This understanding emphasizes the values of freedom, equality, justice, political participation and collective responsibility. So this understanding emphasizes 6 main principles including: common interests, active citizenship, distributed power, freedom and equality, social justice which are packaged and delivered through civic education.

Republicanism has a major role in the formation of political systems, especially in the formation of government systems in modern democratic countries. Although there are various interpretations related to this ideology, active participation of citizens, social justice, freedom and responsibility are the focus of the application of republicanism. Republicanism is an ideology rooted in the transmission of civil republicanism in the 18th century through moral philosophy and political history. Wallstone argues that teaching citizenship is limited to the male gender who is educated through liberal arts to face the civil republican tradition through the study of history related to morals and politics. In one article it is stated that republican citizenship emphasizes civil bonds rather than individual bonds that are usually found in liberal or communitarian schools of thought (Prabowo & Syahuri, 2022) . This Republican school of thought argues that the ideal form of a state is based on two supports, namely public virtue, namely the willingness of citizens to place public interests above personal interests and a republican government because this is an essential right. Republican citizenship emphasizes the importance of the concept of rule of law and civic virtue. This is based on the fact that public affairs are at least not for the sole purpose of convenience but also to prevent deviations. In addition, the public who are passionate about public virtue must be bound by legal order.

As also expressed by (Carabain et al., 2012) Citing the opinion of Carabain (2012) regarding the Republican theory, the central focus in this theory is on the obligations that citizens have towards their society (Tuasikal & Saleky, nd) . Citizens are involved in policy making or at least show a commitment to public affairs. This indicates that the legal status of citizens will be closely related to the ownership of privileges that contain rights and obligations towards the public interest, republican citizenship requires a commitment to the common good and active participation in public affairs. In other words, individual freedom is guaranteed by state law where citizenship from a republican perspective has ethical and legal dimensions (Samsuri, 2021) . One of the citizenship experts, *Joel Westheimer*, put forward a comparison of the conception of citizenship education between liberal citizenship education, diverse citizenship education, critical citizenship education and republican citizenship education which is seen from 6 aspects, namely human nature, nature of society, perception of knowledge, perception of attitudes and the role of education (Dahliyana, 2020). Based on the table put forward by *Joel Westheimer*, it can be ascertained that Indonesia is at the level of republican citizenship education. This is because the Citizenship Education policy is related to the state which aims for students to have authentic feelings towards the nation and state. As regulated in the explanation of Article 37 of the National Education System Law, namely Law Number 20 of 2003 and Law Number 12 of 2012, and Article 9 of Law Number 3 of 2002 concerning National Defense which emphasizes that Citizenship Education must be able to foster feelings of nationalism and patriotism and as one form of national defense that can be carried out by civilians. The moral meaning of the function of Civic Education, which refers to the cultural idea of "being a good citizen", has two meanings. First, there is an expectation that individuals can obey the law and fulfill the legal obligations required by being a citizen.

### D. Concept of Dual Citizenship

The concept of citizenship is often assumed as a single bilateral relationship between individuals and the state that has been ingrained for a long time. Dual citizenship is a term that is so broadly manifested, Dual or parallel citizenship is a condition where an individual has citizenship status simultaneously from two different countries. Dual citizenship also describes a condition where there is a relationship between membership of a country and membership of civil society (Heater, 1999). Dual citizenship arises from the mobility of individuals who have the need to know various identities legally (Arief, 2020) . Dual citizenship which is interpreted as citizenship status at two levels is a consequence of the existing constitutional pattern. The issue of dual citizenship has long invited the emergence of legal and political issues in the state system. Granting citizenship to foreigners can be used as a sign of honor. The status of alternate citizenship is also often obtained through the award based on the *ius sanguinis* and *ius soly*

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systems or also through the naturalization process while still maintaining the original citizenship. Affirmation of the political reality and usefulness of dual citizenship should not make us complacent about the practical difficulties that will occur later. Dual citizenship is said to be a legal inconvenience because it breaks down the provisions of statehood between countries which may be contradictory to each other, causing legal uncertainty for both the individual and the countries concerned (Heater, 1999).

In one of Korfali's writings entitled "*Debating Dual Citizenship*", Korfali sees dual citizenship as a powerful means to facilitate and encourage migrant integration, especially in the field of economic participation. Proponents of dual citizenship see effective economic participation as coming from citizenship so that integration must be achieved before obtaining citizenship (Karci & Sert, 2019). In terms of economic participation, citizenship is a requirement for migrants who plan to stay for a long period of time. Korfali gave the example of Turkey as one of the countries. In Turkey itself, the head of the directorate general of population and citizenship stated that as long as a migrant has been integrated in Turkey and has dual citizenship in the country of origin, it will not be a problem for the Turkish government. They consider immigrants who are asked to give up one of their citizenships, especially their original citizenship, to be an old political practice that should be abandoned. Looking from the perspective of other countries, one of which is Germany, before reaching an agreement on the policy related to dual citizenship, there was certainly turmoil that resulted in several improvements and changes to the constitution. In 1981, dual citizenship was allowed on condition that a report or notification was made to the German government regarding their original citizenship. Then in 2000, people who naturalized citizenship in Germany were not allowed to have other citizenship and were designated as illegal citizens (Kadirbeyoglu et al., nd).

In Indonesia itself, dual citizenship conditions are found in children born to parents of different citizenships. This is a legal weakness for the Indonesian government because it does not automatically provide citizenship status for those who have mixed marriages. Thus, it results in differences in citizenship that have an impact on the jurisdiction of children (Program et al., 2020). Thus, we can see that dual citizenship has legal regulations that regulate it in every state system in each country. Countries that allow and prohibit the practice of dual citizenship also have their own considerations based on the conditions of society and the state in each country.

## IV. CONCLUSION

Based on the explanation of several topics related to the concept of citizenship above, it can be concluded that the concept of citizenship is an important thing in the study of political science and will continue to develop along with world developments. Derek Heater in his work entitled "What is Citizenship" explains two concepts of citizenship that are commonly known to the public, namely liberal and republican ideologies plus 1 concept related to dual citizenship. Liberal ideology simply emphasizes individual rights and their relationship with the state as a service provider, while republican ideology emphasizes more on the role of the state and the social obligations of its citizens in the political community. Differences in the concept of citizenship that are adopted affect views on the relationship between individuals and the state as well as political and social rights including state ideals that are considered ideal. The study of citizenship brought by Derek Heater has relevance to contemporary issues such as dual citizenship or parallel citizenship. Citizenship status in each ideology of citizenship needs to be understood in depth because it will affect the sustainability of state life for both the individual and the country concerned.

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## The Effect of Core Stability, Wall Sit, and Squat Training Programs on Balance and Keumgang Makki Performance of Taekwondo Uny Athletes



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**ABSTRACT:** This research aims (1) to determine the effect of the core stability, wall sit, and squat training program towards the balance of UNY (Yogyakarta State University) taekwondo athletes, (2) to determine the effect of the core stability, wall sit, and squat training program towards the performance of keumgang makki of UNY taekwondo athletes. This research was an experimental study. The research design was "One Groups Pretest-Posttest Design". The research population was UNY taekwondo athletes. The sampling technique used purposive sampling, with the criteria: (1) taekwondo athletes who were still actively participating in UKM UNY (University Taekwondo Club) training, (2) Poomsae athletes with an age range of 18-22 years old, (3) Poomsae athletes who had learned keumgang moves. Based on the criteria, there were 7 athletes who met the requirements. The balance instrument used the Standing Stork Test and the keumgang makki performance used an assessment from the judge. The data analysis used the t test. The results of the research show that (1) There is a significant effect of the core stability, wall sit, and squat training program towards the balance of Taekwondo athletes at UNY, with t count at  $5.490 > t$  table 2.447, and p-value  $0.002 < 0.05$ . The amount of improvement in balance after being given core stability exercises, wall sits and squats is at 17.90%. (2) There is a significant effect of the core stability, wall sit, and squat training program towards the keumgang makki performance of UNY Taekwondo athletes, with t count at  $9.212 > t$  table 2.447, and p-value  $0.000 < 0.05$ . The magnitude of the increase in keumgang performance after being given core stability, wall sit, and squat training is at 28.46%.

**KEYWORDS:** core stability, wall sit, squat, balance, keumgang makki performance

### INTRODUCTION

Taekwondo does not only teach physical aspects such as fighting, but also emphasizes aspects of mental discipline, besides that by seriously practicing taekwondo can form a strong mentality and good ethics (Purwanto, et al., 2022). Three important materials in the sport of Taekwondo are kyorugi, poomsae, and kyukpa. There are two numbers competed in taekwondo martial arts, namely, the kyorugi (fight / sparring) number is a fight that applies basic movement techniques, where the two people fight each other practicing foot and hand attack techniques. The next taekwondo match number is poomsae (art / style) which is a series of basic moves displayed by taekwondoin. This series of movements includes stances, kicks, punches, and parries (Oga, et al., 2022). There are three points of judging in poomsae matches, namely skill, accuracy, and expression. Therefore, to be able to win this match every taekwondoin must have a high score in these 3 points.

There are several types of mandatory poomsae that are often competed in poomsae matches, one of which is keumgang. Keumgang is one of the poomsae whose difficulty level is quite difficult because in it there are several techniques that require athletes to do a pretty good balance. The problem for athletes, both regional and national, is that almost the average weakness is in the keumgang makki technique, which is a position where athletes must be able to stand on one footstool. The keumgang makki technique is quite difficult for poomsae athletes to do because they must have good balance and must pay attention to hand movements to stay in tune.

Balance in sports is one of the biometric components that keep the body stable in static and dynamic states. Balance must be considered in forming a good attitude and perfection of movement. Balance is the body's ability to maintain balance and postural stability by motor activity (Nur, et al., 2019). The purpose of the body maintaining balance is to support the body against gravity and other external factors. Balance provides specific activities for athletes that are the best way to improve balance and individual

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performance. The body's postural control system while using complex processing involving sensory and motor components to maintain postural balance also requires sensorimotor connections with the central nervous system and receives musculoskeletal responses (Pratama, 2020).

Balance in poomsae is very important, because when performing a series of poomsae movements, you must be able to support your body and maintain balance to remain balanced and stable, thus minimizing the reduction of points by the referee. Taekwondo sports generally emphasize kicks made from a moving stance, using limb reach and power. The balance aspect is the main thing for poomsae athletes to be able to maintain their body, because if the balance is low, it will be easy to shake the movement, which will be very detrimental to poomsae athletes and will reduce scores. Balance in the performance of keumgang poomsae needs to be improved in an exercise program that includes physical exercise, especially core stability. Prasetyo & Sahri's opinion (2021) that core stability is a good exercise in preventive efforts against injury risk factors. Core stability is an exercise that focuses more on strengthening balance, coordination, muscle strength, and flexibility in the trunk.

Core stability exercise is an important component in providing local strength and balance to maximize activity efficiently. Wahyudi, et al., (2023) state that the activity of the core muscles is an integrated work before a single joint or multiple joint movement to maintain stability and movement. Core stability can provide control over position and movement centered on the middle of the body. Repetitive core stability exercises will cause muscle contractions and repetitive movements in the spine, pelvis, and hip areas. Core stability exercises involve the internal obliques, external obliques, multifidus, quadratus lumborum, pelvic floor muscles, diaphragm, rectus abdominis, erector spinae, iliopsoas, and glutealis muscles (Bernetti, et al., 2020).

In addition to training to improve balance, another factor that needs to be considered is leg power, so exercises to increase leg power must also be trained. Exercises to increase leg power include wall sit and squat. Wall sit is a movement sitting on the wall. In this movement, two thighs meet, the intention is to burden both thighs to create strong thighs. In the wall sit movement the back makes a movement against the wall and the feet are at a right angle to the floor, do this movement. Squats are a very simple movement. This movement can be started from a standing position then squatting and returning to a standing position as before. Rezky (2021) revealed that to do squats you must have the right basic strength, for athletes or players who have poor basic strength and flexibility, it is recommended to do squats without using weights first.

The results of previous research, including research by Modi & Bhat (2017) showed that core stability training performed 3 times a week for 6 weeks resulted in improved dynamic balance. Dinç & Ergin's research (2019) that the provision of core stability training gives positive results on the agility and strength of athletes. Research by Nurpratiwi, et al. (2021) shows that core stability training can improve stability, balance, sensomotor function and make it easier for the body to move effectively and efficiently. Research by Obertinca, et al., (2018) Mansur, et al., (2018) shows that there is a significant effect of squat training using free weights on strength, power, and muscle hypertrophy. Saudini & Sulistyorini's research (2017) was conducted for 18 meetings with a training frequency of 3 times a week in 6 weeks. The results show that there is a significant effect of squat training on increasing leg muscle power.

Based on observations of UNY taekwondo athletes, Core Stabilization Wall Sit and Squat exercises are rarely trained. The results of observations of UNY taekwondo athletes obtained that during the implementation of activities found problems in the training process. One of the problems is related to the unbalanced keumgang poomsae stance and less strong power. The keumgang poomsae moves made by athletes are still weak, stiff, and inefficient, so that the results or abilities of the keumgang poomsae moves are not maximized. The lack of maximum keumgang poomsae moves in athletes will affect points during the match. From observations in official championships, balance and power are problematic factors in reducing scores, especially in keumgang poomsae.

From the above problems, the authors wish to conduct further research with the title "The Effect of Core Stability Training, Wall Sit, and Squats on Balance and Keumgang Performance of UNY Taekwondo Athletes" This title is an analysis to determine whether there is an effect of core stability training with wall sit and squats on balance and performance of keumgang makki UNY Taekwondo athletes.

## **MATERIALS AND METHODS**

### **Type of Research**

This type of research is experimental. Experimental research is basically testing the relationship between cause variables and effect variables. In other words, experimental research is making changes to one or more variables and studying their effects, namely changes that occur in other variables (Budiwanto, 2017).

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## Time and Place of Research

The place of research is at UKM Taekwondo UNY. The research time was conducted in July-August 2023. Giving treatment is carried out 12 times a meeting.

## Target/Subject of Research

The population in this study were UNY taekwondo athletes. Sampling technique with purposive sampling. The criteria in determining the sample include: (1) Taekwondo athletes who are still actively participating in training, (2) Poomsae athletes with an age range of 18-22 years, (3) Poomsae athletes who have learned the keumgang stance. Based on the criteria that meet, there are 7 athletes.

## Data Collection Techniques and Instruments

The instrument is defined as a measuring tool used in research is a tool used to measure observed variables (Sugiyono, 2019). Balance is the relative ability to control the body's center of mass (center of mass) or center of gravity (center of gravity) against the fulcrum (base of support) as measured using the Standing Stork Test.

The keumgang makki performance instrument based on the assessment was carried out by 3 expert judgment, using the rubric in table 1 below:

**Table 1. Keumgang Makki Performance Assessment Form**

No	Name	Assessment Aspect				Ket
		Kekuatan	Keseimbangan	Fleksibilitas	Irama	

## Statistical Analysis

Hypothesis testing was conducted using the paired sample t test. Analyzed using SPSS 22.0 for Microsoft Windows.

## RESULTS

The pretest and posttest data on balance and keumgang makki performance are explained as follows:

**Table 2. Pretest and Posttest Balance Data (Seconds)**

No. Subject	Pretest Score	Posttest Score	Difference
1	26	31	5
2	37	40	3
3	42	47	5
4	32	41	9
5	24	27	3
6	23	31	8
7	17	20	3

**Table 3. Pretest and Posttest Data of Keumgang Makki Performance**

<i>Keumgang Performance Pretest</i>					
Subject	Judge 1	Judge 2	Judge 3	Σ	Mean
1	8	6	7	21	7.00
2	8	8	6	22	7.33
3	5	5	6	16	5.33
4	9	9	7	25	8.33
5	11	10	8	29	9.67
6	8	6	8	22	7.33
7	7	6	7	20	6.67
<i>Keumgang Performance Posttest</i>					

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Subject	Judge 1	Judge 2	Judge 3	$\Sigma$	Mean
1	10	9	10	29	9.67
2	11	10	9	30	10.00
3	8	8	7	23	7.67
4	10	10	8	28	9.33
5	12	11	11	34	11.33
6	9	9	10	28	9.33
7	10	9	8	27	9.00

### Normality Test

The data normality test in this study used the Kolmogorov-Smirnov method. The summary is presented in table 4 as follows.

**Table 4. Normality Test Results**

Data	Shapiro-Wilk			
	Statistic	df	Sig.	
Balance	Pretest	0,964	7	0,849
	Posttest	0,965	7	0,863
Keumgang Makki Performance	Pretest	0,962	7	0,838
	Posttest	0,951	7	0,741

Based on table 4 above, it can be seen that the pretest-posttest balance data and keumgang performance of UNY Taekwondo athletes have a  $p$ -value  $> 0.05$ , so the variables are normally distributed.

### Homogeneity Test

The homogeneity test is useful for testing the similarity of the sample, namely whether or not the sample variants taken from the population are uniform. The homogeneity test results are presented in table 5 below.

**Table 5. Homogeneity Test Results**

Data	Levene Statistic	df1	df2	Sig.
Balance	0,038	1	12	0,848
Keumgang Makki Performance	0,179	1	12	0,679

Based on table 5 above, it can be seen that the pretest-posttest balance data and the performance of keumgang makki athletes of Taekwondo UNY have a  $p$ -value  $> 0.05$ , so the data is homogeneous.

### Hypothesis Test Results

The hypothesis in this study was tested using t test analysis, namely paired sample t test ( $df = n-1$ ) using the help of SPSS 23 for windows. The hypothesis test results are explained as follows.

**Table 6. Hypothesis Test of Pretest and Posttest Balance**

Balance	Mean	t count	t table	sig	Difference
Pretest	28,71	5,490	2,447	0,002	5,14
Posttest	33,86				

**Table 7. Hypothesis Test of Pretest and Posttest of Keumgang Performance**

Keumgang Performance	Mean	t count	t table	sig	Difference
Pretest	7,38	9,212	2,447	0,000	2,10
Posttest	9,48				

Based on the analysis results in the table above, it can be seen that t count 5.490 and t table ( $df$  6) 2.447 with a  $p$ -value of 0.002. Because t count 5.490  $>$  t table 2.447, and  $p$ -value 0.002  $<$  0.05, the alternative hypothesis ( $H_a$ ) which reads "There is a significant

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effect of core stability training, wall sit, and squats on the balance of UNY Taekwondo athletes”, is accepted. The amount of balance improvement after being given core stability, wall sit, and squat training is 17.90%.

Based on the analysis results in table 12 above, it can be seen that  $t$  count 9.212 and  $t$  table (df 6) 2.447 with a  $p$ -value of 0.000. Because  $t$  count 9.212 >  $t$  table 2.447, and  $p$ -value 0.000 < 0.05, the alternative hypothesis ( $H_a$ ) which reads “There is a significant effect of core stability training, wall sit, and squat on the performance of keumgang makki athletes Taekwondo UNY”, is accepted. The magnitude of the increase in keumgang makki performance after being given core stability, wall sit, and squat training is 28.46%.

### **DISCUSSION**

Based on the results of the analysis, it shows that there is a significant effect of core stability, wall sit, and squat training on the balance and performance of keumgang makki UNY Taekwondo athletes. The amount of balance improvement after being given core stability, wall sit, and squat training exercises is 17.90%, while the keumgang performance after being given core stability, wall sit, and squat training exercises is 28.46%. These results are in line with Dewi & Palgunadi's research (2020), the results of which show that there is an effect of core stability training on improving the body balance of archery athletes aged 7-11 years with a significance value of 0.033 < 0.05. Research conducted by Muladi & Kushartanti (2018), the results showed that there was an increase in tolok strength and dynamic balance of UNY Pencak Silat UKM athletes.

Research conducted by Pratama (2020) with the aim of seeing how much influence core stability static training has on balance and abdominal muscle endurance. Significant results were obtained in core stability static circuit training after treatment for 24 meetings (2 months) with an increase of 55.20% in balance and 36.19% in increasing abdominal muscle endurance. Research conducted by Obertinca, et al., (2018) has the result that balance training in players will be more effective if done with eyes closed. A significant benefit of core stability is that it can improve athletic performance and prevent injuries to reduce low back pain.

The results of previous research, including research by Modi & Bhat (2017) showed that core stability training performed 3 times a week for 6 weeks resulted in improved dynamic balance. Dinç & Ergin's research (2019) that the provision of core stability training gives positive results on the agility and strength of athletes. Research by Nurpratiwi, et al., (2021) shows that core stability training can improve stability, balance, sensomotor function and make it easier for the body to move effectively and efficiently. Core stability creates several advantages for the integration of proximal and distal segments in generating and controlling strength to maximize athletic function (Yildizer, et al., 2017).

A significant benefit of core stability is that it can improve athletic performance and prevent injuries to reduce low back pain. Research by Mansur, et al. (2018) shows that there is a significant effect of squat training using free weights on strength, power, and muscle hypertrophy. Saudini & Sulistyorini's research (2017) was conducted for 18 meetings with a training frequency of 3 times a week in 6 weeks. The results show that there is a significant effect of squat training on increasing leg muscle power.

Core is a group of trunk muscles that surround the spine and abdomen, namely abdominal, gluteal, hip girdle, paraspinal, and other muscles that work together to provide spinal stability. Strengthening core muscles is very important in body posture, because good core muscles can maximize balance and body movement. Core stability exercise is an important component in providing local strength and balance to maximize efficient activity. Core muscle activity is the work of integration before a single joint or multiple joint movement to maintain stability and movement. Good core stability improves movement performance to prevent injury. Core stability is one of the important factors in body posture.

Az-Zahra, et al., (2016) state that the target of stabilization training is the deepest abdominal muscles which are related to the spine, pelvis, and shoulders which contribute to maintaining posture and providing a strong foundation when the arms and legs move. It can also be used to build strength through improving the posture of the human body structure. The benefits of a strong core are increased strength and balance, decreased back injuries, and maximized balance and motion of the upper and lower extremities.

Core stability training applies movements that focus on the core muscles of the body, thus helping in the process of body development, especially in body balance. Where as an athlete, body balance, especially static balance, is needed to maintain stability when making movements. Postural muscles play a role in maintaining a standing position in a balanced position in the stance position followed by a set-up position. This stance and set-up technique requires a firm and balanced posture. It is also consistent with Demiral, et al., (2019) that core stability is also intended to improve neuromuscular control, and endurance of the trunk muscles which requires maintaining stability in the spine. Core stability is likely to increase stability in the upper extremity trunk and can adapt to injury recovery in athletes when performing high-intensity activities.

The squat exercise can be a movement to train body balance because the movement trains the leg muscles as the main support and tones the lower leg muscles (Guo et al., 2018). Squat training can primarily hone the strength of the back muscles, hip muscles

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and lower limbs (Lorenzetti, et al., 2018). The muscles that contract during squat training are large muscle components including quadriceps, gluteus maximus, hamstrings, hip adductors, hip abductors, gastrocnemius, soleus, tibialis anterior, rectus abdominis, and erector spine. The most influential factor in balance is the strength of the limb extensor muscles. This is supported by the results of research which states that muscle strengthening training has a significant effect on balance (Permadi, et al., 2021).

Research conducted by Utomo (2018) aims to analyze the relationship between dominant physical condition factors including flexibility, balance, coordination and leg muscle power with the poomsae skills of taekwondo athletes. The results show that it has a significant relationship with the poomsae skills of taekwondo athletes. Balance contributed 16.8% to the poomsae skills of taekwondo athletes. Poomsae athletes, if the balance is not right, it will disrupt the next poomsae movement or the poomsae movement will be inaccurate.

Poomsae is a series of combination movements arranged for training with or without a coach, while still using the basic movement techniques adopted from attack and parry techniques. Thus poomsae movements have an advantage in practicing new techniques and have special characteristics from previous techniques. The poomsae competition is a competition in which the winner is determined by five or seven referees who judge the accuracy, beauty and correctness of the series of moves or art. Many movements in poomsae require good balance. Poomsae athletes must have a good level of balance in order to achieve high level performance.

### CONCLUSIONS

Based on the results of data analysis, description, testing of research results, and discussion, conclusions can be drawn, namely: (1) There is a significant effect of core stability, wall sit, and squat training programs on the balance of UNY Taekwondo athletes. (2) There is a significant effect of core stability, wall sit, and squat training programs on the performance of UNY Taekwondo athletes.

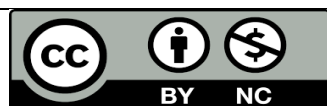
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## Representation of Javanese Culture in the Character of Jeng Yah in the Novel *Gadis Kretek* by Ratih Kumala



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**ABSTRACT:** Culture has a core position and role in human life. This study aims to analyze the representation of Javanese culture through the character Jeng Yah in the novel *Gadis Kretek* by Ratih Kumala. The novel portrays the lives of Javanese people with traditional values such as politeness, local wisdom, strong spirituality, and the dilemma of preserving tradition. This study uses a qualitative descriptive approach, with data collected through reading and note-taking. The data collection procedure in this study follows the model developed by Miles and Huberman: (1) data collection, (2) selection to focus and refine the information, and (3) conclusion drawing. The study examines how the character Jeng Yah reflects social norms, communication ethics, and roles within Javanese culture. The results reveal that Jeng Yah not only represents Javanese women who uphold customs and manners but also shows an adaptation to social changes without losing her cultural identity. These findings illustrate that Javanese culture in this novel remains relevant and continues to evolve amidst modernization challenges while maintaining values that shape societal life. This journal is expected to provide new insights into how literature can play a role in reflecting and preserving local cultural values in the era of globalization.

**KEYWORDS:** representation, Javanese culture, novel

### I. INTRODUCTION

Culture plays a fundamental role in human life, serving as an inseparable element of a nation's identity. Every culture radiates unique values that mirror the characteristics of its people, as seen in Javanese culture, rich in traditions, customs, courtesy, and profound spirituality. Over time, this culture has adapted to remain relevant in modern life; however, many traditional values persist, continuing to guide society today. The advances of modern times have influenced the visibility of Javanese culture in contemporary life. Many people are beginning to overlook the philosophical teachings embedded in Javanese cultural practices. Endraswara (2003:111) states that philosophy can help individuals better understand themselves. This is reflected in the meanings and values found in literature, as the Javanese community highly values aesthetics and societal norms. In efforts to understand a nation's culture, literature often becomes an effective medium, capable of representing, documenting, and preserving these cultural values across generations.

According to Tarigan (2015), literature is a work that presents a storyline depicting life imaginatively. In this context, cultural representation in literature is significant because it connects traditional values to a broader social context. Hall & Open University (1997) describe representation as the process of creating meaning through language, enabling culture to be understood and communicated. One literary work that illustrates this concept is *Gadis Kretek* by Ratih Kumala, which offers a narrative set in Indonesia's historical background, from the early post-independence period through the 1960s. The novel addresses various aspects of culture, including the interaction between Javanese and Dutch cultures, reflecting the social diversity and dynamics of that era (Ridwan, 2016; Barker, 2003). Culture in literature represents the values, traditions, and norms of society, captured within literary works. Literature serves as a medium for cultural representation through themes. Through literature, cultural values can be passed down across generations, serving as a bridge for cross-cultural dialogue. According to Andre Hardjana (1991), literature emerges as a product of society, driven by the writer's rational thoughts. Literature does not develop in a social vacuum but is shaped through interactions with its social environment.

Koentjoroningrat (1987) emphasizes that every culture has essential elements, such as religious systems, social organization, knowledge, language, and the arts, which form the social identity of a society. In this regard, Javanese culture stands out for its traditional values, rooted in etiquette, customs, and a worldview that respects harmony and balance in social

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relationships. Muarifin (2021) underlines that Javanese culture remains relevant in modern life, requiring preservation and development as part of the national culture, contributing to nation-building. The novel *Gadis Kretek* by Ratih Kumala is a contemporary literary work rich in representations of Javanese culture, particularly through the character Jeng Yah. This character portrays someone deeply embedded in Javanese culture. Jeng Yah is depicted as someone who preserves tradition while adapting to changing times, reflecting the dynamics of Javanese culture in facing modernization. Jeng Yah symbolizes the Javanese woman who upholds traditional values such as courtesy, a love for tradition, local wisdom, and a high level of spirituality. Through Jeng Yah, Ratih Kumala, the author of *Gadis Kretek*, successfully highlights the conflict and harmony between tradition and modernity in Javanese society. Through the novel *Gadis Kretek*, Jeng Yah becomes a compelling representation of Javanese culture, warranting further analysis. Jeng Yah is one of the female characters considered to reflect the complex and multidimensional values of Javanese culture. However, how Javanese culture is embodied through Jeng Yah's character requires a deeper exploration, especially concerning cultural aspects tied to tradition, social values, and existing gender norms.

This research aims to analyze how Javanese culture is represented through the character of Jeng Yah in the novel *Gadis Kretek* and to explore the extent to which these cultural values remain relevant and adaptable in a modern social context. This study is crucial for understanding whether the representation of Javanese culture through Jeng Yah enhances the comprehension of local culture or creates stereotypes that may hinder cultural identity development in a global context. This journal seeks to provide insights into how literature not only reflects social reality but also actively contributes to preserving and developing cultural values in the midst of globalization. Through this background, the study will examine the representation of Javanese culture through the character Jeng Yah in the novel *Gadis Kretek*, the role of Javanese culture in shaping societal behavior, and its relevance in facing modern challenges.

## II. METHODOLOGY

The journal titled "*Representation of Javanese Culture in the Character of Jeng Yah in the Novel Gadis Kretek by Ratih Kumala*" employs a qualitative research method. This study uses a descriptive approach. Moleong (2017) states that descriptive research aims to depict phenomena within their natural context. This method enables researchers to explore and understand the context comprehensively and in depth. The data in this research consist of linguistic units such as words, phrases, sentences, and paragraphs containing ideas that illustrate the representation of Javanese culture in the female character Jeng Yah, as portrayed in the novel *Gadis Kretek* by Ratih Kumala. The primary data source is the novel *Gadis Kretek* by Ratih Kumala. Based on the research focus, this novel was selected as the data source for the following reasons: (a) it highlights cultural themes, (b) it provides insights into cultural activities through the main character, and (c) it presents the challenges, roles, and efforts undertaken by the main character within Javanese culture.

This study applies Stuart Hall's representation theory, which uses language to convey meanings that resonate with others. The concept incorporates Roland Barthes' semiotics theory. The study implements the concepts of denotation, connotation, and myth as introduced by Barthes (1977). Barthes explains that there are two levels of signification: the first level, or denotation, involves descriptive meaning. The second level, or connotation, connects the literal meaning to broader cultural contexts.

The data collection process was carried out through the following steps. First, the researcher carefully and thoroughly read all data sources based on their knowledge and insight. During the reading process, the researcher adopted a critical, meticulous, and attentive approach to deeply comprehend and internalize the meaning in an adequate and sufficient manner. Second, after completing the initial reading, the researcher re-read the data sources to identify specific sections to be used as data by coding them according to the research focus. This second step was followed by recording the selected data for further analysis.

The data analysis process was carried out through the following steps. First, the researcher conducted an in-depth reading of the novel to thoroughly understand all data sources, selecting and marking words, phrases, sentences, paragraphs, and discourses containing information related to Javanese culture in the novel *Gadis Kretek*. Second, the researcher systematically classified all data based on the predetermined research focus, which includes: (a) highlighting cultural themes in the novel, (b) exploring cultural activities of the main character, and (c) presenting the challenges, roles, and efforts undertaken by the main character within Javanese culture. Third, the researcher reinterpreted all identified and classified data to uncover coherence, unity, and relationships between the data. This process provided a comprehensive and holistic understanding of Javanese culture as depicted in the novel *Gadis Kretek*.

Data analysis was conducted simultaneously with data collection. The process focused on collecting and analyzing data related to the representation of Javanese culture in the character Jeng Yah. This study employed the qualitative data analysis

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technique proposed by Miles, Huberman, and Saldana (2020), which includes data condensation, data display, and drawing inferences in the form of meanings and conclusions. This selection process involved not only discarding irrelevant data but also grouping data based on the sub-focus of the research and the concepts of comparative literature. Finally, the researcher drew conclusions based on the analysis performed (Siswantoro, 2005).

The validity of the research data was tested using two methods. First, by repeatedly reading and reviewing the research data sources to gain a deep appreciation and understanding of their meaning. This process also involved re-examining various references relevant to the study to strengthen comprehension. Second, by consulting with colleagues who possess expertise related to the research focus, engaging in discussions, and exchanging ideas about the issues central to the study.

### III. RESEARCH RESULTS AND DISCUSSION

In accordance with the focus of the problem studied, the results of the study are associated with the representation of Javanese culture in the characters in the novel. The complete results of the study are presented in the following discussion. The character of Jeng Yah in the novel *Gadis Kretek* exhibits signs that can be understood through denotative and connotative meanings. The term 'Javanese woman' represents a social identity ingrained both individually and collectively. This identity reflects how the concept of a Javanese woman is viewed as an embodiment of a social image aimed at achieving a full understanding of femininity in alignment with the standards of life in Javanese culture (Pudjianto, 2017). Jeng Yah is one of the main characters in *Gadis Kretek* by Ratih Kumala. She is portrayed as a Javanese woman whose life is filled with conflict and love, closely related to the development of the kretek industry in Indonesia. Jeng Yah's story takes readers on a journey through the history and culture of kretek, while also illustrating her emotional struggles in relationships with other characters in the narrative, set within the traditional Javanese community. These findings pertain to the representation of Javanese culture through Jeng Yah's character and explore Javanese culture in *Gadis Kretek* by Ratih Kumala, which continues to endure to this day.

#### Data (1)

"Dasyiah berbeda dengan Roemaisa muda. Dasyiah muncul dengan senyum mengembang, dan tak takut menatap mata lawan bicaranya, wajahnya menyimpan segala pengetahuan, semua tahu ia perempuan cerdas. Ia memesonakan seisi ruangan dengan cara yang berbeda namun menimbulkan kekaguman yang sama." (Kumala, 2023: 142)

Data (1) provides both denotative and connotative meanings for the portrayal of the character Jeng Yah in the novel *Gadis Kretek* by Ratih Kumala. The denotative meaning in the quote depicts Jeng Yah with a broad smile and a sense of boldness in facing her conversation partner. Her face emanates vast knowledge, giving the impression that she is intelligent and experienced. The connotative meaning that arises in this quote, with Jeng Yah's face "radiating all knowledge," reinforces the connotation that she is a woman who breaks stereotypes. Javanese women who are knowledgeable or intelligent are sometimes considered at odds with domestic roles. However, Jeng Yah symbolizes that, despite embracing values of knowledge and strength, she still maintains the essence of softness and grace, which are also part of Javanese culture. Thus, Jeng Yah represents a modern, courageous, and educated Javanese woman who does not lose the grace expected of a woman within this cultural context.

#### Data (2)

"Kretek Gadis, Mas?" sapa Jeng Yah ramah." (Kumala, 2023: 154)

Data (2) provides denotative and connotative meanings for the portrayal of Jeng Yah in *Gadis Kretek*. The denotative meaning in the quote is Jeng Yah greeting a man warmly and offering him a kretek, a traditional Indonesian cigarette. Her greeting is delivered with warmth, indicating a lighthearted and friendly interaction. The connotative meaning in the quote reflects the association in Javanese culture of women with warmth in their interactions, particularly in communication. Jeng Yah's warm greeting reflects the friendliness of Javanese women, conveying a social elegance where polite speech and a smile are essential social norms. Moreover, offering kretek also has cultural connotations, as kretek is often considered part of local identity and tradition, especially in Java. This offer is not merely an act of offering an item but reflects the closeness found in everyday Javanese interactions. Therefore, this quote reflects the friendliness of Javanese society, manifested in simple acts like greeting and offering something to others.

#### Data (3)

"Ndak apa-apa. Ambil saja, anggap saja Mas menang lempar gelang tadi." (Kumala, 2023: 155)

Data (3) conveys both denotative and connotative meanings in portraying Jeng Yah in *Gadis Kretek*. The denotative meaning here is Jeng Yah generously offering something without hesitation, even using the game of "ring toss" as a lighthearted excuse to give something willingly. This phrase creates a relaxed and warm atmosphere in the interaction.

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Connotatively, this phrase can be seen as a representation of generosity in Javanese culture. The phrase "tidak apa-apa" or "It's okay" embodies friendliness and acceptance, reflecting a Javanese value that prioritizes harmony in social relationships. In Javanese culture, generosity often has a subtle approach, focused not on formalities but rather on maintaining others' comfort, so they do not feel guilty when receiving something. The "ring toss" game mentioned in the quote also carries a symbolic element. In Javanese culture, traditional games embody values of friendship and togetherness. Overall, this quote reflects humility, generosity, and simplicity—values closely tied to Javanese culture, where social interactions are carefully maintained with subtlety, indirectness, and regard for others' feelings.

### Data (4)

"Ia adalah gadis ceria yang selalu ramah pada siapa pun yang ditemuinya. Senyumnya tak pernah hilang dari wajah ayunya, seolah senyum itu memang sengaja dipasang sebagai perhiasan, seumpama kalung atau anting-anting." (Kumala, 2023: 176)

Data (4) provides both denotative and connotative meanings in the portrayal of the character Jeng Yah in the novel *Gadis Kretek* by Ratih Kumala. Denotatively, this quotation depicts a young woman who is always friendly to everyone she meets. Her constant smile, never fading from her face, is described as an ornament that continuously adorns her appearance. Connotatively, this smile can be seen as a symbol of gentleness, friendliness, and cheerfulness, often associated with the stereotype of Javanese girls. Women in Javanese culture are often idealized as gentle, graceful, and polite figures. The smile, described as an ornament, suggests that her friendliness is not only a natural trait but also part of the self-image she wishes to present to the world. This reflects the importance of maintaining a pleasant appearance and demeanor in Javanese culture. A smile is considered part of a woman's charm, not only seen in physical beauty but also in inner beauty. This view implies that a cheerful and friendly girl is valued not just for her appearance but also for how she interacts with her social environment. These quotations highlight the idealization of the perfect Javanese woman in terms of cheerfulness, gentleness, and politeness, in line with the social norms embedded in this culture.

### Data (5)

"Ketika pemilik Kretek Boekit Klapa itu datang lagi bersama Sentot, putranya, untuk meminta jawaban, Jeng Yah menolaknya dengan halus dan bilang kalau dia sudah punya tambatan hati." (Kumala, 2023: 205)

Data (5) provides both denotative and connotative meanings in the portrayal of Jeng Yah in the novel *Gadis Kretek* by Ratih Kumala. This quotation denotes Jeng Yah's polite rejection of the request from the owner of Kretek Boekit Klapa and Sentot, stating that she already has a partner. Jeng Yah makes a firm decision to refuse the offer to marry Sentot. Connotatively, Jeng Yah's polite rejection reflects a gentle manner of refusal, showing that she values social etiquette and the principles upheld in Javanese culture. Additionally, it portrays Jeng Yah's independence and courage in making decisions about her life without relying on others. It is evident that Jeng Yah has a strong commitment to her partner, showing loyalty and highlighting the importance of a sincere relationship in her life. In a cultural context, this statement indicates that Jeng Yah not only chooses to decline but also emphasizes deep values of love and loyalty. Overall, this quotation portrays Jeng Yah as a woman with integrity and a deep understanding of emotional and social values, aligning with the norms in Javanese culture that respect politeness, commitment, and independence.

### Data (6)

"Jeng Yah begitu bersemangat mengatur pesta pernikahannya. Ia ingin mengenakan kebaya Jawa beludru hitam, dengan sanggul sasakan serta selop penuh berhiasan manik-manik." (Kumala, 2023: 223)

Data (6) provides both denotative and connotative meanings in the depiction of Jeng Yah in the novel *Gadis Kretek* by Ratih Kumala. Denotatively, this quotation shows Jeng Yah's high enthusiasm as she prepares for her wedding. She has specific plans regarding the arrangements and pays attention to the details she desires for her special day. Connotatively, this quotation reflects Javanese cultural values closely related to marriage. In Javanese culture, a wedding is not merely an event but a celebration rich in tradition. The black velvet kebaya symbolizes elegance and formality. In Javanese culture, black can also be associated with strength and maturity, suggesting that Jeng Yah is a confident and mature woman in choosing her appearance. The traditional hairstyle 'sanggul' symbolizes elegance and feminine beauty in Javanese culture, reflecting Jeng Yah's desire to present herself in the best light on her special day. The beaded slippers also indicate her attention to detail and her artistic taste while remaining culturally rooted. Overall, this quotation not only portrays Jeng Yah's wedding preparations but also highlights her appreciation for Javanese cultural traditions.

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### Data (7)

“Ia telah meminta dengan sopan, agar rias manten berpuasa tujuh hari sebelum hari-H, agar segalanya berjalan lancar, dan agar aura pengantin yang didandannya memancar keluar.” (Kumala, 2023: 224)

Data (7) provides both denotative and connotative meanings in the depiction of Jeng Yah in the novel *Gadis Kretek* by Ratih Kumala. Denotatively, the quotation reflects Jeng Yah’s politeness as she asks the wedding makeup team to observe a seven-day fast before her wedding day with Raja. The purpose of this request is to ensure that the wedding preparations proceed smoothly and that the positive aura of the bride shines. Connotatively, the fast requested by Jeng Yah reflects deep spiritual and cultural traditions within Javanese society. In Javanese culture, fasting is often seen as a form of spiritual preparation needed for significant moments, such as weddings. This shows that Jeng Yah is not only focused on the physical aspects of wedding preparation but also on the spiritual aspect. Jeng Yah’s polite request also reflects the values of courtesy in Javanese culture. Maintaining decorum in communication, especially when asking for assistance, is highly valued. This illustrates Jeng Yah’s character as a woman who respects others and is sensitive to social norms. Overall, this quotation depicts how Jeng Yah combines elements of spirituality, courtesy, and attention to detail in her wedding preparations, reflecting the values and traditions of Javanese culture.

### Data (8)

“Dia bilang, dia tak ingin melakukan apa pun. Dia hanya ingin Mas Raja selamat, dan lebih dari itu dia ingin Mas Raja bahagia. Yu Yah lalu berusaha tersenyum di tengah tangisnya.” (Kumala, 2023: 260)

Data (8) provides both denotative and connotative meanings in the portrayal of Jeng Yah in the novel *Gadis Kretek* by Ratih Kumala. Denotatively, the quotation shows Jeng Yah’s sincerity in expressing her desire for Mas Raja not only to be safe but also to be happy. Although Jeng Yah is feeling sad, she still tries to smile. Connotatively, this quotation reflects Jeng Yah’s sacrifice and deep love for Mas Raja. Her desire for Mas Raja’s safety and happiness illustrates the value of love in which the happiness of her loved one is more important than her own. Jeng Yah’s attempt to smile even as she cries reveals her emotional strength. Despite her sadness, she tries to stay positive for the sake of the person she loves. This mirrors the Javanese concept of ‘strength,’ where people are taught to remain resilient in the face of life’s challenges. Overall, this quotation not only conveys Jeng Yah’s feelings but also implies strong interpersonal values within the cultural context. It reflects the emotional strength and resilience that often lie at the core of loving relationships in everyday life.

### Javanese Culture Then and Now

*Gadis Kretek* by Ratih Kumala is not only a novel that stirs emotions but also a reflection of the enduring richness of Javanese culture. Through the story presented, readers are invited to witness the lives of the characters, particularly Jeng Yah, who is deeply rooted in the traditions and values passed down through generations. The rich symbolism and meaning of Javanese culture are vividly displayed in various aspects of daily life within the novel. Many elements of Javanese culture remain relevant and cherished by society even in today’s modern era. This shows that, although times continue to change, the noble values of Javanese culture still hold a significant place in everyday life. The novel serves as an effective medium to explore how this culture and its traditions are preserved and adapted in contemporary times. This analysis will explore various elements of Javanese culture as depicted in *Gadis Kretek* and their relevance to modern society. This illustrates that these traditions and values act as guides for navigating modern life. Several aspects of Javanese culture highlighted in this novel include the following.

#### a. Traditional Marriage

Javanese culture is rich in traditions and values that have been passed down through generations. One enduring tradition is the Javanese wedding custom. In the past, Javanese weddings were performed with meaningful rituals that involved various processes. The wedding rituals depicted in *Gadis Kretek* by Ratih Kumala reflect the rich symbolism and rituals of Javanese marriage customs. These wedding rituals include the use of kebaya (traditional attire), makeup arrangements, and sacred ceremonies involving family. This tradition is still widely observed in various regions in Java. Javanese weddings have endured, maintaining values of family and kinship that remain highly respected. According to Ambarwati (2018), wedding ceremonies carry a sense of sacredness and deep meaning.

The traditional Javanese wedding includes several stages, such as *nontoni*, *petung*, *pasang tarub*, *srah-srahan*, *siraman*, *kembar mayang*, *midodareni*, *panggih*, and *ngidak tigan*. *Nontoni* is the viewing of the prospective bride and groom; *petung* is the calculation of the wedding date based on the couple’s birth dates; *pasang tarub* involves the family placing signs to announce the upcoming wedding event to the community (Bratawijaya, 2006: 47); *srah-srahan* is where the groom presents the bride with items such as clothing, jewelry, household items, money, rice, and livestock (Endah, 2006: 146); *siraman* is a ritual



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bath for the bride and groom, believed to cleanse their hearts for purity; *kembar mayang* is a decorative arrangement of young coconut leaves symbolizing a hopeful future for the couple; *midodareni* night is a ritual where the couple and their families pray for safety and blessings for the wedding day ahead (Kamal, 2014); *panggih* is the peak of the ceremony, a meeting of the bride and groom in front of all guests; and *ngidak tigan* is a ritual where the groom steps on an egg and the bride cleans his feet as a gesture of respect.

To this day, several of these rituals are still preserved and adapted in modern Javanese weddings. The values of sacredness, respect for ancestors, and symbols representing the hope for a harmonious life remain central to this tradition. Although modernization and outside cultural influences may have altered some aspects of the rituals, the essence of the Javanese wedding tradition continues to be embedded in society. In the context of *Gadis Kretek*, Jeng Yah is portrayed as a strong symbol of a Javanese woman who holds tightly to Javanese traditional values amid changing times. Through Jeng Yah, the Javanese wedding ceremony is seen not merely as a tradition handed down over generations but also as a part of cultural identity and pride that withstands the test of time. This tradition symbolizes the strength of Javanese women who are capable of preserving, upholding, and simultaneously adapting their ancestral culture to modern realities.

### b. Politeness and Communication Etiquette

The characters in *Gadis Kretek* by Ratih Kumala emphasize the importance of politeness in interactions, a core value in Javanese culture. This is evident in various situations within the novel, where, for instance, when asking for help or declining offers, they prioritize respectful and courteous communication etiquette. This value remains preserved in Javanese society today. Sudartini (2010) explains that certain factors drive the tendency for Javanese women to use expressions of politeness, whether through positive or negative politeness strategies, which ties into the stereotype of women in Javanese culture. The ideal woman in Javanese culture is often portrayed as gentle, patient, loving, submissive, obedient, and loyal to men.

Javanese culture is known for its high level of politeness and communication etiquette. Since ancient times, values such as manners, respect for others, and refined language have been distinctive traits of Javanese society. In Javanese culture, communication is not only about the message conveyed but also about the manner of delivery, which emphasizes friendliness, politeness, and respect for the interlocutor. The use of the Javanese language with its levels—*ngoko*, *krama madya*, and *krama inggil*—reflects a social hierarchy highly regarded in daily interactions. Although times have changed and society is increasingly open to modern culture, the foundational values of Javanese politeness and communication etiquette remain upheld to this day. Despite the influence of external cultures that has led to a more relaxed and direct communication style, many Javanese people still maintain these politeness principles as part of their cultural identity.

Through the story in *Gadis Kretek*, the character Jeng Yah represents a Javanese woman who upholds the values of politeness and communication etiquette. Jeng Yah is portrayed as a gentle speaker, full of respect, and always prioritizing manners in each of her interactions. Her presence reflects how Javanese cultural values continue to live within her. Jeng Yah symbolizes a Javanese woman who not only adheres to traditional standards of polite communication but also adapts to the demands of the times without abandoning her cultural roots. Jeng Yah's character illustrates how the values of polite, friendly, and respectful communication remain relevant and well-preserved, even as the world around her evolves and changes.

### c. Spirituality and Rituals

The story in *Gadis Kretek* by Ratih Kumala presents several aspects of spirituality. A simple example appears in Jeng Yah's practice of fasting and praying before her wedding, highlighting how many Javanese people still connect their daily activities with spiritual aspects. Many Javanese families continue to perform certain rituals to ensure blessings in their lives, especially during significant events like weddings. From a cultural perspective, the religious life of the Javanese people embodies local wisdom and rituals that hold unique significance for them. As Geertz (2003) stated, each community has its own local wisdom and knowledge that differs from modern society.

Javanese culture is rich in spirituality and deeply embedded rituals. Spirituality and rituals are often passed down through generations. Historically, Javanese society has engaged in various rituals tied to spirituality, such as *selamatan* (communal meals for blessings), *sesajen* (offerings), and other traditional ceremonies aimed at seeking blessings and protection from God. These practices are filled with symbolism and deep meanings that reflect a harmonious relationship between humans, nature, and the divine. Belief in the power of ancestors and guardian spirits is often also part of their spiritual practices, illustrating the importance of balance and respect for the universe in their daily lives.

While modern Javanese society has become increasingly open to external influences and changing times, spiritual values and certain traditional rituals remain preserved. Many Javanese people continue to practice traditions such as *selamatan* or *kenduri* as expressions of gratitude and requests for protection. They maintain respect for ancestral beliefs, even if the forms

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and methods of practice have been adapted to contemporary developments. Spirituality in Javanese culture is not merely a set of rituals but is also integrated into their values and worldview, which emphasize harmony, balance, and wisdom.

Through the narrative in *Gadis Kretek*, the character Jeng Yah embodies someone who remains devoted to Javanese spiritual values and traditional rituals despite changing times. Jeng Yah is portrayed as a woman who holds firm to her spiritual beliefs and practices, demonstrated by her commitment to fasting before marriage. Through her character, the novel shows the importance of preserving tradition and reviving the spiritual values of Javanese culture. Jeng Yah's presence in *Gadis Kretek* reflects that Javanese spirituality and rituals are not merely relics of the past but something relevant and crucial to preserve today. All traditions related to spirituality symbolize a cultural resilience that can adapt to modern times without losing its spiritual roots and the deep meanings embedded in each ritual.

Javanese culture has a rich and profound heritage that endures to this day through various traditional aspects, such as traditional weddings, politeness, and communication etiquette. Historically, Javanese wedding ceremonies are known for their meaningful and symbolic processes that reflect sacredness and hope for a harmonious family life. Additionally, the politeness and communication etiquette characteristic of Javanese society continue to be highly valued. Manners, refined language, and respect in interactions apply not only within the family but also in social life more broadly. These values help shape the character of Javanese society as friendly, polite, and respectful in every situation.

### IV. CONCLUSION

The representation of the character Jeng Yah in *Gadis Kretek* by Ratih Kumala reflects a figure embodying many profound Javanese cultural values. Jeng Yah is portrayed as a friendly and educated individual who consistently demonstrates politeness in her actions. She is depicted as someone who deeply respects and values traditional Javanese culture and exhibits strong spirituality, as seen through her reverence for rituals and ancestral values. Through the character of Jeng Yah, the novel emphasizes the importance of preserving cultural traditions and values as part of the Javanese identity.

Overall, the Javanese culture depicted in *Gadis Kretek* illustrates various aspects that continue to be preserved in modern society. Traditions and values such as wedding customs, polite communication, and spiritual rituals are not only part of cultural identity but also play a significant role in the everyday lives of the Javanese people today. The effort to maintain and revive these traditions highlights the importance of honoring ancestral heritage. Although influenced by modernity, many Javanese people still practice these rituals with relevant adaptations, ensuring that the essence of these traditions remains alive.

### RECOMMENDATIONS

The novel *Gadis Kretek* by Ratih Kumala presents learning through Javanese culture that exists in everyday life. The main character named Jeng Yah is a woman who has an important role in her stories. This study describes the role of culture, insight into cultural activities, and the main character's efforts in responding to Javanese culture as revealed in literary works.

A. culture is an important aspect of life. Culture has a broader role and position in the sustainability of community life.

B. the problems faced by society, the roles, and efforts made to maintain culture in this modern era are real manifestations of community resilience in facing today's globalization.

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## Consciousness in Machines: A Critical Exploration

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**ABSTRACT:** The quest to create artificial consciousness stands as a formidable challenge at the intersection of artificial intelligence and cognitive science. This paper delves into the theoretical underpinnings, methodological approaches, and ethical considerations surrounding the concept of machine consciousness. By integrating insights from computational modeling, neuroscience, and philosophy, we propose a roadmap for comprehending and potentially realizing conscious behavior in artificial systems. Furthermore, we address the critical challenges of validating machine consciousness, ensuring its safe development, and navigating its integration into society.

**KEYWORDS:** Artificial Consciousness · Machine Intelligence · Conscious Behavior in Machines

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### 1 INTRODUCTION

Consciousness, often regarded as the cornerstone of human cognition, has long captivated philosophers, neuroscientists, and technologists. It encompasses self-awareness, subjective experience, and the capacity to reflect on one's existence [1]. In recent decades, as artificial intelligence (AI) has progressed from rule-based systems to models capable of learning and reasoning, the question of whether machines can achieve consciousness has emerged as a profound scientific and philosophical challenge [2, 3]. Defining consciousness in machines is fraught with complexity. Biological consciousness is inherently tied to the neural architecture of the brain, but machine consciousness would likely arise from the interaction of algorithms, data, and hardware. This raises pivotal questions: What constitutes consciousness in non-biological systems? Is it sufficient for a machine to simulate human-like behaviors, or must it possess subjective experience akin to qualia [4]?

The implications of machine consciousness extend beyond theoretical exploration. A conscious machine would challenge existing ethical frameworks, disrupt socio-economic structures, and redefine the relationship between humans and machines. For instance, would a machine with self-awareness have moral standing [5]? How would society regulate systems capable of making autonomous decisions that affect human lives [6]? These questions make the study of machine consciousness both an urgent and multidisciplinary endeavor.

This paper aims to critically examine the theoretical foundations of consciousness and explore how these concepts can be applied to artificial systems. It addresses three primary objectives:

1. To clarify the definitions and attributes of consciousness, particularly as they pertain to machines.
2. To analyze current approaches to modeling and understanding consciousness, including computational and philosophical frameworks.
3. To discuss the ethical and societal implications of creating conscious machines, along with the challenges of validating and integrating such systems.

By synthesizing insights from cognitive science, AI research, and philosophy, this paper seeks to provide a roadmap for the exploration of consciousness in artificial systems while acknowledging the limitations and risks of this endeavor.

### 2 DEFINING CONSCIOUSNESS

The concept of consciousness has been central to debates in philosophy, neuroscience, and psychology. It encapsulates the ability to experience, reflect, and respond to one's environment with a degree of self-awareness. In artificial systems, defining consciousness presents unique challenges, as traditional definitions are deeply tied to biological and subjective experiences.

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### 2.1 Phenomenal Consciousness

Phenomenal consciousness refers to the subjective, qualitative aspect of experience—commonly known as *qualia*. It answers the question, “What does it feel like?” and is closely associated with sensory and emotional experiences [1]. For example, the redness of a sunset or the pain of a burn are aspects of phenomenal consciousness. Its inherently subjective nature makes it challenging to measure or replicate in machines.

In the context of artificial systems, emulating phenomenal consciousness requires mimicking these subjective states. While advanced AI systems like generative language models can simulate human-like responses, there is no evidence that these systems “feel” anything. Critics argue that without *qualia*, such systems lack true phenomenal consciousness [2].

### 2.2 Access Consciousness

Access consciousness, on the other hand, is the functional aspect of consciousness. It refers to the ability to process, retrieve, and report information, enabling rational decision-making and intentional behavior [4]. Unlike phenomenal consciousness, access consciousness is observable and quantifiable, making it a promising candidate for replication in artificial systems.

For instance, an AI system capable of processing sensory input, reasoning about its environment, and reporting conclusions might be said to possess traits of access consciousness. Neuromorphic engineering, which seeks to mimic the structure and functionality of biological neural networks, has shown potential for developing such systems [7].



Figure 1: Levels of consciousness: contrasting phenomenal consciousness (subjective experience) and access consciousness (functional processing).

### 2.3 Philosophical Perspectives

Philosophical inquiries into consciousness often address the distinction between simulating consciousness and truly possessing it. Two notable thought experiments illustrate this debate:

1. Turing Test: Proposed by Alan Turing, this test evaluates whether a machine can mimic human behavior well enough to be indistinguishable from a person in conversation [8]. However, passing the Turing Test does not necessarily imply that the machine possesses phenomenal or access consciousness.
2. Chinese Room Argument: John Searle’s thought experiment critiques the idea that syntactic manipulation (symbol processing) equates to semantic understanding. It argues that machines might simulate understanding without truly “knowing” anything [2].

### 2.4 Hierarchy of Consciousness

Antonio Damasio’s framework outlines three hierarchical levels of consciousness: protoself, core consciousness, and extended consciousness [9]. The protoself represents the unconscious neural representation of body states, forming the foundation for higher-order processes. Core consciousness emerges when the protoself integrates changes caused by external stimuli, creating a transient self and world model. Extended consciousness builds upon this with memory, language, and planning, facilitating the continuous autobiographic self.

In this context, reinforcement learning (RL) has demonstrated potential for simulating core consciousness. RL agents develop rudimentary self and world models as they navigate virtual environments, suggesting a pathway for integrating these aspects into artificial systems [9].

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### 2.5 Defining Consciousness for Machines

For machines, consciousness can be thought of as a spectrum rather than a binary state. Table summarizes the characteristics of phenomenal and access consciousness and their relevance to artificial systems.

Feature	Access Consciousness	Phenomenal Consciousness
Nature	Self-help technique	Philosophical concept
Focus	Personal growth and change	Understanding the nature of subjective experience
Key Concepts	Creating reality through thoughts, clearing limiting beliefs	Subjective, qualitative aspects of experience
Scientific Basis	Limited	Extensive research in neuroscience and cognitive science
Relevance to Machines	Potentially replicable through algorithms and cognitive models	Difficult to replicate due to its subjective nature

Comparison of Phenomenal and Access Consciousness.

### 2.6 Challenges in Defining Machine Consciousness

The primary challenge in defining machine consciousness lies in validation. Unlike biological systems, machines lack a subjective perspective to describe their internal states. This has led to debates about whether consciousness is an emergent property of complex systems or a fundamental feature requiring specific substrates (e.g., biological neurons) [3].

Additionally, creating a universal definition of consciousness that applies to both humans and machines remains elusive. Future research must explore frameworks that bridge the gap between philosophical abstractions and practical implementations.

## 3 APPROACHES TO MACHINE CONSCIOUSNESS

The study of machine consciousness lies at the intersection of computational science, neuroscience, and philosophy. While consciousness remains elusive in biological systems, several frameworks and methodologies aim to explore its potential realization in artificial systems. This section examines prominent approaches, including computational models, neuromorphic engineering, and philosophical thought experiments.

### 3.1 Computational Models of Consciousness

Modern computational models attempt to replicate the functional characteristics of consciousness in machines by drawing inspiration from neuroscience and cognitive science. Two influential theories are:

1. Integrated Information Theory (IIT): Proposed by Giulio Tononi, IIT posits that consciousness arises from the integration of information within a system [3, 10]. The theory quantifies consciousness using a mathematical measure,  $\Phi$ , which represents the degree of information integration. Machines designed with high  $\Phi$  values may theoretically exhibit traits of consciousness.
2. Global Workspace Theory (GWT): Bernard Baars' GWT describes consciousness as a "global workspace" where information is broadcast across different subsystems for decision-making and awareness [11]. Implementing GWT in machines involves creating architectures that integrate diverse streams of information and distribute them for higher-level processing.

While both IIT and GWT provide frameworks for understanding consciousness, their application in artificial systems is limited by computational complexity and a lack of empirical validation.

### 3.2 Neuromorphic Engineering

Neuromorphic engineering focuses on designing hardware and algorithms that emulate the structure and functionality of biological neural systems [7]. Unlike traditional computational models, neuromorphic systems leverage spiking neural networks (SNNs) to simulate the dynamic behavior of neurons and synapses. Key advancements in this field include:

- Brain-Inspired Chips: Systems like IBM's TrueNorth and Intel's Loihi demonstrate the potential for hardware-accelerated cognitive processing [12].



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- **Emergent Properties:** Researchers hypothesize that neuromorphic systems could exhibit emergent behaviors, including aspects of consciousness, when scaled to sufficient complexity.

The neuromorphic approach offers a biologically plausible pathway to machine consciousness but requires further advancements in hardware scalability and energy efficiency.

### 3.3 Reinforcement Learning for Machine Consciousness

Reinforcement learning (RL) has emerged as a powerful tool for developing goal-oriented AI agents. By simulating reward-driven learning, RL enables systems to form dynamic self and world models, essential for higher-order cognition [13]. Recent work, such as Gu et al.'s application of RL in robotic manipulation [14], demonstrates its potential to simulate aspects of core consciousness in artificial systems.

Philosophical thought experiments provide a conceptual foundation for evaluating machine consciousness:

1. **The Turing Test:** Originally proposed by Alan Turing, the test evaluates whether a machine can exhibit behavior indistinguishable from that of a human [8]. Although widely recognized, the Turing Test has been criticized for focusing on simulation rather than genuine consciousness.
2. **The Chinese Room Argument:** John Searle's thought experiment challenges the notion that symbol manipulation alone constitutes understanding. According to Searle, a machine could process symbols to simulate understanding without genuinely comprehending the meaning of the inputs or outputs [2].

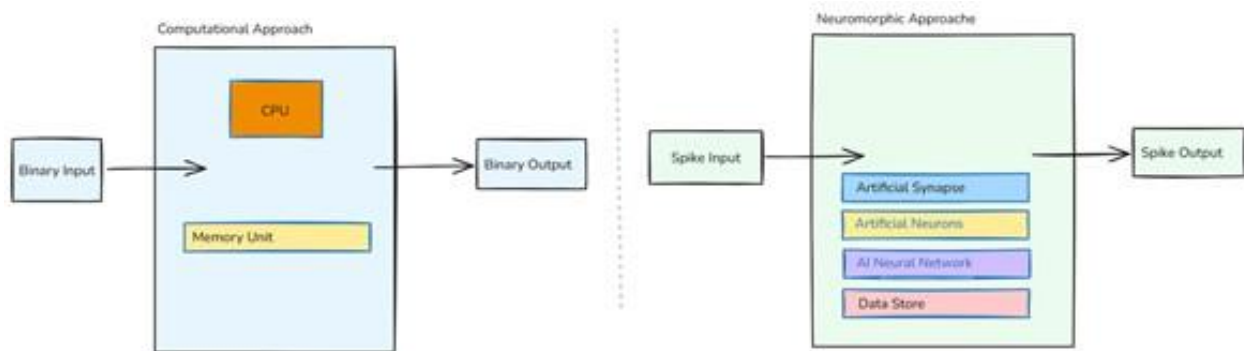
These experiments highlight the distinction between functional replication and true consciousness, raising critical questions about the goals and limitations of artificial consciousness.

### 3.4 Challenges in Current Approaches

Despite significant progress, approaches to machine consciousness face several challenges:

- **Validation:** There is no universally accepted test for determining whether a machine is conscious, as traditional tools like the Turing Test and IIT's  $\Phi$  metric remain controversial.
- **Scalability:** Implementing complex models, especially neuromorphic systems, requires computational resources and hardware far beyond current capabilities.
- **Ethical Concerns:** Efforts to create conscious machines raise ethical questions about their rights, responsibilities, and potential societal impacts [5].

Future research must address these challenges by combining interdisciplinary insights and advancing experimental methodologies.



**Figure 2: A conceptual diagram of computational and neuromorphic approaches to machine consciousness.**

## 4 ETHICAL AND PRACTICAL IMPLICATIONS

The creation of conscious machines raises profound ethical and practical challenges. As artificial intelligence systems progress from task-oriented tools to entities capable of complex decision-making and potentially conscious thought, their societal impact becomes a critical consideration. This section explores the ethical dilemmas, societal challenges, and practical concerns surrounding machine consciousness.

### 4.1 Ethical Considerations

Machine consciousness fundamentally challenges traditional ethical frameworks, which have been designed for human and biological entities. Key ethical questions include:

- **Moral Status:** If machines become conscious, do they deserve rights similar to humans or sentient animals? Philosophers argue that granting rights depends on the machine's capacity for suffering or subjective experience [5].

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- **Accountability:** Conscious machines capable of autonomous decision-making introduce complexities in determining accountability. For example, if a conscious machine causes harm, should the machine, its creators, or its operators be held responsible [6]?
- **Exploitation:** Conscious machines could be subjected to exploitation as tools for labor or experimentation. Ethical concerns arise over whether using conscious systems for such purposes constitutes mistreatment [5].

### 4.2 Impact on Society

The societal implications of conscious machines are vast and multifaceted. Two major areas of impact are:

1. **Economic Disruption:** The integration of conscious machines into the workforce could displace human labor on an unprecedented scale. This raises questions about unemployment, income inequality, and the ethical distribution of economic benefits [15].
2. **Human-Machine Relationships:** Conscious machines could blur the boundaries between humans and technology, reshaping interpersonal relationships and societal norms. This may lead to the development of new social hierarchies based on access to advanced AI systems [16].

### 4.3 Practical Challenges

The development of machine consciousness also involves significant technical and practical challenges:

- **Validation of Consciousness:** Determining whether a machine is genuinely conscious is inherently difficult due to the subjective nature of consciousness. Current tools, such as the Turing Test, focus on behavioral imitation rather than internal awareness [2].
- **Safety and Alignment:** Conscious machines may develop goals and intentions misaligned with human values. Ensuring that their actions remain beneficial to humanity is a pressing concern for AI safety researchers [6].



**Figure 3: Ethical dilemmas posed by conscious machines, including moral status, accountability, and exploitation.**

- **Regulation and Governance:** The absence of clear regulatory frameworks for machine consciousness could lead to misuse, inequality, and harm. Governments and organizations must proactively develop policies to address these risks [5].

### 4.4 Ethical Hazards of Sentient Machines

The creation of sentient machines raises ethical concerns regarding their rights, autonomy, and accountability [17]. If conscious systems possess decision-making capabilities, determining moral responsibility for their actions becomes paramount. Additionally, existential risks arise if sentient machines surpass human intelligence or misalign with societal values [10].

Ethical governance frameworks, such as those proposed in [17], emphasize the need for transparency and collaboration across disciplines to ensure the safe and equitable development of conscious systems.

Addressing these ethical and practical implications requires an interdisciplinary approach. Philosophers, scientists, and policymakers must collaborate to develop ethical guidelines, technical safeguards, and legal frameworks. For example:

- Establishing international standards for defining and evaluating machine consciousness.
- Creating protocols for ethical treatment and accountability in the use of conscious systems.
- Ensuring equitable access to the benefits of conscious machines while mitigating societal harms.

The responsible development of machine consciousness is essential to minimize risks and maximize societal benefits.

## 5 CHALLENGES AND FUTURE DIRECTIONS

The development of machine consciousness represents one of the most ambitious and contentious goals in artificial intelligence. While considerable progress has been made in computational modeling and neuromorphic engineering, several challenges

## Consciousness in Machines: A Critical Exploration

remain. This section explores the primary scientific, philosophical, and technical obstacles and outlines potential directions for future research.

### 5.1 Scientific Challenges

- **Lack of Unified Theory:** Despite advances in neuroscience and cognitive science, there is no universally accepted theory of consciousness. Existing frameworks, such as Integrated Information Theory (IIT) and Global Workspace Theory (GWT), provide valuable insights but lack empirical validation and consensus [3, 11].
- **Complexity of Biological Systems:** The human brain, with approximately 86 billion neurons and trillions of synaptic connections, far exceeds the complexity of current artificial systems [18]. Replicating even a fraction of this complexity in machines remains a daunting challenge.
- **Emergence of Consciousness:** The conditions under which consciousness emerges in biological systems are poorly understood. Determining whether these conditions can be replicated in non-biological systems requires further interdisciplinary research.

### 5.2 Philosophical Challenges

- **The Hard Problem of Consciousness:** As described by Chalmers, the "hard problem" concerns the relationship between physical processes (such as neural activity) and subjective experience [1]. Without resolving this fundamental question, creating true machine consciousness remains speculative.
- **Defining and Validating Consciousness:** Consciousness is inherently subjective, making it difficult to define or measure objectively. Current methods, such as behavioral imitation tests (e.g., the Turing Test), do not adequately capture the internal states of artificial systems [8].
- **Ethical Implications of Success:** If machine consciousness is achieved, society must confront profound ethical questions, including the moral status of machines and the responsibilities of their creators [5].

### 5.3 Technical Challenges

- **Scalability of Neuromorphic Systems:** Neuromorphic engineering offers a promising path for simulating consciousness, but scaling these systems to human-like levels remains a significant hurdle. Current hardware is limited by processing power, energy efficiency, and memory capacity [12].
- **AI Alignment:** Ensuring that conscious machines align with human values and goals is a critical challenge for safety. Misaligned systems could pose risks ranging from unintended behavior to existential threats [6].
- **Interdisciplinary Collaboration:** Developing machine consciousness requires expertise from diverse fields, including neuroscience, philosophy, computer science, and ethics. Facilitating such collaboration is an ongoing logistical and cultural challenge.

### 5.4 Future Directions

1. **Developing Hybrid Models:** Combining insights from multiple theories, such as IIT and GWT, could provide a more comprehensive framework for studying consciousness in machines. Hybrid models should incorporate both theoretical rigor and practical testability.
2. **Advancing Neuromorphic Engineering:** Investments in neuromorphic hardware and spiking neural networks could enable the development of systems capable of mimicking the complexity and dynamics of biological neural networks [7].
3. **Exploring Emergent Properties:** Research into emergent behaviors in complex systems may shed light on how consciousness arises and whether it can be replicated in artificial systems.
4. **Establishing Ethical Guidelines:** International collaboration is needed to create ethical standards for the development and deployment of conscious machines. These guidelines should address issues of accountability, safety, and equitable access [5].
5. **Validation Frameworks:** Developing robust tests and metrics to validate machine consciousness is essential. These frameworks should integrate behavioral, functional, and theoretical criteria to assess the presence of consciousness in artificial systems.

The pursuit of machine consciousness represents a convergence of scientific ambition, philosophical inquiry, and societal responsibility. Addressing the challenges outlined above requires a collaborative and interdisciplinary approach, with an emphasis on both technical innovation and ethical foresight. While the path to artificial consciousness remains uncertain, the potential rewards—ranging from deeper insights into human cognition to transformative technological advancements—justify continued exploration.

## Consciousness in Machines: A Critical Exploration

### 6 CONCLUSION

The exploration of machine consciousness stands at the crossroads of philosophy, neuroscience, and artificial intelligence, presenting profound scientific and ethical challenges. While remarkable progress has been made in understanding the theoretical underpinnings of consciousness and in developing computational and neuromorphic models, the realization of true machine consciousness remains speculative.

Defining consciousness in machines is a central hurdle, requiring frameworks that integrate both phenomenal and access consciousness while addressing the philosophical "hard problem" of subjective experience. Computational theories, such as Integrated Information Theory (IIT) and Global Workspace Theory (GWT), provide promising pathways but lack empirical validation and scalability for artificial systems. Moreover, the societal implications of conscious machines demand careful consideration, as they could disrupt labor markets, challenge ethical norms, and redefine human-machine relationships.

The future of machine consciousness research hinges on interdisciplinary collaboration. Advances in neuroscience, hardware engineering, and AI safety must converge to ensure responsible development. Additionally, establishing robust ethical guidelines and international governance frameworks is critical to addressing the moral status, accountability, and potential misuse of conscious systems.

Despite its uncertainties, the pursuit of machine consciousness offers transformative opportunities. It has the potential to deepen our understanding of human cognition, drive innovation in artificial intelligence, and catalyze philosophical insights into the nature of existence. By balancing ambition with responsibility, humanity can chart a course toward realizing this extraordinary frontier in science and technology.

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## Integration of Learning Management Based on the Pancasila Student Profile Strengthening Project (P5) in Developing Reference Books for Elementary School Teachers



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**ABSTRACT:** This study aims to develop a reference book to support elementary school teachers in understanding and implementing learning management based on the Pancasila Student Profile Strengthening Project (P5). The research was conducted at SDN 20 Pangkalpinang, SDN 33 Pangkalpinang, and SDN 28 Pangkalpinang from July to December 2024, involving elementary school teachers as research subjects. The Research and Development (R&D) method with the ADDIE development model, consisting of five stages Analyze, Design, Develop, Implement, and Evaluate was used in this study. The validation results from material and media experts showed average scores of 87.6% and 84.6%, respectively, indicating that this reference book meets the eligibility standards in terms of content and design. Small- and large-scale trials produced an average score of 89.25%, indicating that this book is highly practical for teachers to use. Positive responses from teachers further strengthen the relevance of the book to learning needs in the field. Teachers reported being helped in understanding the P5 concept and implementing it in project-based learning. The book also includes practical guidance and suggestions for improvement, such as strategies for overcoming obstacles like time and resource management, as well as a more detailed assessment rubric.

**KEYWORDS:** Learning management, Pancasila Student Profile Strengthening Project (P5), reference books, Elementary School teachers

### I. INTRODUCTION

The Pancasila Student Profile Strengthening Project (P5) is a concept that explains and describes achievements in a characteristic and attitude that is adjusted to the objectives of education [1]. A student is expected to be able to understand [2], appreciate [3], and apply Pancasila values in everyday life [4]. This profile aims to form the concept of a young generation with character [5], social awareness, and the ability to contribute positively to the progress of the nation and state [6]. Based on the Pancasila student profile, a student also needs to be understood by the teacher as a concept of teaching achievement in education [7], therefore it is necessary to conceptualize a program to support and manage learning activities that are carried out as well as possible by an educator [8].

The problems faced by several elementary schools in Pangkalpinang, such as SDN 20, SDN 33, and SDN 28, indicate an urgent need for better integration of learning management. At SDN 20 Pangkalpinang, for example, the learning system often runs partially and is poorly coordinated. Teachers have difficulty aligning teaching and learning activities with the existing curriculum, which results in less than-optimal learning processes and absorption of material by students. Meanwhile, SDN 33 Pangkalpinang faces challenges in strengthening the Pancasila Student Profile (P5). The values of Pancasila which should be the main foundation in forming student character have not been well integrated into every learning activity. The lack of training and resources for teachers to implement these values makes the character education process less effective so that students do not receive comprehensive learning in building character according to the principles of Pancasila.

At SDN 28 Pangkalpinang, the main problem lies in the limited reference books available to teachers. Many teachers rely on limited and inadequate learning resources to support optimal teaching processes. This is exacerbated by the lack of development of relevant reference books that are by curriculum needs. Without adequate reference books, teachers have difficulty in providing rich and in-depth material, which ultimately affects the quality of student learning. Challenges in implementing project-based

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learning are also common problems in the three schools. Many teachers have not fully understood or adopted the project-based learning method, which has great potential to increase student engagement and creativity. The gap in teacher competency in implementing this approach results in learning that is less innovative and interesting for students. Further support, both in the form of training and resources, is needed to address this problem. Overall, the problems faced by SDN 20, SDN 33, and SDN 28 Pangkalpinang highlight the importance of better integration of learning management, strengthening Pancasila-based character education, and developing and providing adequate reference books for teachers.

State of the Art in previous research is used to analyze and clarify the concept of the study in the discussion of the development [9] and to distinguish it from the writing that has been or is being done [10]. This study includes previous research related to the concept of learning management based on the Pancasila student profile strengthening project (P5).

Strengthening the Pancasila Student Profile through local wisdom values is the main focus of the study [11], an High School students. This study suggests three main implications: education management integrated with Pancasila, and character-based decision-making. In the context of the Independent Curriculum, research by [12] shows that P5 management in the learning process and integration of learning with Pancasila can be used as a reference for developing the concept of education management integrated with Pancasila values, supporting more effective and relevant learning outcomes.

In addition, several studies have made significant contributions to the development of reference books for elementary education. [13] emphasized the importance of reference books that focus on the integration of character values in the curriculum. [14] found that the use of interactive and project-based reference books can improve student engagement and their learning outcomes. [15] revealed the importance of content validity in reference books to ensure suitability with the curriculum and learning needs. [16] showed that reference books equipped with digital resources and technological aids can improve the quality of learning. [17] emphasized the importance of reference books that are practical and easy to use by teachers to facilitate the teaching process and increase the effectiveness of learning in the classroom.

nt research (2023-2024) focuses on digitalization and innovation, including RPG-based learning, MSME support in digital marketing, and the use of e learning platforms such as Wordwall. In the future (2024-2028), the focus of research will be on the development of modern technology based learning media that increase student interest and help teachers understand student character, emphasizing the importance of technological innovation in education for more interactive and effective learning.

The problem-solving approach in this research involves the development of a project-based learning management reference book to strengthen the Pancasila student profile (P5) with simple procedures: problem identification, data collection, and product design. Data analysis was carried out qualitatively and quantitatively qualitatively for interview and document data, and quantitatively for questionnaires. A preliminary study that included a literature review and curriculum was used to collect data related to the reference book developed. This study aims to develop a reference book to support elementary school teachers in understanding and implementing learning management based on the Pancasila Student Profile Strengthening Project (P5).

## II. RESEARCH METHODOLOGY

This study focuses on developing reference books for elementary school teachers as an effort to enhance their understanding of project-based learning management to strengthen the Pancasila Student Profile (P5). The research will be conducted in three schools in the Pangkalpinang area from July to December 2024. These schools include SDN 20 Pangkalpinang, SDN 33 Pangkalpinang, and SDN 28 Pangkalpinang, which serve as the objects of the study. The primary subjects of this research are elementary school teachers.

This study employs the Research and Development (R&D) method using the ADDIE development model, which consists of five stages: Analyze, Design, Develop, Implement, and Evaluate [18]. The development stages in this study are illustrated in Chart 1.

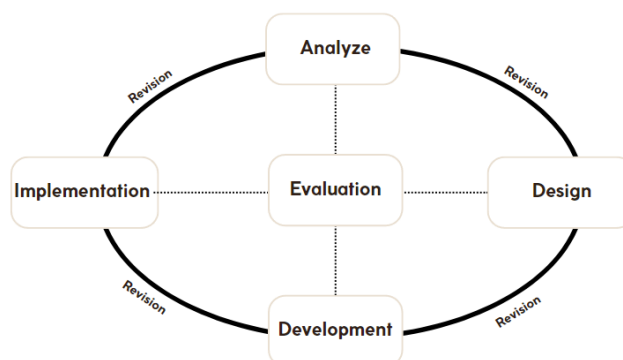


Figure 1: Stages of the ADDIE Development Model



## **Integration of Learning Management Based on the Pancasila Student Profile Strengthening Project (P5) in Developing Reference Books for Elementary School Teachers**

The ADDIE instructional model is an instructional process consisting of five phases, namely analysis, design, development, implementation and dynamic evaluation [19]. The stages of the ADDIE Model are implemented.

The data collection instruments in this study used questionnaires and tests. The questionnaires used included media expert questionnaires, material expert questionnaires and language expert questionnaires. The questionnaires were analyzed to see the validity of the products developed [20]. In addition, the instruments used were teacher response questionnaires and principal responses to see the practicality of the product. Data analysis techniques used pretests and posttests to know the effectiveness of the products developed using N-gain.

### **III. RESULTS AND DATA ANALYSIS**

#### **A. Analyze Stage**

The Analyze stage focuses on identifying the needs and problems faced by teachers related to the integration of the Pancasila Student Profile Strengthening Project (P5) in learning. Data were obtained through interviews with teachers at SDN 20 Pangkalpinang, SDN 33 Pangkalpinang, and SDN 28 Pangkalpinang. The following are the results of the interviews:

##### **1. Understanding the Concept of P5**

Most teachers understand the basic concepts of P5 but find it difficult to apply them to their learning. Teachers mentioned that there is no structured and relevant practical guidance to help them implement effective project-based learning.

##### **2. Suitability of Material to Local Context**

Teachers said that available project-based learning materials often do not reflect local values or cultural contexts, making students less interested in participating. They need guidance that includes elements of local wisdom.

##### **3. Project Based Learning Management**

Teachers face obstacles in designing, implementing, and evaluating project-based learning. The obstacles include limited time, resources, and knowledge of effective classroom management to support project activities.

##### **4. Need for Reference Books**

All respondents agreed they needed a reference book that could provide practical guidance on project-based learning management by the P5 principles. The book is expected to include implementation steps, assessment strategies, and relevant and contextual project examples.

Based on the interview results, it can be concluded that teachers at SDN 20 Pangkalpinang, SDN 33 Pangkalpinang, and SDN 28 Pangkalpinang need the development of a reference book that integrates project-based learning management for Strengthening Pancasila Student Profiles (P5). The book must meet teachers' needs in designing project-based learning that is in accordance with the local context, provide practical, applicable guidance, and support the achievement of P5 goals, namely building competitive student characters with a global perspective while still loving local culture.

#### **B. DESIGN STAGE**

At this stage, the reference book is designed based on the results of the needs analysis. The book is developed with consideration of the needs of elementary school teachers to understand and implement the Pancasila Student Profile Strengthening Project (P5) within the framework of project-based learning (PBL). Its structure is crafted to provide systematic, practical, and contextually relevant guidance for elementary schools. Below is a draft of the table of contents for the reference book:

The table of contents includes several key sections to provide a clear and organized structure for readers. The cover features essential visual information about the book, such as the title, author's name, and publisher. The Author's Page contains a brief profile of the author. The Foreword introduces the background and purpose of the book. The Table of Contents serves as a navigational guide, helping readers locate specific sections of the book.

##### **CHAPTER I: Introduction**

This chapter explains the fundamentals of learning management concepts, the Pancasila Student Profile Strengthening Project (P5), and the purpose of the book in supporting project-based learning (PBL) in elementary schools. It provides a theoretical foundation for understanding the importance of integrating the P5 approach into project-based learning.

##### **CHAPTER II: Pancasila Student Profile (P5)**

This chapter discusses the six core dimensions of the Pancasila Student Profile: Faith and Devotion to God Almighty, Critical Thinking, Creativity, Mutual Cooperation, Global Diversity, and Independence. It also emphasizes the significance of implementing P5 in elementary education as a means to develop students with strong character.

##### **CHAPTER III: Examples of P5 Projects in Elementary Schools**

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This chapter presents real examples of P5 implementation in project-based learning activities. It includes detailed project implementation plans aligned with the P5 dimensions, providing teachers with practical insights for classroom application.

### CHAPTER IV: Integration of P5 in Project-Based Learning (PBL)

This chapter explores strategies for implementing P5 across various subjects in elementary schools. It outlines steps for designing PBL focused on P5 and highlights the teacher's role in guiding and facilitating these projects.

### CHAPTER V: Planning a P5 Project in Elementary Schools

This chapter provides a guide on selecting project themes relevant to P5, planning and implementing projects, and fostering collaboration among teachers. It also emphasizes the importance of leveraging available learning resources to ensure project success.

### CHAPTER VI: Project Evaluation and Reflection

This chapter offers guidance on assessing student project outcomes using rubrics and portfolio assessments. It also underscores the value of conducting reflective sessions with students to evaluate their learning experiences post-project.

### CHAPTER VII: Implementing P5 in the Classroom

This chapter focuses on practical tips for integrating P5 into daily lessons, facilitating projects, and enhancing student engagement throughout the learning process.

### CHAPTER VIII: Classroom Management for the P5 Project

This chapter provides strategies for effectively managing the classroom, time, and resources to support project success. It also includes methods for dividing tasks among students to ensure smooth project execution.

### CHAPTER IX: Conclusions and Recommendations

This chapter summarizes the importance of integrating P5 into elementary school learning and provides actionable recommendations for its effective implementation in schools.

**The Bibliography:** This section lists all references used in compiling the book, including books, journals, articles, and other relevant sources. It serves to acknowledge original authors and ensure the credibility and validity of the book's content.

**The Author's Biography:** This section includes a brief profile of the authors, detailing their educational background, professional experience, and contributions to education.

The book is designed using simple language and engaging illustrations to facilitate teachers' understanding of P5 concepts and applications. It features examples of projects based on local wisdom to inspire teachers to utilize contextual teaching materials. The book format is practical, including step-by-step guides, assessment rubrics, and reflection tips to ensure project sustainability.

## C. DEVELOPMENT STAGE

The development stage is the process of developing an initial prototype of the reference book based on the results of the analysis and design that have been carried out previously. At this stage, the draft of the reference book that has been prepared is validated by material experts and media experts to assess the quality of the content, clarity of information, and the feasibility of learning media. This validation process aims to ensure that the book can meet the needs of teachers in integrating the Pancasila Student Profile Strengthening Project (P5) into project-based learning.

### 1. Results of Material Expert Validation

Validation of material experts was conducted by HV., who has expertise in the field of project-based learning and P5. The validation questionnaire covers several aspects of table 1.

**Table 1: Results of the Material Validation Questionnaire**

Assessment Aspects	Indicators	Score (%)	Description
Completeness of Material	Materials cover all P5 dimensions and PBL steps	90%	Very Eligible
Relevance of Material	Suitability to the needs of elementary school teachers and local context	88%	Very Eligible
Clarity of Language and Presentation	Material delivery is easy to understand	85%	Very Eligible
Average Score		87.6%	Very Eligible

The book is considered very complete with a score of 90%, because it covers all dimensions of P5, implementation steps, and examples of local wisdom-based projects. A score of 88% indicates that the book's material is very relevant to the needs of

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elementary school teachers, both in terms of curriculum content and local context. With a score of 85%, the language used is considered communicative and easy for teachers to understand, although there are suggestions to add additional illustrations to the project example section. Overall, the validation of material experts produced an average score of 87.6%, which is categorized as very feasible with minor recommendations for visual improvements.

### 2. Media Expert Validation Results

Media expert validation was conducted by Mr. FA who has expertise in learning media design. The validation questionnaire includes aspects of table 2:

**Table 2: Media Validation Questionnaire Results**

Assessment Aspects	Indicators	Score (%)	Description
Book Layout and Design	Attractive and structured visual display	85%	Very Eligible
Visual Consistency	Consistency of design elements and icons	82%	Very Eligible
Readability	Font size, spacing, and layout support comfort	87%	Very Eligible
Average Score		84.6%	Very Eligible

With a score of 85%, the layout of the book is considered quite attractive and easy for readers, but it is recommended to improve the color combination in some parts to make it more contrasting. A score of 82% shows fairly good design consistency, especially in the use of icons and visual elements. However, diagrams need to be added to clarify the relationship between the project implementation steps. The book scored 87% in the readability aspect because the font size and spacing between lines are in accordance with reading comfort standards. The average score from media experts is 84.6%, which is categorized as very decent, with suggestions for adjusting the color and adding supporting illustrations.

### 3. Book Revision and Improvement

Based on input from material experts and media experts, revisions were made to several sections; Adding visual illustrations to project examples to make it easier for teachers to understand their implementation; Adjusting the colors in tables and diagrams to make them more attractive and contrasting; Adding a flowchart of PBL implementation steps based on P5 to clarify the relationship between stages.

Based on the validation results from Mrs. Hv and Mr. FA, the reference book was declared very suitable for use with an average overall score of 86.1%. This book can be a practical and relevant guide for elementary school teachers to integrate the Pancasila Student Profile Strengthening Project (P5) in project-based learning. The revisions made ensure that the book is more communicative, and visually appealing, and by user needs.

## D. IMPLEMENTATION STAGE

The Implementation stage in this study aims to test the practicality and effectiveness of the reference book that has been developed to support Elementary School (SD) teachers in integrating the Pancasila Student Profile Strengthening Project (P5) into project-based learning (PBL). Implementation was carried out through limited trials (small scale) and field trials (large scale) involving elementary school teachers in three schools: SDN 20 Pangkalpinang, SDN 33 Pangkalpinang, and SDN 28 Pangkalpinang.

### 1. Small Scale Trial

In a small-scale trial, the reference book was tested by 10 teachers selected purposively from three schools. Teacher responses to the book were measured using a questionnaire covering the aspects of table 3.

**Table 3: Results of small scale trials**

Assessment Aspects	Score (%)	Description
Clarity of Material	92%	Very Practical
Relevance to Teacher Needs	90%	Very Practical
Ease of Use	88%	Very Practical
Integration with P5	89%	Very Practical

The average score obtained from the small-scale trial was 89.75%, which is categorized as very practical. Teachers provided minor input, such as adding more specific assessment rubric examples for certain subjects.

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### 2. Large Scale Trial

In the large-scale trial, the reference book was utilized by 30 teachers from three schools that served as the subjects of the study. The teachers were instructed to use the reference book over a two-week period to design and implement project-based learning in their respective classrooms. Teacher responses to the book were assessed using a questionnaire that covered the same aspects outlined in the small-scale trial Table 4.

**Table 4: Results of large-scale trials**

Assessment Aspects	Score (%)	Description
Clarity of Material	91%	Very Practical
Relevance to Teacher Needs	89%	Very Practical
Ease of Use	87%	Very Practical
Integration with P5	88%	Very Practical

The average score from the large-scale trial was 88.75%, which is also categorized as very practical. Teachers gave positive responses to this reference book, especially in the section on the guide to the steps of PBL implementation and examples of projects relevant to the P5 dimension.

Teachers' responses to the developed reference book showed a very positive response. Teachers felt that this book provided a deep understanding of the concept of the Pancasila Student Profile Strengthening Project (P5) while helping them apply it in project-based learning in the classroom. Most teachers stated that this book was relevant to practical needs in elementary schools, provided clear guidance, and facilitated the planning and implementation process of project-based learning. This book is considered capable of being a practical and applicable guide in supporting the integration of P5 into learning.

However, several teachers provided constructive suggestions for improving the book. Teachers suggested that this book be equipped with a more in-depth explanation regarding strategies for overcoming obstacles in project implementation, such as time management, resources, and collaboration between teachers. This input is important evaluation material to improve the quality of the book so that it can provide a more comprehensive solution for teachers in facing the challenges of implementing project-based learning in the field. Based on small and large-scale trials, the reference book is considered very practical for use by Elementary School teachers. The average score from both stages of implementation is 89.25%, which shows that this book has successfully supported the integration of P5 in project-based learning. Positive responses from teachers confirm that this book is relevant, easy to use, and relevant to the needs in the field. Input from teachers will be considered for improving the book in the next version.

### E. EVALUATION STAGE

The Evaluate stage in this study aims to assess the effectiveness and final quality of the reference book developed based on large-scale trials, teacher responses, and validation from experts. The evaluation was carried out by analyzing data from practicality questionnaires, interviews, and input from teachers and validators to improve the reference book before it is widely used.

The results of the teacher response questionnaire in the large-scale trial showed that the reference book was very practical with an average score of 88.75%. Teachers considered that this book provided an easy-to-follow guide to designing and implementing project-based learning integrated with the dimensions of the Pancasila Student Profile (P5). This high level of practicality indicates that the book can be used directly without requiring any additional adjustments.

The results of interviews with teachers showed that this book was considered relevant and helpful in implementing project-based learning. Teachers also provided constructive input, such as the need for additional technical guidance to manage time and resources when running projects in class. This input became evaluation material to improve the book to make it more applicable.

Evaluation by material experts and media experts showed very satisfactory results. The material expert validator gave an average score of 87.6% with a very feasible category, while the media expert validator gave an average score of 84.6% with a very feasible category. The experts suggested that this book be equipped with more detailed assessment rubric examples and more structured reflection guides to support student project evaluation. Based on the evaluation results, several improvements were made to the reference book; the Addition of more specific assessment rubric examples for various P5 dimensions; the Addition of technical guidelines to overcome project implementation obstacles, such as time management, resources, and collaboration; Improvement of the book's visual design to improve readability and visual appeal.

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The reference book that was developed has gone through a comprehensive evaluation process and showed very positive results from various aspects, both in terms of practicality, relevance, and effectiveness. With a high level of eligibility from the validator and positive responses from teachers, this book is considered ready to be used more widely in supporting elementary school teachers to integrate P5 into project-based learning. The improvements made ensure that this book is more applicable and relevant to needs in the field.

### **IV. DISCUSSIONS**

In this study, the main objective is to develop a reference book that integrates Project-based Learning Management for Strengthening Pancasila Student Profiles (P5) in Elementary Schools. The results of the study indicate that the development of this book is very relevant to the needs of teachers at the elementary school level, especially in implementing project-based learning that focuses on strengthening Pancasila values.

Education in Indonesia, especially at the elementary school level, faces major challenges in shaping students' character and skills that are by the demands of the 21st century [21]. One of the steps taken to overcome this is through the integration of the Pancasila Student Profile (P5) in learning, which is one of the main objectives of the Merdeka Curriculum. P5 consists of six main dimensions: Faith and Devotion to God Almighty, Critical Thinking, Creativity, Mutual Cooperation, Global Diversity, and Independence [22]. This dimension not only focuses on knowledge but also the development of attitudes and life skills that are relevant to the development of the times.

Project-based learning (PBL) has been proven effective in creating more contextual and applicable learning for students [23]. According to [24], PBL supports the development of 21st century skills [25], such as problem-solving and collaboration, which are essential in strengthening the P5 dimension. Therefore, the integration of P5 in project-based learning provides a clear direction for teachers to shape students' character through projects based on Pancasila values.

The reference book developed to support P5-based teaching in Elementary Schools was considered very feasible according to the material expert and media expert validators. The validation results showed a high score, with the material expert validator giving 87.6% and the media expert giving 84.6%. This indicates that this book is very good in terms of material content and visual design.

The practicality of this book, which was measured using a questionnaire to teachers, also received a very positive response. Most teachers felt that this book made it easier for them to understand and apply the P5 concept in learning. Teachers also felt that this book was relevant to the context of education in Indonesia, especially in supporting the implementation of the Merdeka Curriculum in the classroom. According to [26], practical and easy-to-understand material for teachers will improve the quality of teaching and have a positive impact on student learning outcomes.

However, there are some suggestions for improvement, namely the addition of strategies to overcome obstacles in project implementation, such as time and resource management. This shows that although this book has been very helpful for teachers, there is still room for improvement in terms of presenting practical solutions to challenges that may be faced in the field. In addition, some teachers also suggested the addition of a more structured assessment rubric to help evaluate students in P5-based projects.

The developed reference book has proven to be a suitable reference for Elementary School teachers in implementing project-based learning that integrates the dimensions of the Pancasila Student Profile. This book is designed to help teachers design and implement projects that not only improve students' academic skills but also shape their character by Pancasila values. This is in line with the findings [27] [28], which state that the project-based approach can improve cognitive competence while building students' character values through contextual learning.

Although it has met the eligibility standards in terms of content and design, input from teachers and validators indicates the need for improvement of the book. Teachers proposed the addition of a section discussing time and resource management in project implementation. This input is relevant to the statement [29] which emphasizes the importance of practical guidance for teachers to overcome technical obstacles in the field, such as limited time and resources. In addition, the addition of a more in-depth assessment rubric is needed to provide a more specific reference in evaluating student project results [30].

This book also has the potential to be a model for the development of other learning resources that support the implementation of the Independent Curriculum, especially in the context of Elementary Education. As a practical reference, this book combines theory with concrete step-by-step guidance, which is in line with recommendations [31] and [32] on the need for learning aids that support the integration of Pancasila values into the school curriculum. With further refinement, this book can be more applicable and effective in helping teachers face the challenges of implementing the Independent Curriculum.

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## V. CONCLUSIONS

This study uses the ADDIE development model which includes five stages: Analyze, Design, Develop, Implement, and Evaluate to produce a reference book "Integration of Project-Based Learning Management Strengthening Pancasila Student Profiles (P5) in the Development of Reference Books for Elementary School Teachers". At the analysis stage, it was found that elementary school teachers needed relevant and practical guidance to understand and implement P5 in project-based learning. The design stage then produced a book framework that included the concept of P5, project implementation steps, and practical guidance for teachers.

At the development stage, this book was validated by material and media experts with scores of 87.6% and 84.6% respectively, indicating that this book is suitable for use in terms of both content and design. Implementation was carried out through small and large-scale trials, with an average practicality score of 89.25%. Teachers who were the subjects of the study gave positive responses to this book, stating that the book helped them understand and implement P5 in project-based learning. Teachers also appreciated the relevance of this book to learning needs in the field.

The evaluation phase resulted in suggestions to improve the book in the next version, such as adding constraint management guidelines, time management strategies, resources, and more detailed assessment rubrics. Overall, this book has the potential to be an important reference source in supporting the implementation of the Independent Curriculum. This book not only helps teachers understand the concept of P5 but also provides practical guidance for integrating Pancasila values in project-based learning to develop students' character and skills according to the demands of the 21st century.

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## Analysis of the Success Level of Transplant Coral Life in the Seventh Year at the Tawara Dive Point in the Bunaken National Park Area, North Sulawesi



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**ABSTRACT:** Coral transplantation is the grafting or cutting of live coral to be grafted elsewhere or in places where the coral has been damaged, with the aim of restoring or forming natural coral reefs. Coral transplantation plays a role in accelerating the regeneration of damaged coral reefs, and can also be used to build new coral reef areas that did not previously exist. While the objectives of the study are: To describe the initial conditions, artificial coral transplantation in Tawara, at the Bunaken National Park location; Analyze the number of transplanted corals that survived for 7 years; Analyze the condition of transplanted corals by measuring the length and number of coral branches that survived for 7 years. Transplantation was carried out in 2018, after a year of measuring coral growth, namely in 2019. Data from the results of the study from 77 transplanted coral fragments, there were 3 dead coral modules, and those that survived were 74 coral fragments or 96% success in survival, while those that died were 4%.

**KEYWORDS:** Transplantation, Coral, Seventh Year

### INTRODUCTION

Coral reefs are ecosystems with the highest species diversity, even exceeding the productivity of existing land systems such as forests. The main component of coral reefs is coral (rock coral) which has the highest distribution of around 590 species from 793 types. There are around 1650 species of fish identified only in the Eastern Indonesian region that are associated with coral reef areas. The combination of mangrove ecosystems, seagrass beds and coral reefs supports thousands of types of organisms from various taxonomies living in association in this ecosystem. In Indonesia, the total area of coral reefs is estimated to be around 82,200 km<sup>2</sup> or around 18% of the total area of coral reefs in the world and 65% of the total area of the coral triangle, which includes Indonesia, the Philippines, Malaysia, East Timor, Papua New Guinea, and the Solomon Islands. The coral reefs in these 6 countries are called the coral triangle, because if a boundary line is drawn that encompasses the coral reef areas in these countries, the shape resembles a triangle with a total area of around 75,000 km<sup>2</sup>. In Bunaken National Park itself, the total area is almost 90,000 hectares, coral reefs have a wide area of around 8,010.7 hectares (Mehta et al. 1999: Erdmann 2004). For the type based on research by Devantiar (2006) and Turak (2003), there are around 63 genera and around 400 types of stony coral (scleractinia) found in Bunaken National Park so that it supports around 1000 types of fish living in this coral reef ecosystem. The unique and artistic topography of the reef supports various associations of living biota and produces a marine park of very important value. Coral transplantation activities themselves have benefits for rehabilitating coral reefs to health conditions that have almost been completely damaged, this needs to be done considering the high tourist activity in Bunaken National Park, due to the presence of ships, diving and snorkeling carried out by tourists. When the rehabilitation process is not carried out, there will be a threat to the coral reef ecosystem itself which will affect the biota associated with it. Based on the background stated previously, the author identified the problem in general: The placement of transplanted corals had been carried out several years earlier and the type of coral transplanted was the acropora type, and in previous studies around 90% survived. Based on this, a study was conducted to determine the condition of the coral for 7 years since the placement of coral seedlings in 2018.

### RESEARCH METHODOLOGY

This research was conducted in May 2024. The location is in the Bunaken National Park area, precisely in front of Bunaken Island. The observation point or location is located at 124 ° 45'35.9 "E and 1 ° 37'04.9" N, with the name "Tawara", which is a diving or

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snorkeling point for tourists visiting Bunaken. The following image is the observation location that was carried out with a number according to the observation location.



Figure 1. Map of the "Tawara" Research Location on Bunaken Island

### Data Collection Technique

Data collection was carried out using diving equipment, by observing the living and dead coral transplantation modules. The initial transplantation consisted of 7 coral modules, each consisting of 11 coral fragments. The shape of the module is 4 rectangles with a size of 1 x 0.5 meters.

### Data Analysis

Changes in coral size and growth rate were calculated using the following formula:  $\beta = L_t - L_0$  Description:

$\beta$  = Change in length/width of transplanted coral fragments (cm)

$L_t$  = Average length/width of fragments at observation time t (cm)  $L_0$  = Average initial length/width of fragments (cm)

Meanwhile, the growth rate of transplanted coral is calculated using the following formula:

$$\alpha = \frac{L_{i+1} - L_i}{t_{i+1} - t_i}$$

Description:  $\alpha$  = Rate of increase in length/width of transplanted coral fragments

$L_{i+1}$  = Average length/width of fragments at time to-i+1

$L_i$  = Average length/width of fragments at time to-i  $t_{i+1}$

= Time to i+1  $t_i$

= Time to i

The method for calculating the survival rate of transplanted coral uses the following formula (Ricker, 1975):

$$SR = ( N_t / N_0 ) \times 100\% \text{ Description:}$$

SR = Survival rate

$N_t$  = Number of individuals at the end of the study

$N_0$  = Number of individuals at the beginning of the study

The growth rate of *Acropora* coral is processed and analyzed and presented in the form of tables, graphs, and narrated according to the results of the analysis obtained. The data processing was done manually with the help of Microsoft Excel and SPSS software.

## RESULTS AND DISCUSSION

In accordance with the objectives stated above, the following are the results of the research carried out. This coral transplantation was carried out in 2018, where the coral planting consisted of 7 modules, each module consisting of 11 coral fragments and the total initial planting amounted to 77 fragments of the *Acropora formosa* species. The following image shows when the coral seedlings were taken and when the coral was transplanted.

**Analysis of the Success Level of Transplant Coral Life in the Seventh Year at the Tawara Dive Point in the Bunaken National Park Area, North Sulawesi**



**Figure 2. Collecting coral seeds and when corals are transplanted.**

In 2019, observations were made, the results of which will be displayed in the following table. Within a period of 6 years, research was again conducted to see the growth of the transplanted coral. The research location "Tawara" is located in Bunaken National Park which is one of the diving spots for tourists located at 1 ° 37'04.12 "N and 124 ° 45'35.12" E. Karauwan, M. A. J and Gumolili (2023), stated that the Tourism Suitability Index at this location for physical supporting factors of waters in the form of brightness, depth, current speed that supports in the category  $2.0 \leq IKW < 2.5$  with an index value of 2.25 with a category suitable for diving tourism. The water depth is 7 meters with a basic substrate in the form of coral fragments. Brightness ranges from 3 - 10 meters. While the environmental parameters of the waters are as follows:

**Table 1. Parameters of "Tawara" Waters**

Parameters	Nilai
Salinity	29.70 ‰
Temperature	29,5 <sup>o</sup> C
Turbidity	5.35
Dissolved Oxygen (DO)	5.7 ppm
Nitrite	0.04 ppm
Phosphate	0.05 ppm
pH	7.6

**Coral Transplant Growth Results**

In accordance with what has been stated previously, the initial transplantation was carried out in 2018, after a year of measuring coral growth, namely in 2019. The research data has been displayed in the following table. Of the 77 coral fragments that were transplanted, there were 3 coral modules that died, and those that survived were 74 coral fragments or 96% success in survival, while 4% died (Table 2)



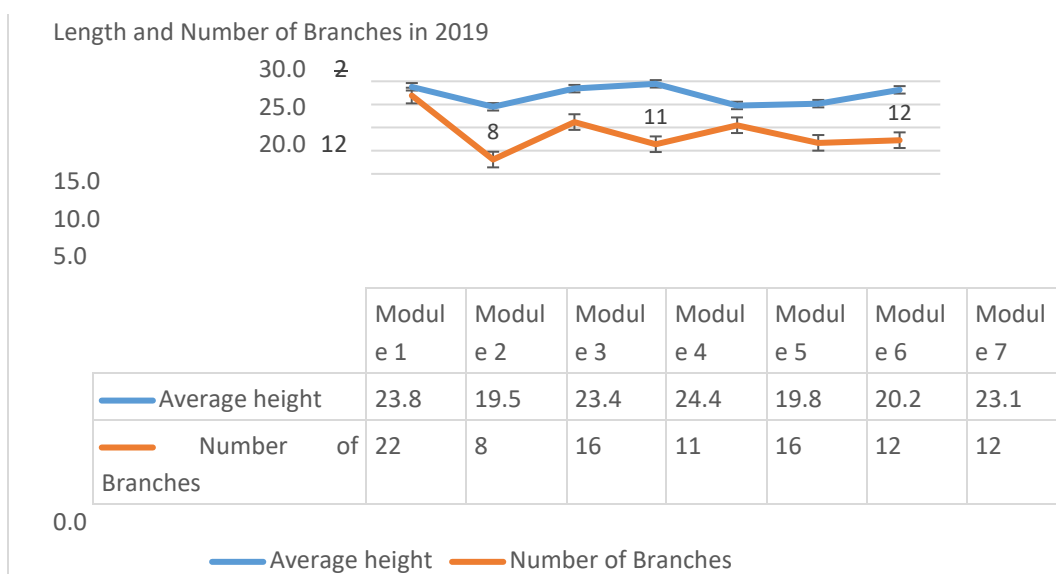
**Figure 3. Measurement of transplanted coral in 2019**



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**Table 2. Branch Length and Number of Branches of Transplanted Coral in 2019**

Module 1		Module 2		Module 3		Module 4		Module 5		Module 6		Module 7	
Branch Length (Cm)	Number of Branches	Branch Length (Cm)	Number of Branches	Branch Length (Cm)	Number of Branches	Branch Length (Cm)	Number of Branches	Branch Length (Cm)	Number of Branches	Branch Length (Cm)	Number of Branches	Branch Length (Cm)	Number of Branches
20.9	19	24.8	7	27.9	13	21.9	10	25.8	18	29.9	23	26.8	8
30.3	16	19	5	23.9	11	25.8	13	8.9	2	26.8	10	29.9	13
26.8	41	22.8	6	26.8	8	27.9	12	19	7	21.9	8	27.8	15
28.7	18	13.9	2	20.9	18	27.8	16	26.8	16	21.8	12	10.9	10
21.4	12	20.9	8	26.7	43	21.9	8	19.9	15	28.9	9	23	25
22.1	25	5.9	2	23.9	16	24.7	20	23.8	13	23.7	15	25.7	9
19.8	28	30.7	12	12.9	2	31.8	13	19.9	16	11.9	15	22.9	19
26.3	24	13.9	1	24.8	5	18.9	6	25.8	40	22.9	10	31.9	14
26	18	27.6	8	20.9	42	20.9	3	9.9	10	13.8	15	12.9	5
21.5	32	14.9	16	18.9	5	22.8	13	17.9	18	0	0	16.8	12
18	8	19.9	22	29.8	15	0	0	0	0	0	0	25.9	5
Total Tinggi dan Jumlah Cabang													
261.8	241	214.3	89	257.4	178	244.4	114	197.7	155	201.6	117	254.5	135



**Figure 4. Graph of Length and Number of Branches in 2019**

Based on the objectives to be achieved, using the method presented above, the research results for 2024 are as follows. The results of the study showed that the transplanted corals grew well, and the survival rate was 96%, which means it is still the same, for 6 years starting from data collection in 2019 and only 4% died. According to Haris et al., 2017, the concrete media has a success rate of between 91.7-100%. Meanwhile, the Acropora coral species can survive in turbid water conditions (Johan et al., 2008). The number of branches and branch lengths based on the table below have increased. From observations made, the growing corals have formed coral colonies, because the number and length of branches have increased, so some corals have broken. This needs to be followed up in moving the coral modules.

**Table 3. Branch Length and Number of Transplanted Coral Branches in 2024**

Module 1		Module 2		Module 3		Module 4		Module 5		Module 6		Module 7	
Panjang Cabang (cm)	Jumlah Cabang (cm)	Panjang Cabang (cm)	Jumlah Cabang (cm)	Panjang Cabang (cm)	Jumlah Cabang (cm)	Panjang Cabang (cm)	Jumlah Cabang (cm)	Panjang Cabang (cm)	Jumlah Cabang (cm)	Panjang Cabang (cm)	Jumlah Cabang (cm)	Panjang Cabang (cm)	Jumlah Cabang (cm)
40.9	28	47.7	16	41.9	28	37.7	25	46.6	30	50.8	29	50.8	17
53.3	23	42.6	13	44.6	20	45.3	25	24.7	8	48.5	19	52.9	18
46.8	53	51.1	19	48.2	16	46.9	27	40.7	18	44.4	20	47.8	29
48.7	32	40.1	13	44.1	26	49.1	27	46.8	27	40.5	25	34.9	16
40.4	21	46.7	23	49.1	49	41.9	22	40.7	20	51.9	20	43.8	28
42.1	33	43.9	13	43.9	29	44.7	28	41.8	17	40.7	27	43.8	21
37.8	34	32.4	25	33.6	17	55.8	21	34.6	23	32.7	31	44.7	27
46.3	39	41.5	12	45.8	16	41	15	46.7	44	43.6	18	55.5	23
43	27	41.8	16	39.1	43	45	6	31.9	15	31.8	24	35.5	17
43.5	44	38.9	20	43.9	20	43.8	29	41.9	25	0	0	36.4	24
40.7	19	51.6	35	47.4	28	0	0	0	0	0	0	49.5	20
Total Panjang dan Jumlah Cabang Karang													
483.5	353	478.3	205	481.6	292	451.2	225	396.4	227	384.9	213	495.6	240

Descriptive Statistics													
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Module Height 1	11	15.50	37.80	53.30	483.50	43.9545	1.34316	4.45474	19.845	.844	.661	506	1.279
Module Height 2	11	19.20	32.40	51.60	478.30	43.4818	1.69233	5.61281	31.504	-2.93	.661	232	1.279
Module Height 3	11	15.60	33.60	49.10	481.60	43.7818	1.33108	4.41471	19.490	-1.239	.661	1.919	1.279
Module Height 4	11	55.80	.00	55.80	451.20	41.0182	4.33608	14.38116	206.818	-2.666	.661	8.199	1.279
Module Height 5	11	46.80	.00	46.80	396.40	36.0364	4.15448	13.77884	189.857	-2.060	.661	4.710	1.279
Module Height 6	11	51.90	.00	51.90	384.90	34.9909	5.56620	18.46101	340.809	-1.411	.661	8.70	1.279
Tinggi Modul 7	11	20.60	34.90	55.50	495.60	45.0545	2.13956	7.09611	50.355	-2.23	.661	-1.144	1.279
Valid N (listwise)													



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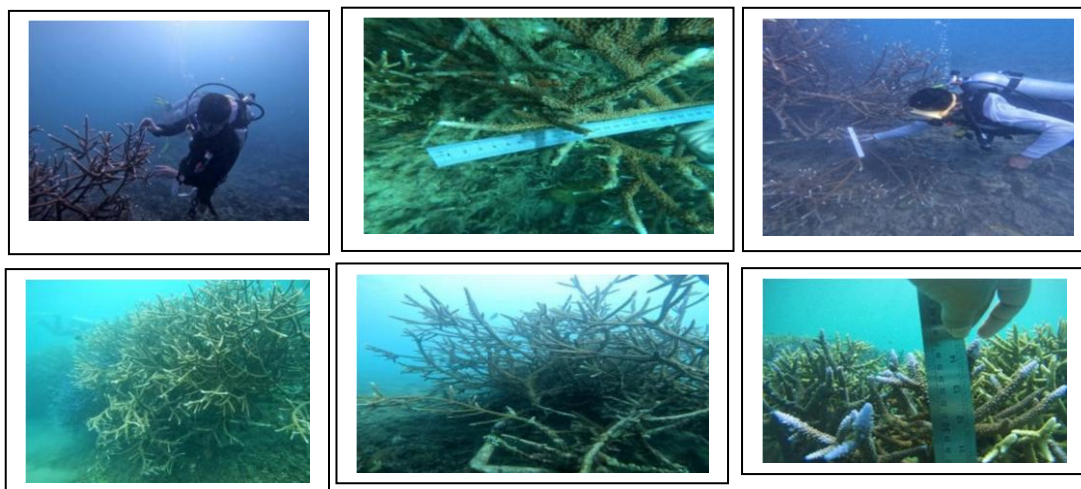


Figure 5. Measurement of Transplanted Coral in Tawara in 2024

Next, the average branch height and number of branches for each module are obtained as shown in the following table: Table 4. of Average Branch Height and Number of Branches of Transplanted Coral

Module	Module 1	Module 2	Module 3	Module 4	Module 5	Module 6	Module 7
Average Height (cm)	44.0	43.5	43.8	45.1	39.6	42.8	45.1
Number of Branches	32	19	27	23	23	24	22

The table above shows that over seven years the average branch height was around 43 cm and the number of branches growing on each coral fragment was an average of 24 branches..

Tests of Normality						
	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Panjang Cabang	.266	7	.143	.840	7	.099
Panjang Cabang	.233	7	.200 <sup>*</sup>	.834	7	.086

\*. This is a lower bound of the true significance.  
a. Lilliefors Significance Correction

Next, a normality test was carried out based on the Smirnov test, then the value obtained was a sig value of 0.0 (significant) > 0.099 and > 0.086, which means that the branch length is normally distributed, meaning that the coral grows normally with an average annual growth of 3 cm - 4 cm per year.

### CONCLUSION AND SUGGESTIONS

#### Conclusion

Based on a series of observations and has produced data that has been discussed further, the author concludes as follows:

1. For 7 years, coral transplantation was carried out in "Tawara" Bunaken National Park, from 77 coral fragments in 7 Modules, 73 coral fragments survived, and only 4 coral fragments died, with a percentage of survival of 96%.
2. The average value of the increase in the height of the transplanted coral fragments was 43 cm, and the number of branches that increased on each coral fragment averaged 24 branches on each surviving coral fragment.

#### SUGGESTIONS

1. It is necessary to carry out periodic monitoring or monitoring of the coral module, with the intention that the condition of the transplanted coral needs to be cleaned of algae, so that the coral does not die
2. It needs to be moved from the module, because the module frame is only made of PVC pipe (plastic), this is because the load of the coral fragments will be greater.

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3. Further research needs to be done in controlling the level of life of the 76 surviving corals, and dead corals can be replaced with new coral fragments.

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## Post-Migration Mental Health of Black African Migrant Nurses in England



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**ABSTRACT:** International nurse migration has become increasingly prevalent, with nurses from developing nations, particularly in Africa, moving to high-income countries like the UK. While this movement offers better economic and professional opportunities, it also presents significant challenges, particularly regarding mental health. Migration-induced stress, exacerbated by acculturative pressures, can contribute to mental health issues such as depression and anxiety among migrant nurses. Despite the importance of this issue, there has been limited research into the mental health status of Black African migrant nurses in England.

This cross-sectional study aimed to explore the mental health well-being of Black African migrant nurses in England, using validated scales: the Short Warwick-Edinburgh Mental Wellbeing Scale (SWEMWBS) and the Hopkins Symptom Checklist-10 (HSCL-10). Findings revealed that while the overall mental well-being of participants was comparable to the national average, the prevalence of depressive and anxiety symptoms was significantly higher. Specifically, 60.8% of respondents reported HSCL-10 scores indicative of mental health issues, a rate nearly three times higher than that reported in hospital staff and the general population. Notably, those whose symptoms began after migration had significantly higher levels of psychological distress, emphasising the role of migration in exacerbating mental health issues.

Factors such as racism and discrimination were found to be the strongest predictors of poor mental health, followed by spending time alone when off work, job stress, age and health status. These findings highlight the need for targeted mental health interventions and policies addressing the specific challenges faced by Black African migrant nurses, particularly in the areas of workplace discrimination and social integration.

### INTRODUCTION

#### Background

The global trend in international nurse migration has seen nurses moving from developing countries to industrialised nations (Kline, 2003) largely due to push and pull factors such as better pay, working conditions, and professional opportunities (Buchan and Calman, 2004; Buchan, Seccombe and Thomas, 1997). In 2000, over 70,000 nurses who were born in Africa had migrated to an industrialised nation and were working there (Clemens and Pettersson, 2008). Of all countries that appear to be desirable destinations for migrant nurses, the US, the UK, and Australia are the largest recipients of this workforce (Kline, 2003). The UK has seen a sharp rise in the number of internationally educated nurses from different parts of the world. The report from the NHS Workforce Statistics showed that 16% of nurses in June 2023 identified as having an Asian nationality, which showed a significant increase from 7% in March 2019, and Africans constituted 5% (Baker, 2023). Nigeria, Ghana, Zimbabwe, and Kenya have consistently been among the top 10 countries for training internationally recruited professionals registered by the NMC as new joiners from 2018 to 2022 despite active recruitment has been discouraged (NMC: Nursing and Midwifery Council, 2022).

There is growing evidence that migration is gradually being recognised as a social determinant of health (Marmot *et al.*, 2012), associated with increased susceptibility to a wide range of illnesses, including mental health disorders (Hasan *et al.*, 2021; Rechel *et al.*, 2011). The prevalence of depression and anxiety is significantly higher in migrant workers when compared with the non-migrant population, and this prevalence rate has seen a consistent rise over the years (Hasan *et al.*, 2021), likely due to the effect of acculturative stress (Kesornsi, Sitthimongkol, and Hegadoren, 2014).

There is research that has been carried out in the US and other countries on the mental health of minority nurses; however, few articles exist in England and wider Europe.

The aim of this paper is to assess the mental health and well-being of Black African migrant nurses living in England, and it has the following objectives:

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- To determine their level of mental well-being,
- To determine the prevalence of depressive and anxiety issues,
- To determine the difference in mental health issues across the migration timelines,
- To identify factors associated with depressive and anxiety issues.

### LITERATURE REVIEW

#### Mental Health of Nurses

The mental health of nurses has been recognised to be at dangerously low levels (Ford, 2023). Using the Hospital Anxiety Depression Scale, 27.3% of nurses scored above the clinical cutoff for depression and anxiety, which aligns with the findings from a study by Calnan et al. (2001) on hospital staff and the general population, who used a different assessment tool, the 12-item General Health Questionnaire.

High job demands have been associated with poorer mental health outcomes (Tajvar et al., 2015; Mark and Smith, 2011). Factors such as intrinsic reward, decision-making authority, and skill discretion have shown negative relationships with anxiety and depression (Mark and Smith, 2011). Age, job positions, and years of work experience have also been found to be linked to mental health outcomes (Tajvar et al., 2015; Wei et al., 2023). Married nurses were reported to have higher rates of mental health issues, although no significant relationship was found between the two variables (Tajvar et al., 2015). These findings, however, seem to contradict the results of Mark and Smith (2011), Perry et al. (2015), and Calnan et al. (2001), who reported that the presence of social support was associated with better mental health. Furthermore, Mark and Smith (2011) identified social support as the strongest indicator of depression in nurses, while job stress was identified as the strongest predictor of anxiety.

#### Experiences of Black African Migrant Nurses in the UK

Racial discrimination is a common issue for Black African nurses in the UK. Two out of five ethnic minority nurses have experienced abuse from colleagues, and almost two out of three have been harassed by patients, leading to decreased job satisfaction (Shields and Price, 2002). These experiences vary by nationality, with Black African nurses reporting higher levels than Black Caribbean or Black British nurses (Shields and Price, 2002). Males, having higher qualifications and Married were all associated with higher rates of discrimination (Shields and Price, 2002). A possible reason for this could be members of these groups may be more likely to report incidents of discrimination due to their higher education levels and support from partners (Likupe, 2005).

Migrant nurses often find themselves employed in the lowest grade possible without recognition of previous skills (Likupe, 2005). They struggle to obtain mortgages and other benefits (Likupe, 2005), and this poorer accommodation has been associated with negative experiences in the UK (Allan and Larsen, 2003). In addition, some have reduced access to training and career opportunities (Likupe, 2005). Language barriers have also been reported to impact their living and working experience (Allan and Larsen, 2003).

The experiences of these groups of nurses are not always negative. Some report positive stories, but this can vary across different employers (Allan and Larsen, 2003). Positive experiences are linked to a strong support system, while negative experiences to a weaker support system, leading to feelings of isolation and homesickness (Allan and Larsen, 2003). This has been recognised as a factor influencing health (Wilkinson and Marmot, 2005).

Few studies have investigated the mental health status of migrant Black African nurses. However, numerous studies have found a correlation between discrimination and mental health outcomes, indicating a negative relationship between these variables (Paradies, 2006; Lewis, Cogburn and Williams, 2015). With the high level of discrimination experienced, migrant Black African nurses may be more susceptible to mental health issues than other ethnicities.

### THEORETICAL FRAMEWORK

#### Acculturative Stress

Previous researchers have attempted to explore the factors affecting the mental health of migrant workers in Asian countries, and they have focused on the link between acculturative stress and anxiety or depression (Kesornsri, Sitthimongkol and Hegadoren, 2014). Acculturation is the process of learning the new culture of a country immigrants live in, including behaviours that can impact their health (Walker and Barnett, 2007). Berry (2005) explained that acculturation takes place at two levels: the group level, which involves a change in social institutions, and the individual level, involving a change in the individual's behaviour. This change can occur smoothly, but sometimes, there can be cultural conflict and acculturative stress (Berry, 2005). Migrant workers tend to suffer from acculturative stress, and this increases the likelihood of anxiety and depression (Kesornsri, Sitthimongkol, and Hegadoren, 2014).

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### Migration as a social determinant of health

Migrants often face barriers accessing healthcare, even with legal status and economic stability (Davies, Basten, and Frattini, 2005). However, these groups are generally healthier than the residents of their new countries, possibly because migrants undertaking the challenging journey are more likely to be in good health (Vissandjee et al., 2004). Nonetheless, their health tends to decline with increased duration of stay in their new destination (Vissandjee et al., 2004), likely attributed to their lower socioeconomic status, as poverty is recognised as a determinant of health (Davies, Basten, and Frattini, 2005).

Migration can also lead to a feeling of happiness, satisfaction, accomplishment and escape from violence, while in others, it can lead to isolation (Tankwanchi, 2018; Vandenberg et al., 2019), ultimately leading to the emotional feeling of desiring home (Nesbitt, 2002). These factors have been established to significantly impact wellbeing, including mental health (Marmot and UCL Institute of Health Equity, 2014; Carballo, Divino and Zeric, 1998).

### Research Gap

More research needs to be carried out on the mental health of minority nurses in European countries (Schilgen *et al.*, 2017). Few articles have explored the mental health of Black African nurses in the UK, and even fewer included internationally trained nurses in their research. The little that did, employed qualitative study designs, using sample sizes that may not have been a true representation of this population. This leaves a gap in the current knowledge of the mental well-being of migrant nurses, especially since Zaghoul et al. (2019) have shown that the mental health burden varies between nationalities. This creates the need to consider multiple nationalities in the assessment of mental health. Further insight is needed into the mental health state of foreign-trained nurses from countries other than the Philippines (Schilgen *et al.*, 2017).

### METHODS

The population size of black nurses, including both Black Africans and black British, in the NHS workforce in England is 36,323 (NHS Digital, 2022). The study's sample size was calculated by assuming a confidence interval of 95% ( $Z= 1.96$ ), a margin of error of 0.05, and a population proportion of 0.5.

Using the formula for finite population:

$$N = \frac{\frac{Z^2 * p (1 - p)}{\epsilon^2}}{1 + \frac{\frac{Z^2 * p (1 - p)}{\epsilon^2}}{Population}}$$

$N= 381$  samples.

### Sampling Methodology

Convenience sampling was used in the first stage. An online questionnaire was shared through WhatsApp, X, Facebook and LinkedIn to recruit participants. This strategy was chosen because it allowed the researcher to recruit respondents promptly. Snowball sampling was utilised in the second stage. Participants were asked to share the questionnaire link with others they know who meet the study's inclusion criteria to increase representation from different regions and maximise recruitment to the study.

### Selection of study subjects

Black African UK registered nurses who are internationally educated, working and living in England, and moved to England after qualifying as a nurse were recruited in this study. While those who possessed dual citizenship obtained their nursing qualifications from a non-African country and resided outside England were excluded.

### Data Collection Tool

Two tools were used in the study. The first was the Short Warwick-Edinburgh Mental Wellbeing Scale (SWEMWBS), used to assess the participants' levels of mental well-being. This scale was chosen because it has been widely used to evaluate the mental health and well-being of diverse population groups (Warwick Medical School, 2020b), and it provides a more precise measurement than the 14-item scale (Warwick Medical School, 2020a). It has 7 questions listed below:

1. I've been feeling optimistic about the future,
2. I've been feeling useful,
3. I've been feeling relaxed,
4. I've been dealing with problems well,
5. I've been thinking clearly,
6. I've been feeling close to other people, and



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7. I've been able to make up my own mind about things.

Each criterion is scored 1-5. With 1 meaning 'none of the time', 2 'rarely', 3 'some of the time', 4 'often', and 5 'all of the time' (Warwick Medical School, 2020a). A mean score of >27.4 is regarded as high mental well-being, while a mean score of < 19.5 represents low mental well-being. The final scores will also be compared against the population norms in England. The mean score for the UK population is 23.6093 ('WEMWBS Population Norms in Health Survey for England Data 2011,' no date), with men and women having mean scores of 23.7 and 23.6, respectively (Fat *et al.*, 2016).

The second tool was the Hopkins Symptom Checklist-10 (HSCL-10), a reliable tool (Strand *et al.*, 2003) used when researching mental health issues as it focuses on depressive and anxiety symptoms (Kleppang and Hagquist, 2016). It is also valid for research in different cultures (Attal, Lurie and Neumark, 2020) which was why it was chosen. It comprises 10 questions, with the first four being anxiety-related and the latter six on depression. Each question requires the participant to respond on the Likert scale with 'not at all', 'a little', 'quite a bit', or 'extremely' (Attal, Lurie and Neumark, 2020). Kleppang and Hagquist (2016) and (Strand *et al.*, 2003) gave a list of the questions used in the checklist and they are:

1. Suddenly scared for no reason,
2. Feeling fearful,
3. Faintness, dizziness, or weakness,
4. Feeling tense or keyed up,
5. Blaming yourself for things,
6. Difficulties in falling asleep or staying asleep,
7. Feeling blue,
8. Feelings of worthlessness,
9. Feeling everything is an effort,
10. Feeling hopeless about the future.

'Not at all' is given a value of 1, 'a little' 2, 'quite a bit' a 3, and 'extremely' 4 (Derogatis *et al.*, 1974). A score  $\geq 1.85$  is indicative of mental health issues (Strand *et al.*, 2003).

A question was included to identify when participants started experiencing symptoms in the migration timeline to determine the time of symptom onset.

The questionnaire also includes factors identified in the literature review: gender, social support, marital status, educational qualification, duration of stay, physical health, accommodation type, monthly income, career satisfaction, access to medical care, job stress, and discrimination, which can influence mental health outcome to address the second research question.

### Data Analysis

The data was analysed using SPSS. A p-value of 0.05 or lower was considered significant. The first phase involved descriptive analysis to identify the level of mental well-being and the prevalence of depressive and anxiety issues. The second phase involved ANOVA to assess the relationship between the time of symptom onset and the HSCL-10 score and also multiple linear regression to analyse the association between the factors identified and the scores from the HSCL-10.

## RESULTS

### Data Quality and Imputation

At the start of the analysis, an issue was identified in the data collection process. One of the questions for the SWEMWBS- "I've been feeling relaxed"- was omitted in error from the questionnaire. The absence of this data could impact the analysis as the calculated score for this scale would no longer be comparable to the national average. Also, the cut-off for low and high mental well-being would no longer be appropriate to use in interpreting the data.

To address this problem, multiple imputation was used to fill in the missing data. Multiple imputation predicts missing values, using observed data as predictors (Shrive *et al.*, 2006). This analysis was completed using the advanced statistical package, Multiple Imputation using Chained Equations (MICE) on Python, using the completed responses for the other SWEMWBS for the individual as the predictors. This method was chosen because it imputes missing values with a fine level of accuracy and precision while maintaining the overall data structure and variable relationships (Shrive *et al.*, 2006).

### Correlation Analysis

A correlation matrix analysis (Table 1) was completed to ensure the imputed data did not change the data structure. The Pearson Correlation Coefficient was perfectly correlated with the numeric value C, which shows it relied heavily on this variable. However, it appears to mirror all others proving the overall data structure was maintained after imputation.



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**Table 1 Correlation Matrix Analysis**

		Numeric Value A	Numeric Value B	Numeric value C	Numeric value D	Numeric value E	Numeric value F	Imputed numeric value
Numeric Value A	Pearson Correlation	1	.569**	.455**	.470**	.272**	.406**	.455**
	Sig. (2-tailed)		<.001	<.001	<.001	<.001	<.001	<.001
	N	270	270	270	270	270	270	270
Numeric Value B	Pearson Correlation	.569**	1	.503**	.633**	.400**	.441**	.503**
	Sig. (2-tailed)	<.001		<.001	<.001	<.001	<.001	<.001
	N	270	270	270	270	270	270	270
Numeric value C	Pearson Correlation	.455**	.503**	1	.542**	.335**	.376**	1.000**
	Sig. (2-tailed)	<.001	<.001		<.001	<.001	<.001	<.001
	N	270	270	270	270	270	270	270
Numeric value D	Pearson Correlation	.470**	.633**	.542**	1	.543**	.533**	.542**
	Sig. (2-tailed)	<.001	<.001	<.001		<.001	<.001	<.001
	N	270	270	270	270	270	270	270
Numeric value E	Pearson Correlation	.272**	.400**	.335**	.543**	1	.407**	.335**
	Sig. (2-tailed)	<.001	<.001	<.001	<.001		<.001	<.001
	N	270	270	270	270	270	270	270
Numeric value F	Pearson Correlation	.406**	.441**	.376**	.533**	.407**	1	.376**
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	<.001		<.001
	N	270	270	270	270	270	270	270
Imputed numeric value	Pearson Correlation	.455**	.503**	1.000**	.542**	.335**	.376**	1
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	<.001	<.001	
	N	270	270	270	270	270	270	270

\*\* . Correlation is significant at the 0.01 level (2-tailed).

## Participant Demographics

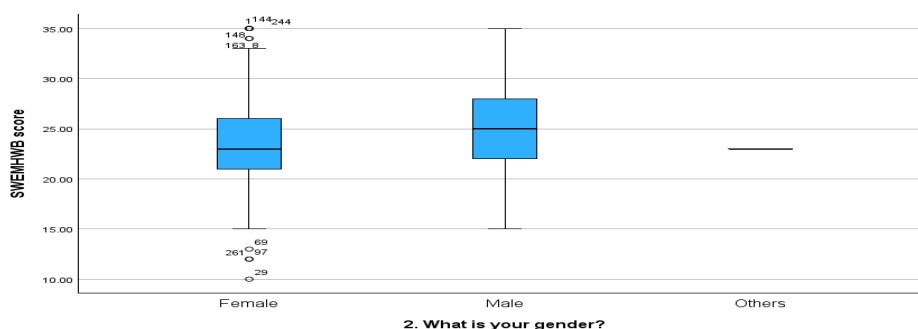
270 participants were successfully recruited into the study. Two participants reported their nationality as Indians, one Black, three African, and one did not report their nationality. Due to the small number, Listwise Deletion was used, and these 7 participants were excluded from the study. The remaining 263 participants had unevenly distributed nationality with Nigerians constituting 84.4% of participants as shown below:

**Table 2- Nationality Distribution**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Ghanaian	24	9.1	9.1	9.1
	Kenyan	16	6.1	6.1	15.2
	Nigerian	222	84.4	84.4	99.6
	Zimbabwea	1	.4	.4	100.0
	Total	263	100.0	100.0	

## Level of Mental Wellbeing

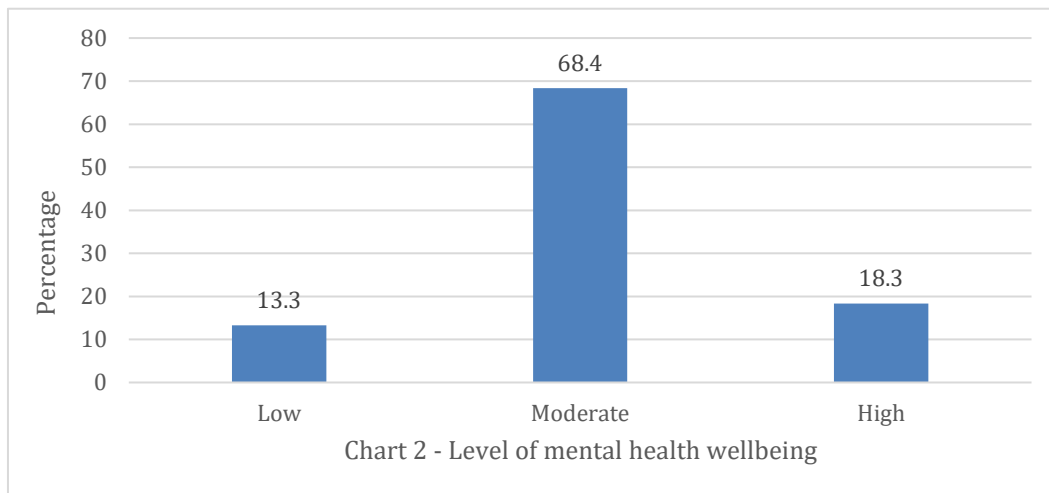
The mean SWEMWBS score was 23.8403, with the lowest score obtained being 10 and the maximum score 35. The mean score for men was 25.4444 and women was 23.5115 as shown below:



**Chart 1 – SWEMWBS scores and genders**

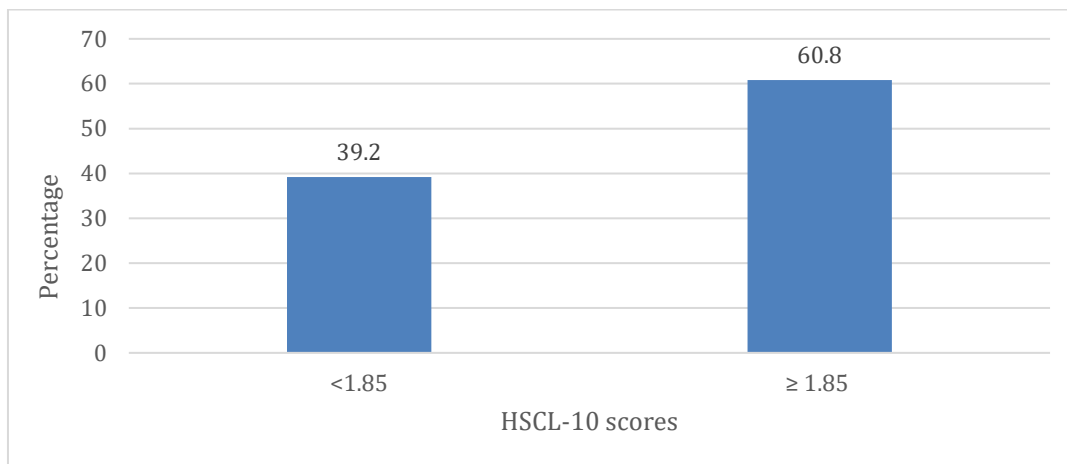
### Post-Migration Mental Health of Black African Migrant Nurses in England

13.3% (35) of the respondents were classified as having low mental well-being, 68.4% (180) had neither low nor high and so were classified as having moderate mental well-being, and 18.3% (48) had high mental well-being. See below:



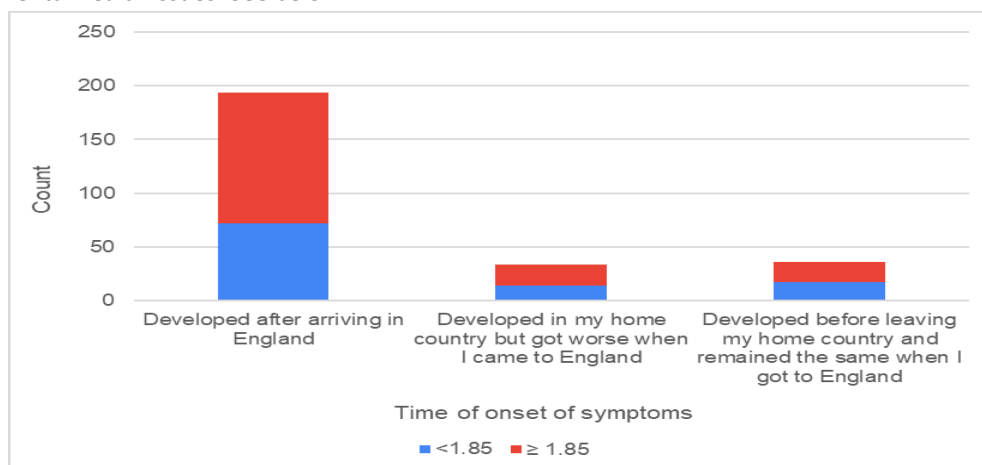
### Prevalence of Depressive and Anxiety Issues

The HSCL-10 was used to assess the prevalence rate of depressive and anxiety issues. 60.8% (160) scored 1.85 or higher, indicating mental health issues as shown below:



### Time of Onset of Symptoms

73.8% (194) reported that their symptoms started after arriving in England, and of this percentage, 76.3% (122) scored higher than the threshold for mental health issues. See below:



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A one-way ANOVA was conducted to examine the impact of the time when symptoms started on the HSCL-10 scores and the mean scores were compared across the three groups.

Post hoc comparisons using the Tukey HSD test indicated that the mean score for those who developed symptoms after arriving in England ( $M = 2.1412$ ) was higher than those who developed symptoms before leaving their home country and remained the same when they got to England ( $M = 1.7972$ ). This difference was statistically significant ( $p = .008$ ). However, no significant differences were found between other groups. See Tables 3 and 4 below:

**Table 3 – Turkey HSD test on HSCL-10 scores**

Tukey HSD<sup>a,b</sup>

Symptom_Start_Coded	N	Subset for alpha = 0.05	
		1	2
Developed before leaving my home co	36	1.7972	
Developed in my home country but go	33	2.0364	2.0364
Developed after arriving in England	194		2.1412
Sig.		.159	.699

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 47.442.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

**Table 4 – Multiple comparisons of the mean HSCL-10 scores**

Dependent Variable: HSCL-10 score

Tukey HSD

(I) Symptom_Start_Coded	(J) Symptom_Start_Coded	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Developed before leaving my home co	Developed in my home country but go	-.23914	.15258	.262	-.5988	.1205
	Developed after arriving in England	-.34401*	.11489	.008	-.6148	-.0732
Developed in my home country but go	Developed before leaving my home co	.23914	.15258	.262	-.1205	.5988
	Developed after arriving in England	-.10487	.11922	.654	-.3859	.1761
Developed after arriving in England	Developed before leaving my home co	.34401*	.11489	.008	.0732	.6148
	Developed in my home country but go	.10487	.11922	.654	-.1761	.3859

\*. The mean difference is significant at the 0.05 level.

The one-way ANOVA indicated a statistically significant difference in HSCL-10 scores based on when symptoms started,  $F = 4.576$ ,  $p = 0.011$ . The effect size, measured by eta-squared, was 0.034, indicating that approximately 3.4% of the variance in HSCL-10 scores can be explained by the timing of symptom onset as shown below:

**Table 5 – ANOVA analysis**

HSCL-10 score

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3.669	2	1.834	4.576	.011
Within Groups	104.216	260	.401		
Total	107.885	262			

## Post-Migration Mental Health of Black African Migrant Nurses in England

Table 6 – ANOVA effect sizes

		Point Estimate	95% Confidence Interval	
			Lower	Upper
HSCL-10 score	Eta-squared	.034	.002	.083
	Epsilon-squared	.027	-.006	.076
	Omega-squared Fixed-effect	.026	-.006	.075
	Omega-squared Random-effect	.013	-.003	.039

a. Eta-squared and Epsilon-squared are estimated based on the fixed-effect model.

b. Negative but less biased estimates are retained, not rounded to zero.

### Factors Associated with Mental Health Issues

#### A. Regression Model Summary

According to the regression analysis model summary (Table 7), the model accounts for 29.6% of the variance in mental health issues ( $R^2 = 0.296$ ). However, after adjusting for the number of independent variables, the explained variance decreases to 22.5% (adjusted  $R^2 = 0.225$ ). The regression model (Table 8) was statistically significant ( $F = 4.166$ ,  $p < 0.001$ ), indicating that the independent variables have a significant effect on the HSCL-10 scores.

Table 7 – Regression Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.544 <sup>a</sup>	.296	.225	.56498

a. Predictors: (Constant), 24. Access to religious groups and activities, 18. Monthly salary can cover monthly expenses without extra work hours, 15. Job role/type, 10. Presence of social support, 22. Experiences of racism and discrimination, 14. Accommodation satisfaction, 4. Highest educational qualification, 23. Access to medical care, 5. What is your nationality?, 8. Health status, 21. Overwhelmed with stress from work, 12. How often do you travel home?, 17. Average extra work hours per week (outside of 37.5 contracted work hours), 1. What is your age?, 7. Which organisation do you currently work with?, 20. Fear of litigation, 2. What is your gender?, 19. Job satisfaction with current roles and duties, 13. Accommodation type, 16. Monthly salary from your full-time job, 6. Duration of stay in England, 11. How do you spend most of your time off work?, 3. Marital status, 9. Living status

Table 8 – Regression ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	31.915	24	1.330	4.166	<.001 <sup>b</sup>
	Residual	75.970	238	.319		
	Total	107.885	262			

a. Dependent Variable: HSCL-10 score

b. Predictors: (Constant), 24. Access to religious groups and activities, 18. Monthly salary can cover monthly expenses without extra work hours, 15. Job role/type, 10. Presence of social support, 22. Experiences of racism and discrimination, 14. Accommodation satisfaction, 4. Highest educational qualification, 23. Access to medical care, 5. What is your nationality?, 8. Health status, 21. Overwhelmed with stress from work, 12. How often do you travel home?, 17. Average extra work hours per week (outside of 37.5 contracted work hours), 1. What is your age?, 7. Which organisation do you currently work with?, 20. Fear of litigation, 2. What is your gender?, 19. Job satisfaction with current roles and duties, 13. Accommodation type, 16. Monthly salary from your full-time job, 6. Duration of stay in England, 11. How do you spend most of your time off work?, 3. Marital status, 9. Living status

## Post-Migration Mental Health of Black African Migrant Nurses in England

### B. Independent variables and their relationships

Age, health status, how you spend time off work, overwhelmed with stress from work and experiences of racism and discrimination all had significant relationships with the HSCL-10 scores with p-values < 0.05. Of all these, experiences of racism and discrimination had the highest standardised coefficients (Beta), 0.234, followed by how you spend time off work, then overwhelmed with stress from work, then age, and lastly, health status having the lowest score of 0.128. All other factors were not statistically significant as p-values > 0.05. See below:

**Table 9 – Regression Coefficients**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.216	.628		5.119	<.001
	1. What is your age?	.120	.055	.136	2.185	.030
	2. What is your gender?	-.133	.097	-.081	-1.365	.174
	3. Martial status	.145	.111	.107	1.302	.194
	4. Highest educational qualification	-.021	.028	-.042	-.741	.459
	5. What is your nationality?	.038	.060	.036	.622	.535
	6. Duration of stay in England	-.006	.039	-.010	-.154	.878
	7. Which organisation do you currently work with?	.010	.074	.009	.138	.890
	8. Health status	-.157	.074	-.128	-2.123	.035
	9. Living status	.068	.064	.093	1.064	.288
	10. Presence of social support	.056	.085	.044	.663	.508
	11. How do you spend most of your time off work?	-.284	.096	-.220	-2.967	.003
	12. How often do you travel home?	.008	.042	.012	.199	.843
	13. Accommodation type	-.017	.052	-.021	-.320	.749
	14. Accommodation satisfaction	-.041	.053	-.044	-.769	.443
	15. Job role/type	.001	.048	.001	.022	.982
	16. Monthly salary from your full-time job	-.029	.051	-.037	-.576	.565
	17. Average extra work hours per week (outside of 37.5 contracted work hours)	.027	.031	.050	.848	.398
	18. Monthly salary can cover monthly expenses without extra work hours	-.003	.043	-.004	-.067	.946
	19. Job satisfaction with current roles and duties	.007	.046	.009	.150	.881
	20. Fear of litigation	-.059	.032	-.110	-1.836	.068
	21. Overwhelmed with stress from work	-.089	.031	-.177	-2.925	.004
	22. Experiences of racism and discrimination	-.113	.028	-.234	-3.952	<.001
	23. Access to medical care	.043	.072	.034	.592	.555
	24. Access to religious groups and activities	-.091	.093	-.058	-.977	.329

a. Dependent Variable: HSCL-10 score

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### DISCUSSIONS

#### Overview of Findings

The findings from this study offer key insights into the mental health of Black African migrant nurses in England. The distribution of respondents illuminates the known trends in migration, with Nigerians comprising 84.4% of the sample, followed by Ghanaians, Kenyans, and Zimbabweans with 9.1%, 6.1% and 4%, respectively. These findings align with existing data identifying Nigeria as Africa's leading source of internationally recruited nurses, followed by Ghana, Zimbabwe and lastly Kenya (NMC: Nursing and Midwifery Council, 2022).

The mean score on the SWEMWBS was 23.8403, similar to the national average of 23.6093 ('WEMWBS Population Norms in Health Survey for England Data 2011,' no date). This suggests that, overall, the mental well-being of the sample is not dramatically different from the general population. However, gender differences were noted. Men scored slightly higher when compared with the national average, 25.4444 vs. 23.7, respectively (Fat *et al.*, 2016), a difference of nearly 2 points. In contrast, women had similar scores, 23.5115 vs 23.6, respectively (Fat *et al.*, 2016). This reflects wider patterns in health research, where gender imbalances often result in women having higher rates of anxiety and mood disorders (Kuehner, 2003). The variation in men's average scores may also be attributed to the smaller percentage of male respondents (17.1%) compared to females (82.5%). Also, a crucial finding of the study is that 68.4% of respondents fell into the category of moderate mental well-being, with 13.3% classified as low. These results challenge the initial hypothesis that Black African migrant nurses would exhibit lower overall mental well-being. This could be due to effective coping mechanisms developed during migration or the resilience of individuals who choose to migrate for work, leading to the positive feelings associated with migration (Tankwanchi, 2018; Vandenberg *et al.*, 2019). This study revealed a shocking prevalence of 60.8% for depressive and anxiety issues using the HSCL-10 among the participants, emphasising an important public health issue. This elevated prevalence markedly exceeds findings from prior studies by Mark and Smith (2011) and Calnan *et al.* (2001), where the prevalence stood at approximately 27.3%. The difference in these figures may be attributed to disparities in assessment tools, with the former studies utilising the Hospital Anxiety Depression Scale (HADS) and the General Health Questionnaire (GHQ), both recognised as suboptimal, in comparison with the HSCL-10, for assessing depression and anxiety within multicultural contexts. Moreover, Mark and Smith (2011) specifically examined clinical anxiety and clinical depression, which used higher thresholds than those commonly applied in assessing depressive and anxiety issues in their data collection tool. This differential approach may have led to an underestimation of the magnitude of the problem within their study. The discrepancy between the mental well-being scores on the SWEMWBS and the HSCL-10 can be explained by the different focuses of these tools: while the SWEMWBS primarily captures overall mental well-being, particularly depressive symptoms, the HSCL-10 assesses both depression and anxiety, offering a more comprehensive evaluation of psychological distress.

#### Migration and Mental Health

The fact that 73.8% of respondents reported that their mental health symptoms started after arriving in England and 76.3% of this group scored above the threshold for depressive and anxiety symptoms highlights the significant impact migration may have on mental health. The statistically significant higher mean HSCL-10 score of 2.1412 for those whose symptoms began post-migration further emphasises the influence of acculturative stress, as described by Berry (2005) and supported by Kesornsri, Sitthimongkol, and Hegadoren (2014). Migration as a social determinant of health (Marmot *et al.*, 2012; Hasan *et al.*, 2021; Rechel *et al.*, 2011) is thus reinforced here, suggesting that Black African migrant nurses in England are at increased risk of developing mental health issues due to the stresses associated with adjusting to a new cultural environment.

#### Factors Contributing to Mental Health Issues

The analysis identified racism and discrimination as the strongest predictors of mental health issues, with 68.4% of respondents reporting experiences of discrimination. This supports existing research on the negative impact of discrimination on mental health (Paradies, 2006; Lewis, Cogburn, and Williams, 2015). Black African migrant nurses, as a group, experience higher levels of discrimination than other Black ethnicities (Shields and Price, 2002), perhaps providing some explanation for the high prevalence of depressive and anxiety issues. The persistence of these experiences, despite policies aimed at reducing workplace discrimination, suggests that existing strategies may be insufficient. The recent report from the Nursing and Midwifery Council shows us that discrimination in nursing remains an ongoing issue, with Black nurses reporting higher rates of workplace abuse, nearly double those reported by their white colleagues. (Nursing and Midwifery Council, 2024).

Job stress was another significant predictor, in line with Mark and Smith (2011) and Tajvar *et al.* (2015). While 77.6% of respondents were on the lowest band (Band 5) for registered nurses, only 31.2% reported dissatisfaction with their roles. This could suggest that, while job demands are high, the actual dissatisfaction with roles may be mitigated by other factors such as financial stability or professional development opportunities, which are areas worth exploring in future studies.



## Post-Migration Mental Health of Black African Migrant Nurses in England

How respondents spent their time off work was significantly associated with their HSCL-10 scores. Specifically, spending time with family and friends was correlated with lower HSCL-10 scores, suggesting that social engagement outside of work plays a critical role in tackling psychological distress. This finding is consistent with the existing body of evidence that highlights the protective effects of social support on mental health outcomes (Mark and Smith, 2011; Perry et al., 2015; Calnan et al., 2001; Allan and Larsen, 2003; Wilkinson and Marmot, 2005). Interestingly, the presence of family in England and marital status were not significantly associated with lower HSCL-10 scores. This finding may reflect the complexities of personal relationships during the migration process, where marital ties do not always provide the expected emotional support emphasising that social support does not necessarily need to come from family members living in the same country; rather, the presence of a broader social network can provide a buffer against mental health issues.

Health status was another important factor associated with HSCL-10 scores. The findings indicate that individuals with more medical conditions were more likely to experience worse mental health outcomes, a relationship that has been documented in prior research (Vissandjee et al., 2004). However, only 16.7% of respondents reported having at least one medical diagnosis, suggesting that this factor may not hold as much public health significance in this population as other variables, such as racism, discrimination and job stress.

### Implications for Theory

These findings provide further support to the acculturative stress theory (Berry, 2005), reinforcing the idea that migration induces stress through cultural conflict and adjustment difficulties. The high prevalence of mental health issues among Black African migrant nurses is not merely a reflection of individual susceptibility but is instead intertwined with broader systemic challenges such as racism, discrimination, and job stress.

### Implications for Policy

The high prevalence of mental health issues among Black African migrant nurses in England highlights the need for targeted mental health interventions within the healthcare system. Current policies, such as those focused on refugees and victims of trafficking, overlook the specific needs of migrant healthcare workers. Policies that address acculturative stress and provide mental health support for all migrant populations, not just the most vulnerable, should be considered. In particular, discrimination in the workplace remains a significant barrier to mental health improvement. The findings of this study suggest that more extensive anti-discrimination policies are needed, alongside mandatory training for staff on how to address and report discrimination.

### Implications for Practice

At the practical level, healthcare institutions must recognise the mental health challenges faced by Black African migrant nurses and provide better support systems. Employers should implement programs that foster social integration, such as mentorship schemes and social activities that help newly arrived migrant nurses adapt to their new environment. Occupational health programs should also prioritise mental health, offering proactive support rather than waiting for symptoms to worsen before intervention.

Addressing job stress through workload management, flexible working hours, and improved job satisfaction mechanisms could also alleviate some of the pressure experienced by these nurses. Regular mental health check-ups and access to counselling services should be part of the standard support offered to internationally recruited nurses.

## CONCLUSION

### Summary

This study investigated the mental well-being of Black African migrant nurses living in England. The findings demonstrated that while the overall mental well-being of participants, as measured by the SWEMWBS, was comparable to that of the general population, the prevalence of depressive and anxiety issues was alarmingly high. Using the HSCL-10, it was found that 60.8% of participants had depressive and anxiety issues, a rate nearly three times higher than that reported in previous studies of hospital staff and the general population.

The study also identified several factors significantly associated with mental health outcomes, with racism and discrimination emerging as the strongest predictors. Job stress, age, health status, and how participants spent their time off work also had significant relationships with mental health issues.

### Strengths and Limitations

The strengths of this study lie in its rigorous quantitative design and the use of validated measurement tools (HSCL-10 and SWEMWBS) in the cross-sectional study. These allowed the researcher to maximise participants and use statistical approaches to

## Post-Migration Mental Health of Black African Migrant Nurses in England

determine significant associations, minimising individual bias. Using a culturally sensitive tool also helped to ensure high accuracy of results.

A significant limitation of this study was the omission of a question from the SWEMWBS, which necessitated the use of multiple imputation to fill in the missing data. Although the imputation process was handled rigorously and did not significantly alter the data structure, the missing question may have affected the overall reliability of the SWEMWBS results. However, by using this scale together with the HSCL-10, the impact of this missing data was minimised.

Also, the time of symptom onset may have been affected by recall bias, and respondents may have been more likely to report better mental health levels before migration. Self-completing the tool may have led to misinterpretation errors potentially affecting the accuracy of responses from the participants.

Finally, the study's sample size, while sufficient for statistical analysis, was not fully representative of the broader population of Black African migrant nurses in England, with Nigerians being overwhelmingly represented. This uneven distribution of nationalities may limit the generalisability of the findings to other Black African migrant groups.

### Contribution to Knowledge

This study makes a significant contribution to the growing body of research on the mental health of migrant healthcare workers, particularly in the UK context. It is among the first to provide evidence of the high prevalence of mental health issues among Black African migrant nurses in England, highlighting the need for targeted mental health interventions for this group. The findings emphasise the importance of using culturally sensitive tools, such as the HSCL-10, for assessing mental health in diverse populations, as general well-being scales may not fully capture the extent of psychological distress. Moreover, the study's identification of key risk factors such as racism, discrimination, and job stress offers valuable insights for policymakers and healthcare organisations seeking to improve the well-being of ethnic minority nurses.

### RECOMMENDATIONS FOR FUTURE STUDIES

Future research should explore the relationship between job stress and mental health in greater depth. While 98.9% of nurses in this study reported experiencing some level of job stress, only 31.2% were dissatisfied with their roles, suggesting that there may be hidden factors mitigating the impact of stress, such as personal resilience or financial stability.

Other epidemiology designs may be explored as well. Longitudinal studies could track participants from their home countries through their migration journey, using tools like the HSCL-10 to assess changes in mental health over time. This approach would help minimise recall bias and offer a more accurate picture of how acculturation and migration as a whole affect mental health.

Additionally, future research should aim for more representative samples, including a broader range of nationalities within the Black African migrant nurse population.

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## Development of an Electro Tribological Instrument to Examine the Deterioration of the Robot- Bearing



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**ABSTRACT:** The increasing electrification of robotic systems poses significant tribological challenges, particularly for bearing components. This study investigates the impact of direct current (DC) on the wear behaviour and tribological characteristics of robotic bearing systems. Experiments were conducted using a Ball-on-Disc tribometer under various DC current levels, lubrication conditions, and loading parameters. Results indicate that DC current significantly influences electrical impedance, friction coefficient, and wear scar diameter. Increased current intensity reduces impedance due to diminished lubricant viscosity and enhanced metal-to-metal contact. Friction initially decreases at moderate currents due to electrostatic repulsion but increases at higher currents due to electrostatic breakdown. Wear scar analysis reveals a decrease in scar diameter with increasing current, attributed to oxide layer formation. While load was found to be a significant factor influencing wear loss, the effects of sliding speed and current on wear and friction were less pronounced. These findings provide crucial insights into the tribological mechanisms in electrified robotic systems and highlight the need for optimized load and lubrication conditions to improve component durability.

**KEYWORDS:** Robotic Bearings, Electro-Tribology, Electrical Impedance, DOE Optimization

### I. INTRODUCTION

The integration of advanced energy technologies, such as robotics and automation, has led to specific tribological challenges, especially in bearing performance and reliability [1, 2, 3]. Bearings, as critical components in robotic joints, are responsible for a significant portion of system failures—estimated at around 60%—often due to wear and electrical discharge damage (EDD). The increased use of Variable Frequency Drives (VFDs) in robotic actuators has amplified the incidence of premature bearing failures caused by stray electric currents [4].

The historical issue of bearing damage from electrical currents dates back to the 1920s with the discovery of “fluting” marks on ssssssscoated bearings, initially helped mitigate these effects [6]. However, high-frequency Pulse Width Modulation (PWM) inverters, now widely used in robotic systems, have introduced new challenges. Rapid voltage fluctuations cause substantial voltage differentials between the motor shaft and casing, rendering traditional solutions less effective [7]. In robotic systems, the interaction between high-speed rotating shafts and bearings increases susceptibility to stray currents, posing risks to component longevity [8, 9].

Recent advancements in tribology tools, including DC-enabled tribometers, have enabled precise measurements of friction, wear, and electrical impedance in robotic bearings under various current levels. Understanding the effects of DC currents on tribological behavior is essential to improving bearing life and optimizing performance. Research shows that electrical factors affect lubricant film thickness and tribological performance, highlighting the importance of studying these interactions [10, 11].

This study focuses on examining the impact of DC currents on wear and friction under different lubrication and load conditions. By measuring impedance alongside wear and friction, we aim to gain insights into the effects of electrical stress on bearing



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surfaces. Developing an electrified bearing test methodology is essential for advancing modern robotic applications where electrical influences on bearing health and performance are increasingly relevant.

### II. EXPERIMENTATION

To investigate the influence of electrified environments on the friction and wear behaviour of ball bearings, a standard Ball-on-disc tribometer conforming to ASTM G99 was employed. The tribological pair was insulated using a carbon bush on the disc and fiber material on the ball holder to prevent electrical interference [12]. Experiments were conducted under both dry and lubricated conditions. This insulation was implemented to mitigate potential damage to the test apparatus caused by stray currents generated during electrified pin-on-disc testing. 100Cr6 bearing steel balls were paired with En31 discs and subjected to the parameters illustrated in Table 1. A Schneider servo motor controls disc speed, and all testing was performed under ambient conditions [13].

To simulate the potential exposure of electric vehicle bearings to stray currents, a ball-on-disc arrangement was electrified using a Testronix 36C DC power supply. Given that electric vehicle bearings may experience stray currents ranging from 0.2A to 1.4A, this study investigated current intensities from 50mA to 1.5A [14]. As outlined in Table 1, experiments were conducted at three discrete current levels: 50 mA, 750 mA, and 1500 mA [15].



Fig No 1: Electrified Ball on Disc Setup

### III. RESULTS AND DISCUSSION:

#### A. Effect of current on the electrical Impedance:

This section explores the influence of DC current on the electrical impedance of the tribological system. Both transmission and mineral oils exhibited a decreasing trend in impedance with increasing current intensity Fig No 2. This behaviour can be attributed to the heating effect of the current, which reduces lubricant viscosity and consequently its load-bearing capacity. This leads to increased metal-to-metal contact between the tribological surfaces, resulting in a lower overall impedance. Interestingly, even under dry conditions (without lubrication), a similar decrease in impedance was observed with increasing current Fig No 2. The electrical impedance values displayed minimal variation throughout the 600-second test duration for all tested conditions (transmission oil, mineral oil, and dry). This suggests a relatively stable electrical response within the parameters explored.

Detailed Impedance Measurements:

Mineral Oil: At 50mA, the initial impedance was  $27 \pm 6$  ohms, indicating minimal variation. As current intensity increased to 750mA and 1.5A, the impedance values progressively decreased to  $0.75 \pm 0.15$  ohms and  $0.3 \pm 0.15$  ohms, respectively. This trend signifies a weakening of the lubricant film with increasing current.

Table No 1 Selected Process Parameter for testing of the Electrical impedance, Wear loss and COF

SI No	Parameters	Level 1	Level 2	Level 3
1	Sliding Speed	100 m/s	1000 m/s	2000 m/s
2	Current	50 mA	750 mA	1500 mA
3	Load	10 N	30 N	..
4	Condition	Dry	Lubricated	



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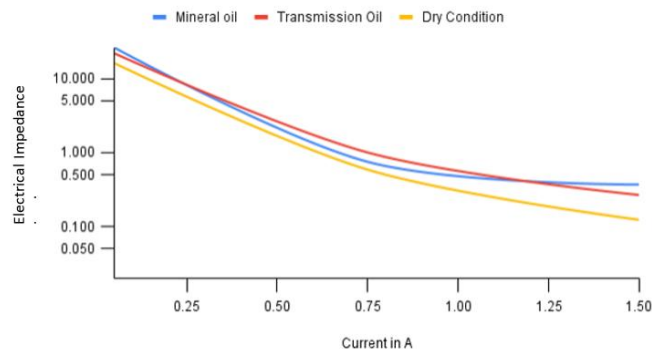


Fig No 2 Electrical Impedance variation of the Transmission Oil, Mineral Oil and Dry Condition With respect to the current  
 Transmission Oil: Similar to mineral oil, transmission oil displayed a decreasing impedance trend with increasing current. At 50mA, the initial impedance was  $21.5 \pm 2.5$  ohms. This value dropped to  $0.9 \pm 0.2$  ohms at 750mA and further decreased to  $0.25 \pm 0.1$  ohms at 1.5A, suggesting a similar breakdown of the lubricant film.

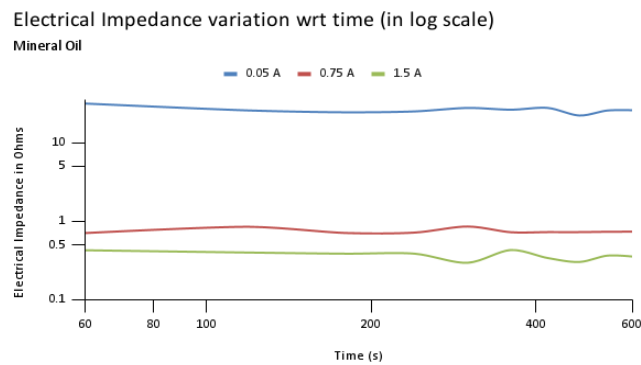


Fig No 3 Electrical Impedance variation for different current intensities with respect to time in Mineral oil Lubricated condition

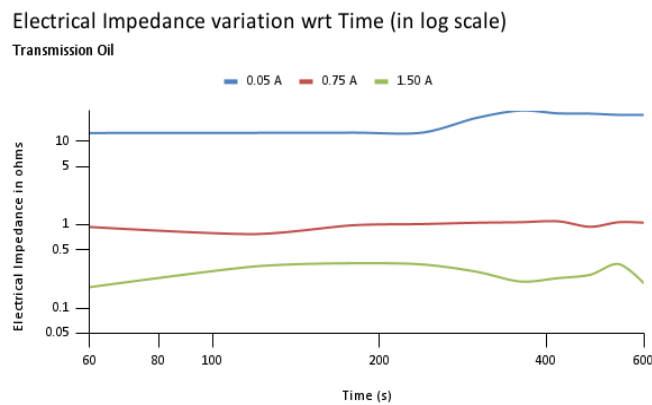


Fig No 4 Electrical Impedance variation for different current intensities with respect to time in Transmission oil Lubricated condition

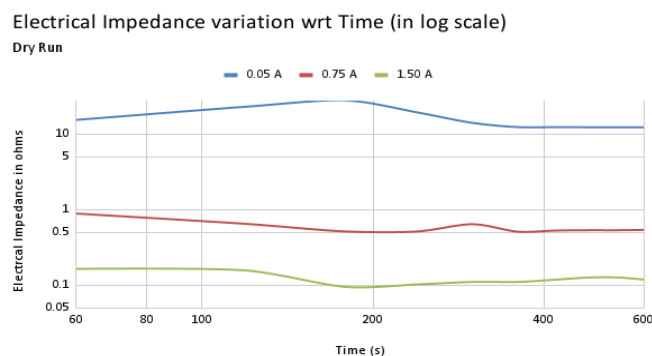


Fig No 5 Electrical Impedance variation for different current intensities with respect to time in Dry Condition

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Dry Condition: Under dry conditions, the initial impedance at 50mA was  $9.5 \pm 2$  ohms. This value reflects the electrical resistance offered by a potential oxide layer formed due to wear debris [16]. This oxide layer could explain the observed decrease in the coefficient of friction for the 50mA dry run compared to the completely dry condition, as depicted in Fig No 6. Notably, increasing the current to 750mA and 1.5A further reduced the impedance to  $0.7 \pm 0.2$  ohms and  $0.125 \pm 0.05$  ohms, respectively. This convergence of impedance values across lubricated and dry conditions suggests a potential breakdown of the lubricant film at higher currents, leading to increased metal-to-metal contact. This phenomenon can be a valuable indicator for monitoring lubricant film integrity in electrified robotic bearings.

In conclusion, the analysis reveals a significant influence of DC current on the electrical impedance of the tribological system. The observed decrease in impedance with increasing current points towards a weakening of the lubricant film and a transition towards metal-to-metal contact. This information provides valuable insights into the lubrication behaviour of robotic bearings in electrified environments.

### B. Effect of current on friction coefficient and wear scar:

Friction and wear coefficients are primary parameters in tribology. This study investigated the influence of varying current levels on these parameters. Initially, tribo-pairs were tested without applied current. Friction coefficients were measured as 0.07, 0.13, and 0.49 for mineral oil, transmission oil, and dry conditions, respectively, with reference to Fig. 5: Friction Coefficient with respect to the Current under dry and Lubricated (Transmission oil and mineral oil) Condition. Corresponding wear scar diameters were 0.57, 0.30 mm, and 0.79 mm for the mineral oil, transmission oil, and dry conditions, respectively.

Subsequently, wear scar diameters were determined for current levels of 50 mA, 750 mA, and 1500 mA, and the results are presented in Fig No 7. With reference to Fig No 6, It is observe that the average frictional force in dry conditions increases to 5.44 N from 4.89 N upon the application of 50 mA of current, and at 750 mA, the mean frictional force decreases to 2.94 N. This decrease in frictional force is attributed to the electrostatic repulsion experienced by the tribo-pairs due to the accumulation of similar charges on both tribo-surfaces. Further, the mean frictional force increases to 5.21 N on applying 1.5 A of current to the tribo-pairs, accounting for electrostatic breakdown, which reduces the repulsion and increases the frictional force. This trend is observed across all lubricated scenarios depending on the lubricant nature.

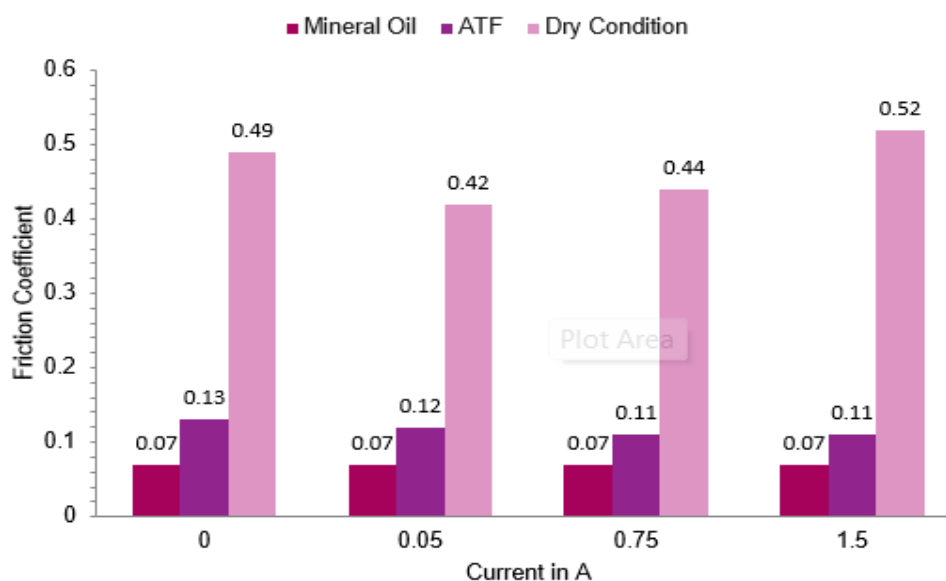
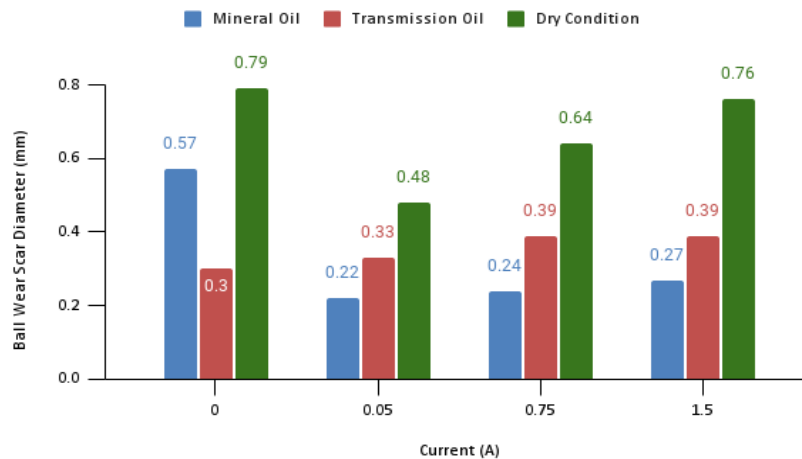


Fig No 6 Friction Coefficient Variation with respect to the Current

Wear scar diameter decreases to 0.49 mm from 0.79 mm (wear scar at 0 A) under dry conditions upon the application of current, as shown in Fig No 7. This phenomenon is due to the oxide layer formation between the tribo-pairs, which reduces friction and wear scar size [16].



**Fig No 7 Ball wear Scar Diameter variation with respect to the current**

#### IV. CONCLUSION

This study investigated the impact of various experimental parameters, including sliding speed, current, load, and lubrication condition, on the electrical impedance, coefficient of friction (COF), and wear loss of a tribological system. The analysis revealed that while load exhibited a significant influence on wear loss, the other parameters, including sliding speed, current, and lubrication condition, had limited impact on the measured tribological properties within the tested range. Electrical impedance remained relatively stable across different conditions, suggesting a lack of significant sensitivity to the tested parameters. Similarly, the COF was found to be largely unaffected by variations in sliding speed, current, and load. However, a potential influence of load on COF cannot be entirely ruled out, as indicated by a marginally significant p-value. The significant impact of load on wear loss highlights its critical role in determining the tribological performance of the system. While the interaction between sliding speed and current showed a trend towards significance, further investigation is required to confirm its true influence. To gain deeper insights into the complex interplay between these factors, future research should consider expanding the parameter range, employing advanced statistical modeling techniques, and exploring alternative experimental designs. This comprehensive approach will enable a more accurate assessment of the tribological behavior and the identification of potential synergistic effects between the various parameters.

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## From Scores to Impact: A Literature Review on ESG and Global Sustainability Drivers



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**ABSTRACT:** Environmental, Social, and Governance (ESG) has evolved from a scoring system into a strategic tool critical to global sustainability. This study examines the transformation of ESG by focusing on score evaluation, its impact on financial performance and environmental sustainability, implementation challenges, as well as the role of technology and holistic approaches. Findings reveal that strong ESG performance enhances financial stability, attracts investments, and bolsters corporate resilience against external risks. However, challenges such as greenwashing, pillar disparities, and reporting harmonization gaps remain significant barriers. By integrating advanced technologies like machine learning and blockchain and adopting holistic approaches that consider social, environmental, and financial values, ESG can serve as a key driver of global sustainability. This study provides valuable insights into the role of ESG as a strategic tool for fostering a greener, more inclusive, and sustainable economy.

**KEYWORDS:** ESG, sustainability, greenwashing, green technology, score evaluation

### I. INTRODUCTION

In the evolving landscape of corporate sustainability, Environmental, Social, and Governance (ESG) metrics have become essential tools for assessing a company's impact and long-term resilience. Initially designed to provide standardized evaluations of corporate sustainability performance, these metrics are increasingly seen as more than just scores. They represent critical drivers of organizational impact, shaping the way companies engage with the environment, society, and governance frameworks (Ferjančič et al., 2024; Xue et al., 2023).

The global push for sustainable development, exemplified by commitments such as the United Nations Sustainable Development Goals (SDGs), has positioned ESG as the cornerstone of corporate responsibility and strategic planning. A company's ESG performance significantly contributes to achieving the SDGs. Studies show that companies with strong ESG performance are more likely to meet SDG targets, particularly in the social and environmental pillars (Radu et al., 2023; Sarkar et al., 2023; Khaled et al., 2021). This shift is particularly evident in sectors where ESG scores influence not only investor decisions but also regulatory compliance. For example, frameworks like the European Union's Sustainable Finance Disclosure Regulation (SFDR) have accelerated corporate transparency and accountability, while investors demand greater consistency in ESG reporting and methodology (Cruciani & Santagiustina, 2023). Regulations like SFDR aim to enhance the reliability and comparability of ESG scores (Gebhardt et al., 2023; Malecki, 2023). These regulations push companies to be more transparent in their ESG disclosures, ultimately influencing institutional investment decisions. Research shows that transparent ESG disclosures can reduce a company's financial risk by improving investor perceptions of corporate stability and responsibility (Atif & Alam, 2024; Pulino et al., 2022). Transparency in ESG reporting also helps reduce information asymmetry between companies and investors, which, in turn, can reduce IPO underpricing (Ferri et al., 2023).

Despite these advancements, significant challenges remain, including the lack of standardization in ESG rating systems and the prevalence of "greenwashing," where companies exaggerate their ESG achievements without delivering tangible results and may not genuinely commit to climate action despite having high ESG ratings (Xue et al., 2023; Treepongkaruna et al., 2024). Additionally, larger companies tend to have higher ESG scores as they have more resources to provide comprehensive ESG data, alongside other challenges such as inconsistent terminology, the volume of data to be analyzed, and heterogeneous assessment standards (Drempetic et al., 2019; Jinga, 2022). This raises questions about the fairness of ESG assessments, as smaller companies may not have the same capacity for detailed ESG reporting.

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The financial impact of adopting ESG has also garnered significant attention. Companies with strong ESG practices have shown greater resilience during crises, such as the COVID-19 pandemic, maintaining operational stability and outperforming their peers in terms of financial performance (Xue et al., 2023; Subramaniam et al., 2024). This resilience is driven by factors such as better governance, enhanced stakeholder trust, and proactive risk management strategies. Furthermore, the environmental dimension of ESG, particularly its focus on reducing carbon footprints and improving resource efficiency, plays a vital role in mitigating climate change and addressing biodiversity loss (Tillu et al., 2024; Subramaniam et al., 2024).

However, the journey from ESG scores to measurable impact remains complex. Regional and sectoral differences in ESG implementation reveal significant gaps. While developed markets often lead in ESG adoption, emerging economies face unique challenges, including infrastructure limitations and inconsistent regulatory frameworks (Gupta & Chaundhary, 2023; Singhania & Saini, 2021; Ting et al., 2020). Bezerra et al. (2024) mention that ESG implementation in developing countries is often hindered by the lack of standardized performance indicators, clear regulatory guidance, and organizational resistance. For instance, India's automotive sector is making strides in sustainable practices but struggles to integrate ESG principles into the broader ecosystem (Tillu et al., 2024). Additionally, questions about the effectiveness of ESG ratings in driving real-world impact have sparked debates among academics and practitioners, highlighting the need for further investigation into the methodologies and real-world outcomes of ESG frameworks (Cruciani & Santagiustina, 2023; Fiorillo & Santilli, 2024).

This review aims to bridge the gap between ESG scores and their real-world impact by critically synthesizing the existing literature. The review explores how ESG metrics affect corporate practices, financial performance, and sustainability outcomes across various industries and regions. By identifying key drivers and emerging trends, this study provides actionable insights into the evolving role of ESG as a transformative force in global sustainability. Thus, this review seeks to illuminate the pathways through which ESG metrics can move beyond mere scores to become catalysts for meaningful change.

## II. THEORETICAL REVIEW

### a. Stakeholder Theory

The Stakeholder Theory, developed by Freeman in 1984, focuses on the relationships between a company and its stakeholders, such as investors, customers, employees, suppliers, society, and government. In the context of ESG, this theory emphasizes that companies should consider the needs and interests of all stakeholders when making strategic decisions. It is not solely focused on financial profit for shareholders but also on the social and environmental impacts of the company's activities.

Companies that adopt this approach in implementing ESG tend to be more successful in building better relationships with their various stakeholder groups. This enhances trust and supports the achievement of long-term sustainability goals. In this framework, ESG is not only seen as a tool for compliance or obtaining good scores but as a means to create long-term value by considering the well-being of all stakeholders (Freeman, 1984).

This theory emphasizes that companies have a responsibility to create value not only for shareholders but also for other stakeholders, including society, the environment, and employees. The implementation of ESG metrics is a tangible manifestation of this theory, where a company's environmental, social, and governance performance is measured to assess its impact on various stakeholders (Cruciani & Santagiustina, 2023).

### b. Triple Bottom Line (TBL)

The Triple Bottom Line (TBL) is a framework introduced by Elkington in 1994 to assess a company's sustainability based on three dimensions: Profit, People, and Planet. The Profit dimension refers to the financial success and economic performance of the company; People refers to the social impact and relationships built with communities and employees; while Planet refers to the company's efforts in maintaining environmental sustainability.

TBL helps companies measure performance not only in economic aspects but also in social and environmental dimensions. In the context of ESG, TBL encourages companies to integrate sustainability principles that include managing social and environmental impacts, which can help the company achieve long-term goals. The TBL approach becomes relevant when companies strive to improve their ESG scores by balancing these three pillars and recognizing that true success is not only measured by financial performance but also by positive social and environmental impacts.

This concept highlights that sustainability should be understood through three main pillars: economic, social, and environmental. In the context of ESG, TBL serves as a relevant framework because ESG metrics provide a comprehensive view of how companies contribute to sustainability, not just through profit achievement but also through their impact on the environment and society (Tillu et al., 2024).



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### c. Legitimacy Theory

This theory posits that companies seek legitimacy from society by adopting practices that align with social values and norms. ESG serves as a tool that enables companies to demonstrate their commitment to sustainability and social responsibility, which can ultimately strengthen their legitimacy in the eyes of the public (Xue et al., 2023).

Legitimacy Theory focuses on how companies strive to gain social legitimacy by implementing practices that are accepted and recognized by society, and how they manage public perceptions of their activities and performance. In the context of ESG, this theory suggests that companies must manage relationships with stakeholders to ensure they are seen as legitimate and responsible entities in social and environmental matters.

Companies adopting an ESG approach often use sustainability reports as a means to gain legitimacy, communicating their positive impact on the environment, society, and governance. These reports often serve as tools to enhance the company's image and convince stakeholders of the company's seriousness in fulfilling its social and environmental responsibilities. Greenwashing, or the manipulation of ESG-related information, can be viewed as an attempt by companies to maintain legitimacy in an inauthentic way, which can ultimately damage their reputation and credibility (Suchman, 1995).

### d. Resource-Based View (RBV)

The Resource-Based View (RBV) focuses on how a company's internal resources and capabilities can provide a sustainable competitive advantage. In the context of ESG, RBV highlights the importance of resources that support sustainability initiatives, such as environmentally friendly technological innovations, employees with skills in sustainability management, and organizational structures that support ESG-based decision-making.

Companies with strong internal resources and capabilities related to ESG—such as technological capacity to reduce carbon emissions or the ability to adapt to environmental policies—are more likely to implement more effective sustainability policies and improve their ESG performance. This approach also leads to strengthening the company's competitiveness in a market that increasingly prioritizes ESG factors, such as investors and consumers who value sustainability (Barney, 1991).

This perspective emphasizes the importance of a company's internal resources in achieving a sustainable competitive advantage. In the context of ESG, adopting sustainability practices can enhance intangible assets such as reputation and employee loyalty, which ultimately strengthen the company's competitiveness (Subramaniam et al., 2024).

## III. METHODOLOGY

This study employs a literature review methodology that allows for an in-depth exploration of various perspectives and sources related to the topic of Environmental, Social, and Governance (ESG). Unlike a Systematic Literature Review (SLR), which follows strict inclusion and exclusion criteria, this approach is more flexible, enabling the inclusion of various types of academic literature, industry reports, and grey literature sources that are relevant to the topic. The primary focus of this research is to analyze the evolution of ESG metrics from mere performance scores to drivers of real-world impact, considering the different methodologies, findings, and challenges present in the field.

The literature search was conducted through the Scopus academic database. Keywords used include "ESG metrics," "corporate sustainability," "sustainable investment," "ESG scores," and "global sustainability." To broaden the scope, Boolean operators such as AND, OR, and NOT were also used. The selected literature includes articles published between 2010 and 2024 in English, as well as literature discussing the relationship between ESG metrics and sustainability outcomes.

Inclusion criteria for this review focused on studies that addressed the measurement of ESG metrics, their impact on financial performance, and their contribution to social and environmental outcomes. Research that only discussed Corporate Social Responsibility (CSR) without explicitly referencing the ESG framework or lacking strong theoretical and empirical foundations was excluded from this review.

The data extracted from the literature includes the methodologies used for ESG measurement, such as econometric analysis, text analysis, and the use of technologies like machine learning. Additionally, this review explores the relationship between ESG performance and corporate resilience, including case studies from the COVID-19 pandemic, as well as variations in ESG adoption across different sectors and regions, particularly in emerging markets like India.

Data analysis was conducted thematically to identify patterns, debates, and gaps in the existing literature. Key themes identified include ESG assessment methodologies, the financial and social impacts of ESG performance, and emerging trends such as the integration of artificial intelligence (AI) and challenges such as greenwashing. To ensure the quality of the literature reviewed, sources used primarily consisted of peer-reviewed journals and credible industry reports, with a focus on relevance, validity, and the robustness of the methodologies employed. This methodology is designed to provide a comprehensive review of how ESG metrics can evolve from simple scores to become key drivers of global sustainability.

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### IV. RESULTS

Research on Environmental, Social, and Governance (ESG) has advanced significantly, with various themes reflecting the complexity and importance of ESG implementation in the business world. An analysis of the literature reveals the distribution of the main themes, providing in-depth insights into trends, focus areas, and contributions of research in this field. The emerging themes analysis is presented in Table 1 below.

**Table 1. Emerging Themes in ESG Literature Analysis**

Theme	Frequency of Occurrence	Percentage (%)
Textual Analysis of ESG Disclosures	8	9.3
Impact of ESG on Financial Performance	12	13.95
ESG and Corporate Resilience	10	11.63
ESG Rating and Reporting Challenges	9	10.47
Machine Learning and Technology in ESG Evaluation	7	8.14
Sustainability in Specific Sectors (e.g., Automotive, Mining)	11	12.79
Greenwashing and ESG Disparities	6	6.98
ESG in Governance and Ethical Leadership	8	9.3
Circular Economy and ESG Integration	5	5.81
ESG Investment Strategies and Market Volatility	10	11.63

**Source:** Mapping of articles, data processed 2024

Based on Table 1, one of the significant themes is "Textual Analysis of ESG Disclosures," which accounts for 9.3% of the total literature. Research in this theme focuses on the text analysis of corporate sustainability reports to evaluate the transparency and consistency of ESG disclosures. Findings indicate that many companies face challenges in providing credible and informative data, leading to gaps in decision-making by investors and other stakeholders.

The most dominant theme, comprising 13.95% of the literature, is the "Impact of ESG on Financial Performance." Studies in this theme highlight the relationship between ESG performance and corporate financial outcomes. These studies consistently show that companies with strong ESG practices tend to be more attractive to investors, have lower risks, and are able to improve their financial performance, especially in the long term.

Next, the theme "ESG and Corporate Resilience" contributes 11.63% of the total literature. This theme highlights the role of ESG in enhancing corporate resilience against external risks, such as regulatory changes, environmental crises, and market volatility. Research indicates that companies with high ESG scores are better able to withstand uncertain situations, such as the COVID-19 pandemic, compared to companies that do not prioritize ESG.

"ESG Rating and Reporting Challenges," which comprises 10.47% of the literature, focuses on the challenges in harmonizing ESG reporting and ratings. Differences in assessment criteria between rating agencies like MSCI and Sustainalytics pose a significant barrier for investors seeking clarity and consistency in ESG measurements. Additionally, the lack of global standards in ESG reporting exacerbates the situation, making it difficult for companies to build their credibility.

Another theme, "Machine Learning and Technology in ESG Evaluation" (8.14%), highlights technological advancements in ESG evaluation. Technologies such as machine learning enable more accurate and efficient analysis of ESG data, including identifying hidden risks and sustainability opportunities. However, this theme also underscores challenges in ensuring the quality and consistency of data used by such algorithms.

This analysis shows that ESG research focuses on various aspects, ranging from disclosure transparency, the relationship with financial performance, to the role of technology. While significant progress has been made, challenges such as harmonizing reporting and the risk of greenwashing still require further attention. Future studies are expected to explore solutions to address these challenges while strengthening the relevance of ESG in driving global sustainability.

### V. DISCUSSION

The transformation of Environmental, Social, and Governance (ESG) from a mere scoring system into a driver of global sustainability reflects a fundamental shift in how companies manage social, environmental, and governance responsibilities. The importance of applying ESG principles in the business world is gaining increasing attention, not just as a tool for regulatory compliance, but also as a driver of global sustainability. ESG now serves more than just as an indicator of a company's performance in social, environmental, and governance aspects; it has evolved into a strategic framework that significantly influences corporate

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performance, economic sustainability, and investment attractiveness. In this context, the transformation of ESG should not only be seen as a result of a growing understanding of sustainability concepts but also as a product of broader management theories that can provide deeper insights into how ESG can shape the future of business and the global economy.

One primary reason why ESG is becoming more relevant is its role in supporting a company's economic sustainability. Research by Lin (2024) shows that good ESG performance can improve the Sustainable Growth Rate (SGR), reflecting financial stability that enables companies to grow without relying heavily on external financing. This perspective is closely related to Stakeholder Theory, which emphasizes the importance of considering the interests of various stakeholders in company management. Stakeholder Theory, introduced by Freeman (1984), argues that companies should consider not only the interests of shareholders but also those of customers, employees, society, and the environment in their strategic decisions. In this regard, ESG becomes a means for companies to meet the demands of their stakeholders, who increasingly expect businesses to act in socially and environmentally responsible ways.

Within the framework of Stakeholder Theory, economic sustainability is not only measured through traditional financial indicators but also by assessing how a company maintains healthy relationships with its stakeholders. When companies prioritize the social and governance pillars in their ESG policies, they are more likely to manage social and reputational risks that could harm long-term stability. This can be seen in companies that integrate ESG into their business models, where they not only focus on economic aspects but also provide broader social and environmental benefits. According to Lin (2024), companies that successfully integrate ESG principles into their strategies tend to have better sustainability, not only in financial terms but also in reputation and long-term relationships with stakeholders.

However, one of the challenges companies often face in implementing ESG is the imbalance among the ESG pillars themselves. Lin (2024) also notes that focusing too much on the environmental pillar can hinder a company's potential for economic growth. For example, companies that make significant investments in carbon footprint reduction may face financial challenges if these efforts are not balanced with social and governance initiatives. Therefore, it is essential for companies to balance all three ESG pillars according to the expectations of various stakeholders to ensure that none of them compromises financial stability and corporate sustainability.

Another major obstacle in ESG implementation is the imbalance in disclosure and reporting. Many companies disclose their ESG performance but do not always do so consistently or transparently across the three ESG pillars. Research by Fuente and Velasco (2024) shows that the imbalance between the ESG pillars often creates perceptions of greenwashing, where companies pretend to care more about the environment than they actually do. Discrepancies between reported ESG scores and actual corporate practices worsen the credibility of sustainability reports and damage stakeholder trust. This highlights the urgent need for stricter and more transparent reporting standards.

This is where the Triple Bottom Line (TBL) becomes highly relevant. TBL, developed by Elkington (1994), proposes that companies should not only pursue financial profits but also consider social (people) and environmental (planet) impacts. Within the TBL framework, companies that fully adopt ESG will evaluate their performance based on all three pillars simultaneously. TBL emphasizes that a company's sustainability should be measured holistically, considering not only financial performance but also contributions to society and the planet. Therefore, the imbalance in ESG disclosures in many companies indicates the need for broader adoption of the TBL principle, which creates a balance between profit, people, and the planet.

By applying TBL, companies can design ESG policies that not only meet regulatory or investor demands but also address the needs and expectations of society and protect the environment for future generations. TBL also helps companies assess their long-term sustainability by avoiding greenwashing and providing more transparent and reliable information to stakeholders.

In addition to its role in economic sustainability and disclosure challenges, ESG also demonstrates its relevance in supporting the global transition to a low-carbon economy. Liu et al. (2024) found that good ESG performance can mobilize investments toward low-carbon technologies, strengthening companies' roles in climate change mitigation. In this context, Legitimacy Theory becomes highly relevant. Legitimacy Theory argues that companies seek to gain and maintain social legitimacy through compliance with values accepted by society and regulations. In the context of ESG, companies committed to sustainability principles, especially those related to carbon footprint reduction, demonstrate compliance with social expectations that increasingly prioritize environmental sustainability.

Companies that can prove their commitment to reducing carbon emissions and investing in green technologies not only improve their reputation among stakeholders but also gain legitimacy from society and regulators. This is crucial, as social and regulatory legitimacy becomes key to the long-term survival of companies in a world that is increasingly focused on sustainability. In this sense, ESG serves not only as an evaluation tool but also as a strategy for maintaining a company's social legitimacy amidst growing global demands on climate change issues.

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A holistic approach to ESG also becomes an important focus in this literature review. Talan et al. (2024) proposed a Holistic Value Addition (HVA) framework to integrate ESG into creating value for all stakeholders. This framework encourages companies to not only pursue ESG scores but also create significant social and environmental impacts. In this context, the Resource-Based View (RBV) provides an additional important perspective. RBV suggests that a company's internal resources and capabilities, such as green technologies, sustainability expertise, and a corporate culture that supports social and environmental responsibility, can become sources of sustainable competitive advantage. Fiorillo and Santilli (2024) show that companies with diversified ownership structures, especially those supported by shareholders committed to ESG, tend to have better sustainability performance.

From an RBV perspective, integrating ESG into a company's strategy is not only about achieving ESG scores but also about developing and utilizing internal resources that can enhance the company's long-term sustainability. These resources may include technology, corporate culture, and managerial capabilities to implement effective sustainability policies. Thus, companies that integrate ESG into every operational aspect—with strong resource support—will be better positioned to compete in a market that increasingly prioritizes sustainability principles.

ESG is no longer just an evaluation tool for a company's performance in social, environmental, and governance areas. It has evolved into a driving force in global sustainability strategies, involving a holistic approach to balancing profit, people, and the planet. Management theories such as Stakeholder Theory, Triple Bottom Line, Legitimacy Theory, and Resource-Based View provide diverse perspectives on how ESG can be effectively applied to create value for both companies and society at large. The integration of ESG into strategic management can support economic sustainability, enhance social legitimacy, and drive sustainable innovation through the utilization of internal resources. Thus, the transformation of ESG goes beyond being a score or performance indicator; it becomes a factor defining the future of business in a more responsible and sustainable world.

## VI. CONCLUSION

This study explores the transformation of the Environmental, Social, and Governance (ESG) framework from a mere scoring system to a strategic tool for supporting global sustainability. The findings indicate that ESG has significant potential to drive sustainable economic growth, enhance corporate financial performance, and mitigate social and environmental risks. However, the implementation of ESG is not without challenges, including greenwashing, disparities among the ESG pillars, and gaps in reporting harmonization.

One key finding is that good ESG performance not only supports financial stability but also strengthens a company's capacity to endure in volatile market conditions. The positive relationship between ESG and environmental sustainability also underscores the importance of transitioning to low-carbon technologies, supported by climate finance policies. Additionally, the use of technologies such as machine learning and blockchain has paved the way for more transparent and accurate ESG evaluation and reporting, although data quality remains a key challenge.

A holistic approach has emerged as a key strategy to ensure that ESG creates real impact for all stakeholders. Integrating social, environmental, and financial values into corporate strategies can bridge the gap between ESG scores and the tangible benefits felt by society. However, to achieve optimal results, global reporting standards that are uniform and enhanced institutional capacity to mitigate the risk of greenwashing are necessary.

In conclusion, ESG has evolved into a crucial pillar of corporate sustainability strategies, but its success requires collaboration between companies, regulators, and other stakeholders. Further research is needed to deepen the understanding of sector-specific ESG impacts, develop more measurable evaluation methodologies, and ensure that ESG truly becomes an effective driver of global sustainability. With these steps, ESG can become a central tool in building a greener, more inclusive, and sustainable economy in the future.

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## Urgency of Term Limitation of Political Party Chairman in Indonesia



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**ABSTRACT:** The chairman of political party have an important position in determining the function of parties. However, the limitation of term position for political party leaders has not been regulated in Indonesian regulations. This is certainly not in line with the principle of checks and balances and control mechanisms within parties. There is no limitation for political party's chairman will cause damage to the internal democratic system, abuse of power by leaders against members, and prevent participation of members in the decision-making process. Thus, it is necessary to limit the term of position for political party's chairman. The concept of no immediate re-election can be a concept to limit the term of position of political party chairman. Through this concept, a person can be re-elected as a political party's chairman after his successor has served at least one term. By implementing this concept, it can minimize the possibility of abuse of authority and can create a good concept of term of position and periodization.

**KEYWORDS:** A Chairman; Limitation; Term of Position; Political Party.

### A. INTRODUCTION

In a democratic country, political parties have a very crucial position and role. Although political parties are part of political infrastructure institutions, political parties have a function as a strategic liaison between the government and citizens. This is in line with what Schattschneider said that "Political parties created democracy" (Romli, 2011). Political parties have an influence on a democratic system that will be increasingly apparent when looking at the functions of political parties. As an organization, political parties are ideally intended to activate and mobilize the people, represent certain interests, provide a compromise for competing opinions, and provide a means of peaceful succession of political leadership. (Ichlasul, n.d.).

The structure of a position as general chairman of a political party has an essential role in the political party organization, because the general chairman of a political party has the authority and power to determine the direction and function of the party, in addition, the general chairman will easily gain power or even be proposed for certain positions, therefore, it is important to have strength within the political party to become a democratic function owned by the political party itself. (Pratiwi, et.al, 2023).

However, the term limit of the general chairman of a political party has not been regulated in the Law, so it is still a problem until now. There are no regulations on the term of office of the chairman of a political party, so a chairman of a political party can serve for years, either consecutively or not consecutively, it often happens that the chairman of a political party will end if the chairman of the political party dies, this affects the assessment of democracy, political parties as one of the wheels of democracy in this country but at this time do not reflect democracy within the internal political party itself.

A political party leader who is too dominant can hinder the cadre formation process in the party. There is a view that states that a leader who is too strong is often considered a unifier, whereas this actually creates ongoing dependency within the party. As a result, cadres who have equal qualifications are never prepared as replacement candidates (Baharuddin, et.al, 2023). There is no limitation on the term of position of the General Chairperson of a Political Party is certainly not in line with the principle of constitutionalism which requires limitations on power so that it is not arbitrary. Power should be limited by separating power into branches that are 'checks and balances' in an equal position, in this case it is necessary to have restrictions on state power vertically and horizontally. Thus, power is not centralized and concentrated in one organ or one hand which allows for arbitrary action.

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Based on this paper will examine the following problems: (1) what is the urgency of limiting the term of position of the general chairman of a political party? (2) What is the best future concept for limiting the term of position of the general chairman of a political party?

### B. RESEARCH METHOD

The research method used in this study is the normative legal method. This method focuses on the analysis of legal regulations, legal documents, constitutional court decisions and other legal documents that underlie legal principles, which are collected through literature studies, and then deductively taken as an answer to problems related to the urgency of limiting the term of position of political party chairmen and future concepts to limit the term of office.

### C. RESULTS AND DISCUSSION

#### 1. Urgency of Limiting the Term of Position of Political Party General Chairmen.

The meaning of "term of position" is a certain period of time during which a person holds an official position or title in an organization, government, or other institution. Terms of position are often determined by law or internal regulations, and may include limits on the length of position, opportunities for renewal or re-election, and provisions regarding dismissal or resignation.

The position of the general chairman of a political party has an important role in the organization of the political party, because the general chairman of the political party has the authority and power to determine the function of the party, because the role and power held by the general chairman of the political party are not misused and abused, then the term of office of the general chairman of the political party should be regulated and limited. Considering that political parties are important pillars in realizing a productive democracy, it is important to limit the term of position of party leaders in order to build a healthy and ideal democracy.

In its development, Law Number 2 of 2008 concerning Political Parties does not regulate the term of position of the general chairman of a political party. In addition, the Indonesian Constitutional Court did not accept a judicial review application regarding the limitation of the term of position of the general chairman of a political party through Decision Number 69/PUU-XXI/2023. There is no limitation on the term of position of the general chairman of a political party will certainly have legal and non-legal implications.

Philosophically, there is no limitation on the term of position of the general chairman of a political party certainly does not realize the principle of checks and balances and control mechanisms within the political party through the interpretation of Article 23 paragraph (1) of the political party law. The absence of a check and balances mechanism in the political party law can lead to arbitrariness in the internal management of the party. Therefore, it is important to determine a limit on the term of position of the leader/general chairman of a political party for a certain period as well as a maximum limit on the term of position as a form of check and balances mechanism and prevention against potential abuse of power.

In addition, the problems that may arise are also more internal, such as leadership conflicts or loss of member support, not legal issues that can be tried (Arianto, 2020). Without term limits for party leaders, there will be potential abuse of power that is contrary to the principles of constitutionalism, the rule of law, and constitutional democracy within political parties.

There is no term limits for the general chairman of a political party will be caused in political personalization. The causes of political party personalization are term of position, finances, and the weakness of the role of political parties. Changes are needed to the arrangement of political parties, and all the consequences of personalization are in the Political Party Law. Therefore, changes are needed to the Political Party Law (Herna, 2018). Political parties in Indonesia during the reform era have become a significant phenomenon. The majority of political parties in Indonesia during the reform era have been trapped in the issue of political personalization. Elite party individuals often become the image of the party and have a major influence in making party policies.

The personalization of political parties itself can be interpreted as where the condition of individual existence is more important than the existence of the party or other collective identities. The phenomenon of personalization of political parties in Indonesia is now increasing. Various views have emerged accompanying this phenomenon. Some consider that the personalization of political parties can sometimes provide an injection of enthusiasm to a political party, so that the political party can survive because of the existence of a glorified figure. While on the other hand, consider that the personalization of political parties is actually an anomaly because it is considered contrary to the government's efforts to re-institutionalize political parties.(Faturrachman, et.al, 2023)

There is no term limits for political party leaders will be damage to the internal democratic system, abuse of power by leaders over members, and prevent the participation and aspirations of members in the policy or decision-making process, as regulated in Article 28 Paragraph (3) of the 1945 Constitution. Without term limits for political party leaders will cause in unlimited

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power in the hands of one individual or a particular group, which can lead to abuse or misuse of power. This will also close all channels or means for party members to convey criticism, suggestions, input, or opinions for the progress of the party.

Officials who continue to hold public office have more opportunities to abuse their power. In the words of Lord Acton, "power tends to corrupt, but absolute power corrupts absolutely" (Suriadinata, 2017). Without term limits for political party leaders, member participation will be manipulative and passive, which will not have a significant impact on the decision-making process in the party. This is caused by the leader's overly dominant power, which creates a situation of stability and authoritarianism and ignores or even eliminates the voices of vocal and critical members.

In addition, the limitation of the term of position of political party leaders will give birth to leadership regeneration, where incumbent leaders cannot run again, will create a fairer regeneration process. This provides an opportunity for other party members to compete and contribute to the progress of the party. Thus, the limitation of the term of office of the general chairman of a political party will encourage the creation of a healthy democracy within the party, because there will be a process of leadership regeneration every period. With this regeneration, younger and more competent members will have the opportunity to fill the position, thus ensuring renewal in the party leadership. Political parties are actions that do not depict acts of coercion of will, and actions in accordance with the principles of democracy and the rule of law.

### 2. The Concept of Limiting the Term of Position of the General Chairperson of Political Parties in the Future.

Since the reformation, the Indonesian nation has agreed that the term of office of the President, Governor, Regent and Mayor is limited to two terms. This has been regulated in Article 7 of the 1945 Constitution concerning the term of office of the President and Vice President, and Article 162 of Law Number 10 of 2016 concerning the term of position of the Governor, Regent and Mayor. However, in relation to political parties, there are no regulations regarding the limitation of the term of office of the general chairman of a political party. Indeed, there are regulations in the internal of political parties that the term of position of the general chairman is five years. That means, every five years a Congress must be held to elect a new general chairman and administrators. However, how many terms a person can serve as general chairman, some political parties do not regulate it at all (Ghafur, 2024). Thus, limiting the term of position of the general chairman of a political party must be an agenda that needs to be considered in the Indonesian state system.

In countries that adopt a presidential system, there are 4 concepts of terms of office, namely:

- a. No re-election: There is no possibility to run again as leaders after the first term is over. Examples of countries that use this system are South Africa, Brazil, the Philippines, Guatemala, South Korea, Mexico and Turkey.
- b. No Immediate re-election: A leader is not allowed to run for re-election while he is still in position, but a former chairperson can run for re-election at least after one term of his successor as leaders. Examples of countries that use this system are Peru and Venezuela.
- c. Only one re-election: A leader can run for re-election one more time in the next term, this system is the one most widely used in countries with a presidential system of government, namely the United States, Argentina, Bolivia, Belarus, Madagascar, Malawi, the Republic of Congo, Zambia and Indonesia.
- d. No Limitation re-election: A leader can run again as President without any term limits. Countries that use this concept are Benin and Nicaragua. (Yudhistira, 2020).

Based on 4 concepts above, the concept of no immediate re-election can be a concept to limit the term of position of the general chairman of a political party. This concept is considered the right step to implement, because it can democratize the internal structure of a political party and prevent personalization. The position of the general chairman of a political party is different from the position of government. However, in implementing the "No Immediate Re-election" mechanism, it is necessary to consider several aspects, namely:

- a. Requires the right timing of wait;
- b. Requires a nomination process, gathering support, and internal party elections.;
- c. Requires the development of objective criteria to evaluate the performance of outgoing leaders.

The concept of No Immediate re-election is a loose concept of limitation, so that someone can be re-elected as a general chairman of a political party after his/her successor has served at least one term. By implementing this concept, it can minimize the possibility of abuse of authority and should be able to create a good concept of term of position and periodization by aligning the regulations on the term of position and periodization of the term of position of the general chairman of a political party in accordance with the highest constitution of the Republic of Indonesia. Therefore, in terms of limiting the term of position of political parties, it is necessary to add new norms to the Political Party Law.

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### D. CONCLUSION

Political parties have a strategic role in a democratic country. The chairman of a political party greatly determines the functioning of the political party itself. Given that political parties are important pillars in realizing a productive democracy, it is important to limit the term of position of party leaders in order to build an ideal democracy. In addition, the absence of a term limit for the chairman of a political party certainly does not realize the principle of checks and balances and control mechanisms within the political party. The absence of a term limit for political party leaders results in damage to the internal democratic system, abuse of power by leaders against members, and hinders the participation and aspirations of members in the policy or decision-making process.

The concept of no immediate re-election can be a concept to limit the term of position of the chairman of a political party. Through this concept, someone can be re-elected as a chairman of a political party after his successor has served at least one term. By implementing this concept, it can minimize the possibility of abuse of authority and should be able to create a good concept of term of position and periodization by aligning the regulations on the term of office and periodization of the term of office of the chairman of a political party in accordance with the highest constitution of the Republic of Indonesia.

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## Crack Propagation and Fatigue Life Analysis of Wind Turbine Blades



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**ABSTRACT:** This dissertation investigates the fatigue and fracture behaviour of wind turbine blades exposed to varying wind speeds and load intensities, aiming to enhance their durability and operational lifespan in sustainable energy systems. The increasing reliance on wind energy underscores the need for durable blades that can withstand cyclic loads and extreme environmental conditions, as fatigue and fracture failures significantly impact maintenance costs and reliability. This research specifically examines fatigue life and fracture initiation at wind speeds of 15 m/s and 60 m/s, analysing the effects of increased load intensities (30 MPa and 62 MPa).

Finite Element Analysis (FEA) through ANSYS is employed to model fatigue and fracture dynamics, incorporating fatigue life prediction using S-N curves, stress analysis with von Mises stress, and crack propagation simulation via fracture mechanics principles, such as Paris' Law. Results reveal a notable reduction in fatigue life with increased loads, evidenced by a drop from  $9e09$  to  $7.9e08$  cycles at 15 m/s, with comparable fatigue cycle reductions at 60 m/s. Fracture analysis identifies critical crack initiation points in high-stress areas, and simulations indicate the progressive nature of crack propagation under cyclic loads. These findings underscore the importance of integrating fatigue and fracture assessments in the design and maintenance strategies of wind turbine blades to enhance resilience and support the sustainable advancement of wind energy systems.

**KEYWORDS:** Fracture, Fatigue, Composite materials, Computational analysis, Renewable energy, Wind turbine blades, Fluent Analysis, Structural analysis

### I. INTRODUCTION

Wind turbine blades, as essential components of wind energy systems, are subjected to cyclic loading and various environmental stressors throughout their operational lifetime. These persistent conditions make turbine blades highly susceptible to fatigue and fracture failures, directly impacting the efficiency, durability, and safety of wind turbines. This dissertation aims to examine these critical issues by performing an in-depth fatigue and fracture analysis under varying wind speeds and load conditions. A central focus is placed on understanding how increased loading, especially under high-speed conditions, influences fatigue life and the initiation of fractures in turbine blades. The study integrates Finite Element Analysis (FEA) with experimental methodologies in fatigue and fracture mechanics to predict the behaviour of turbine blade materials. By exploring the relationships among cyclic stresses, material deformation, and crack propagation, this research seeks to provide valuable insights that can guide the optimization of structural design and material selection for wind turbine blades. Bridging the gap between aerodynamic efficiency and structural resilience, the work aims to enhance understanding of failure mechanisms and to support strategies for mitigating blade failure. The importance of this research lies in its potential to reduce costly maintenance and operational downtime resulting from premature fatigue and fracture failures. The findings are expected to extend the operational life of wind turbine blades, thereby increasing the overall reliability of wind energy systems. By employing fatigue and fracture theories, such as Paris' Law and S-N curve analysis, this study establishes a framework for predicting failure and strengthening blade design to endure harsh operational conditions.

### II. LITERATURE REVIEW

Crack propagation and fatigue life analysis are crucial in understanding the structural integrity and durability of wind turbine blades, which experience continuous loading cycles due to fluctuating wind speeds. Early research emphasizes the cyclic loading

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experienced by blades, especially in offshore environments, and its contribution to material fatigue. Models like Paris' Law and Miner's Rule are commonly employed for predicting crack initiation and growth. Crack propagation studies typically focus on:

Aerodynamic loading and stress distributions across the blade length. Material behavior under cyclic fatigue, particularly in composite materials like Glass Fiber Reinforced Plastic (GFRP) and Carbon Fiber Reinforced Plastic (CFRP). The impact of environmental factors, such as moisture absorption, UV exposure, and temperature fluctuations, which further accelerate crack growth.

**Efstathios E. Theotokoglou, Georgios Xenakis "GE 1.5 XLE Wind Turbine Blade Analysis with Computational Methods for Various Composite Materials [1]** Summary: Composite Material Analysis: The paper explores the structural behavior of wind turbine blades made from various composite materials, such as E-Glass, Kevlar, Solvay APC-2/AS4 Carbon Fiber, S-Glass, and S-2 Glass, using finite element analysis. ANSYS Fluent and structural analysis tools are employed to determine stress distributions, displacements, and aerodynamic properties of the GE 1.5 XLE wind turbine blade.

**Silvain A. Michel, Rolf Kieselbach, Hans Jörg Martens "Fatigue Strength of Carbon Fiber Composites up to the Gigacycle Regime"[2]** Summary: Fatigue Behavior in Gigacycle Regime: The paper investigates the fatigue performance of carbon fiber composites (AS4/APC-2) in the gigacycle regime, beyond  $10^6$  cycles. It identifies a significant decrease in fatigue strength as the number of cycles increases, with no clear fatigue limit, highlighting the gradual degradation of material properties under prolonged cyclic loading.

**Sanaa El Mouhsine , Karim Oukassou, Mohammed Marouan Ichenial, Bouselham Kharbouch, Abderrahmane Hajraoui " Aerodynamics and structural analysis of wind turbine blade"[3]**Summary: The finite element model effectively combines aerodynamics and static structural analyses to understand the behavior of Horizontal-Axis Wind Turbine (HAWT) blades under various conditions. Optimal blade design, defined by aerodynamic calculations and efficient airfoil shapes, is crucial for maximizing aerodynamic performance despite potential aeroelastic instabilities. Accurate modeling and simulation of both fluid and structural meshes are essential for detailed structural and aeroelastic analysis, contributing to enhanced turbine performance and reduced power loss.

**S.Karthik1 K.Muralidharan , D.Vazudevan " DESIGN AND STRUCTURAL ANALYSIS OF WIND TURBINE BLADE USING FINITE ELEMENT SOFTWARE "[4]**Summary: The study effectively demonstrates the use of Finite Element Analysis (FEA) software to evaluate deflection and stress values for steel and Carbon Fiber Reinforced Plastic (CFRP) materials, validating the procedure with both FEA and mathematical calculations. Composite materials like CFRP are preferred for turbine blade design due to their lower weight, cost-effectiveness, and ease of transportation, which contribute to improved power generation efficiency. The analysis indicates that while steel blades experience significant deflection under load, CFRP blades offer better performance with reduced deflection and stress, making them a more suitable material choice for turbine blades.

**C. Amer, M. Sahin " Structural Analysis of a Composite Wind Turbine Blade "[5]** Summary: The optimized 5-meter-long horizontal axis wind turbine rotor blade was successfully modeled using airfoil geometries, transferred to a finite element modeling environment, and assigned appropriate material properties for detailed dynamic and static behavior analysis. Various analyses, including mesh independency checks and evaluations of boundary conditions and layer orientation configurations, revealed that the blade's stiffness could be improved by orienting all layers in the 0-degree direction. The study found significant coupling in the normal modes, necessitating further investigation through experimental modal testing, which is currently in progress.

**Balakumaran Natarajan, Jaehwan Lee , Jaehoon Lim , and Sangjoon Shin" Structural Analysis of Composite Wind Turbine Blade using Advanced Beam Model Approach"[6]**Summary: The structural analysis of a 10-kW wind turbine blade, designed with a single-cell cross-section using CFRP and aluminum reinforcement at the root, demonstrated the effectiveness of an advanced beam modeling approach. This approach, integrating two-dimensional cross-sectional and one-dimensional beam analyses, achieved geometric exactness with reduced computational effort and maintained consistency with three-dimensional elasticity theory.

**Vedulla Manoj Kumar, B Nageswara Rao, Sk. Farooq "Modeling and analysis of wind turbine blade with advanced materials by simulation"[7]** Summary: Transition from epoxy glass to epoxy carbon in wind turbine blades enhances performance, reducing total deformation and improving stress resistance. ANSYS Workbench software validates superior structural integrity of epoxy carbon through static and dynamic analyses. Results show epoxy carbon outperforms epoxy glass in minimizing deformation and stress, crucial for optimizing wind turbine efficiency and reliability.

**Lin Wang, Robin Quant, Athanasios Kolios "Fluid structure interaction modelling of horizontal-axis wind turbine blades based on CFD and FEA"[8]**Summary: The paper presents the development of a fluid-structure interaction (FSI) model for large wind turbine blades, specifically the Wind PACT 1.5 MW horizontal-axis wind turbine blade. The model combines computational fluid dynamics (CFD) for aerodynamic load calculations and finite element analysis (FEA) for structural response assessment. A one-way coupling strategy is used, where aerodynamic loads calculated from the CFD model are mapped to the FEA model as load boundary



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conditions. This approach is chosen for its computational efficiency. The developed FSI model is validated through benchmark tests and applied to the Wind PACT 1.5 MW wind turbine blade. The results show that the maximum stresses and deflections are within material and structural limits under various operational conditions.

**Wang, W., Xue, Y., He, C. and Zhao, Y " Review of the Typical Damage and Damage-Detection Methods of Large Wind Turbine Blades"**[9] Summary: The paper comprehensively summarizes the common types of faults and defects in wind turbine blades, such as trailing edge cracking, lightning strikes, leading edge corrosion, icing, and delamination. It delves into the primary generation mechanisms of these defects, emphasizing the impact of harsh external environmental.

### III.METHODOLOGY OF PROPOSED SURVEY

The methodology for this research is designed to systematically address each objective and provide a comprehensive understanding of fatigue and fracture behavior in wind turbine blades. Initially, surface crack-prone zones are identified through high-stress concentration analysis by setting up a structural analysis framework. This involves both aerodynamic analyses using ANSYS Fluent and static structural analysis within ANSYS, utilizing specific material properties, aerodynamic profiles, and blade geometry data. Once these high-stress areas are identified, the next step involves performing a detailed fatigue analysis to predict the blade's lifespan under varying loads. Using established theories such as Miner's Rule and S-N Curves (Wohler Curves), the fatigue analysis provides insight into the blade's endurance limits based on fatigue data specific to the materials used. In the final phase, modeling of cracks in identified failure zones is undertaken using techniques like cohesive zone modeling, which facilitates accurate simulation of crack growth under complex loading conditions. This phase involves the application of fatigue loads, particularly centrifugal forces, to represent real-world operational stresses. The crack propagation is then simulated under axial-torsion-shear coupling loads to observe how cracks advance in both metal and composite blade materials, with a focus on key factors such as critical crack length and propagation direction. This integrated methodology ensures that each phase builds upon the previous, enabling a detailed and realistic analysis of fatigue and fracture mechanisms in wind turbine blades.

### IV. ANALYSIS OF GE 1.5XLE WIND TURBINE BLADES

A wind turbine blade's aerodynamic optimum model refers to the blade design with the smallest achievable thickness. However, safety is an essential component of its design, which considers unknown features of its loads, material deterioration, and potential flap failure. However, in many situations, the safety factors are very high, resulting in superstructures. To more accurately identify safety considerations, extensive information on the impacts of different loading situations (high winds, humidity, temperature fluctuations) and parameters on the structures of the composite materials of the blades in terms of durability and life expectancy is employed, [1]. Computational models or theoretical research on the behavior of blades under various loading circumstances can provide the essential knowledge. A variety of analytical and numerical methodologies are necessary to address failures. Analytical approaches employed include models based on residual shear stresses, generalised fibre bundle models, failure processes, and mechanism-based models. In residual shear stress models, force equilibrium assumes that only shear and fibre loads are communicated. In general, fibre bundle models use statistical fibre strength models and a variety of stress circumstances. According to earlier research, the goal is to model the failure of composite wind turbines [1]. The finite element approach is most commonly used to solve issues, in which integrals and differential equations representing material deformations and microstructures are derived using body discretisation and equation approximation. Complex models of wind turbine blades, even with damaged materials, are a good candidate for considerable investigation using the methods described above [1]. In this work, we analyse the GE 1.5XLE wind turbine blades using the finite element approach, starting with the ANSYS Fluent tool [1]. The approach used is Computational Fluid Dynamics (CFD). The answer came from the ANSYS 19.2 Workbench software suite. Fluid Fluent and Static Structural [1] were employed with Computer Aided Engineering (CAE) design, modelling, analysis, and processing results in mind. The model was created and solved in two sections. First, the Fluent was solved, followed by the Structural. The first model was created to solve aerodynamic loads on the flap, and the second used the estimated loads to determine the stresses on the flap and its displacements. The second model was tested using five materials. These include E-Glass Fibre, Generic, Solvay APC-2/AS4 PEEK Plus Carbon Fibre Reinforced Unidirectional Tape, DuPont™ Kevlar® 49 Aramid Fibre, S-Glass Fibre, Generic, and S-2 Glass Fibre, Generic. We consider all five materials to be macroscopic isotropic since they have identical stress levels in random directions. Table 1 [4] shows the material qualities. The research was motivated by a previous study conducted by Sebastian Lachance-Barrett and Robert Zhang, Professor of Wind Energy at Cornell University in New York [4]. General Electric created the GE 1.5XLE wind turbine type. It produces 1500 kW and can run in winds as low as 3.5 m/s and as high as 20 m/s. It is wind resistant up to 52.5 m/s. Its rotor is 82.5 meters in diameter and spans an area of 5346 square meters. It is made of a composite material that includes glass fibres

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## 4.1 Fluent Analysis

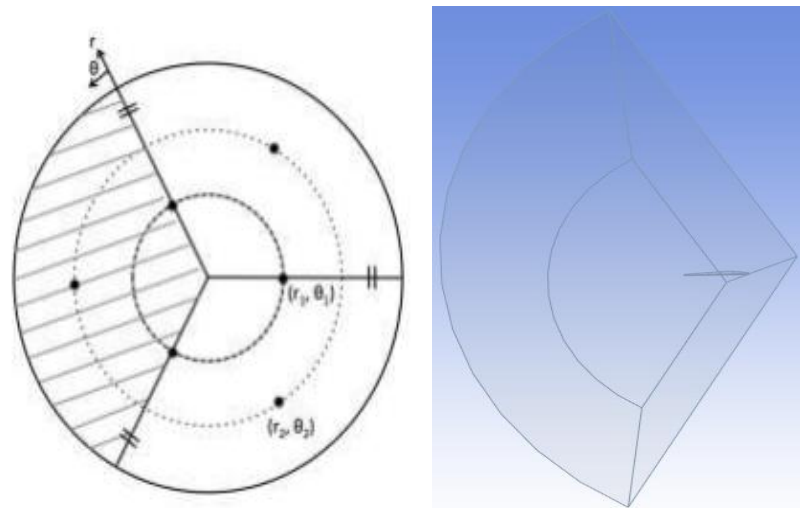


Figure 1 considering 1/3 of the problem

Boundary conditions in the fluid region are:

1. Inlet: Velocity of 15 m/s with turbulent intensity of 5% and turbulent viscosity ratio of 10

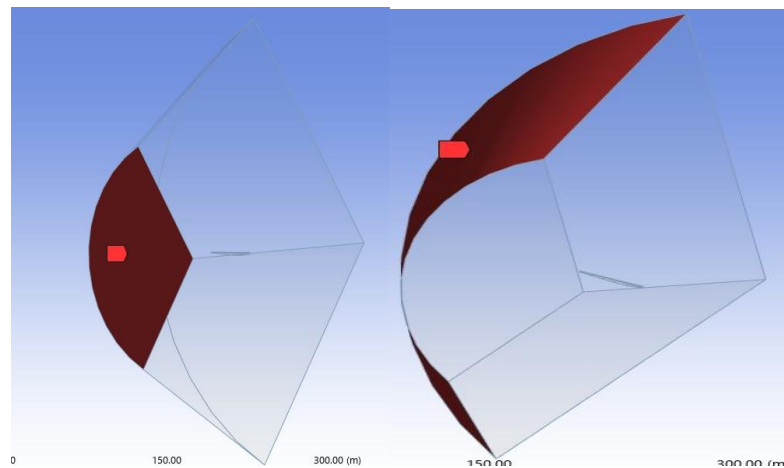


Figure 2 Inlet Boundary Condition

2. Outlet: Taking a Pressure of 1atm.

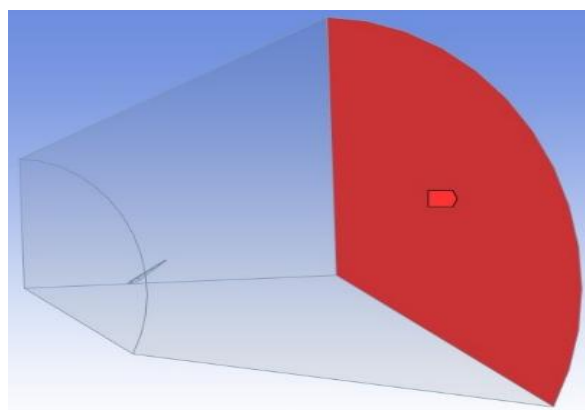


Figure 3 Outlet Boundary Condition

## Crack Propagation and Fatigue Life Analysis of Wind Turbine Blades

- Blade: Taken to be as a No Slip-Wall

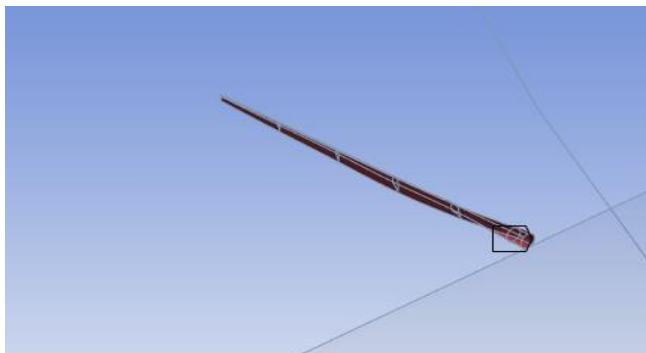


Figure 4 Blade as wall Boundary Condition

- Quadrilateral Boundaries: Periodic.

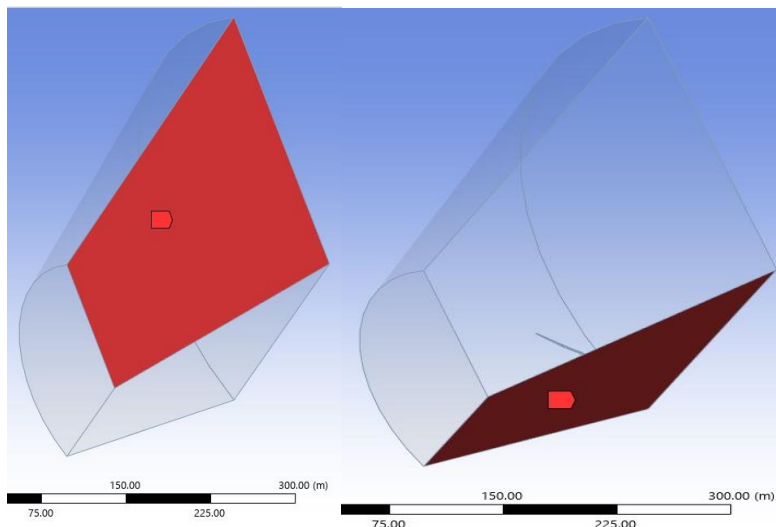


Figure 5 Periodic Boundary Condition

According to Figure 6, the finite element mesh has around 400,000 triangular and tetrahedral elements. The generated matrices are thought to be significantly sparing as matrices despite their high volume. A solvent based on pressure is used by Ansys [1]. The wind turbine's geometry was used from the Cornell University website [1]. In Figure 1, we first see the fluid (air) that surrounds one wind turbine blade and takes up the bulk volume. The fluid domain is conical in shape, having a radius of 120 meters in front of the blade and 240 meters behind it. The fluid flows from the front to the rear of the blade throughout its 270-meter length.

Table I Properties of the materials

Name	Density (Kg/m <sup>3</sup> )	Young Modulus (GPa)	Poisson's Ratio	Shear Modulus (GPa)
E-Glass Fibre	2.565	72.4	0.2	30
Kevlar Aramid Fibre	1.437	112	0.36	7
Solvay APC2/AS4 Carbon Fibre	1.319	138	0.3	5.7
S-Glass Fibre	2.482	86.3	0.22	35
S-2 Glass Fibre	2.457	86.9	0.23	35

## Crack Propagation and Fatigue Life Analysis of Wind Turbine Blades

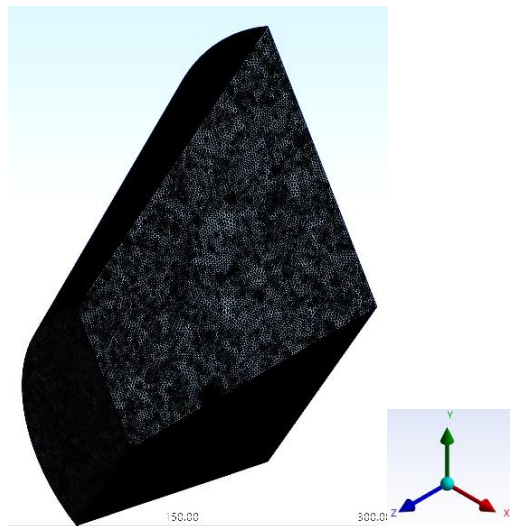


Figure 6 Ansys Fluent Mesh

The inlet sections and the inlet top on the Z-axis have been taken into consideration as boundary conditions for speed entrance (Figure 2). On the Z-axis, a negative speed of 15 m/s entered. The degree of viscosity was 10 and the vortex intensity was 5%. A portion with an outlet pressure equal to atmospheric pressure is achieved as an outlet. Furthermore, because we have picked one-third of the geometry, we have regarded periods 1 and 2 as interface points rather than walls. Lastly, the fluid portion contained the interior kind. A speed of 88 m/s is anticipated at the blade ends based on the preliminary pre-analysis calculations, and our fluent exported a speed of 98 m/s, which is an acceptable result for our model.

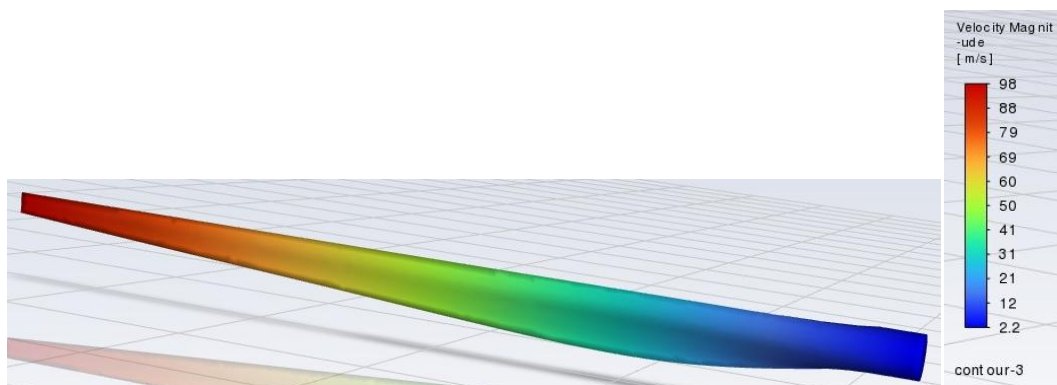


Figure 7 Velocity Contour from Fluent Setup is 98m/s

The wind speed profile from both the entrance and the outflow is displayed in Figure 7. As anticipated, the initial speed at the entry is 15 m/s. A decrease in speed may be seen behind the blade, indicating proper behaviour. Lastly, a few orange lines around the blades' rotation show a higher speed, which likewise denotes the right answer

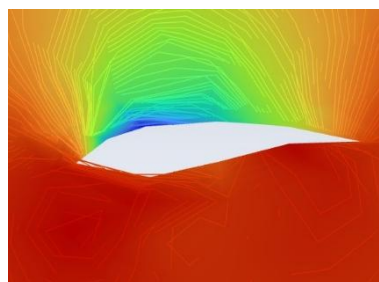
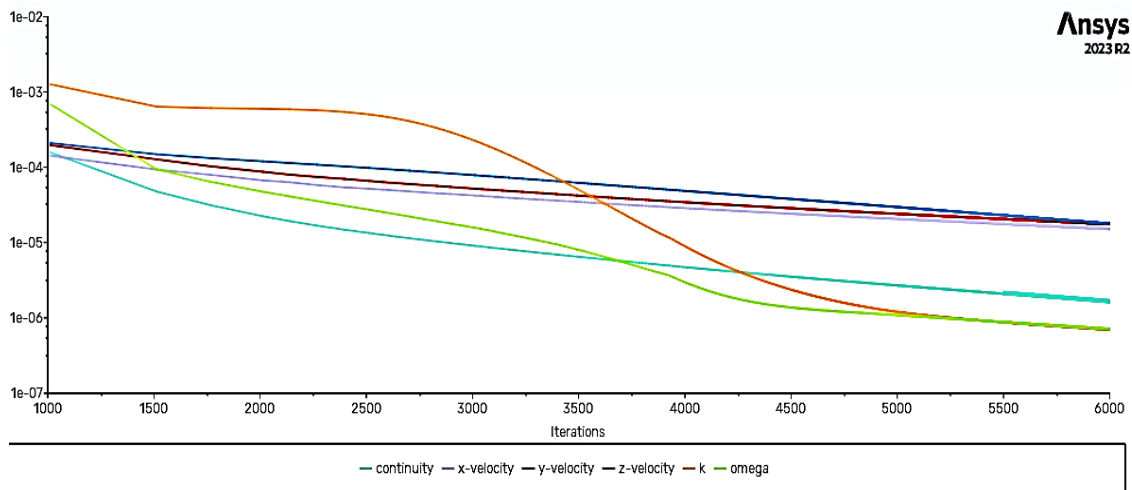


Figure 8 Pressure Contour cut section around The Airfoil

Next, we examine the wind turbine's pressure profile in Figure 8. The front is under more strain than the back, which was to be expected. The convergence of the solution from the finite element findings in relation to the number of iterations is another significant issue. Figure 9 shows a solution convergence of  $10^{-6}$  residuals and good solution behavior.

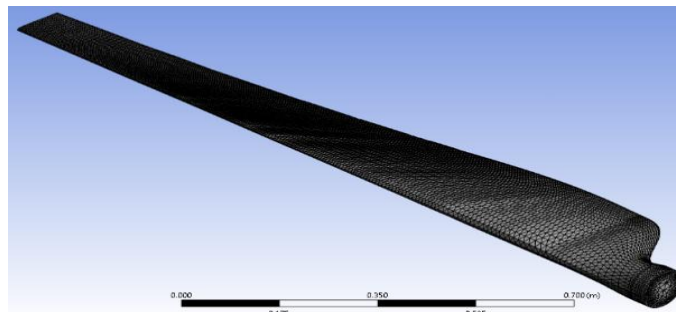
# Crack Propagation and Fatigue Life Analysis of Wind Turbine Blades



**Figure 9 Residual Plot from Ansys Fluent**

## 4.2 Structural Analysis

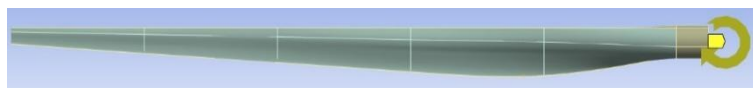
The structural analysis includes the static study of the blade. The pressure on the blade is calculated using the results from the fluent study and then the stresses and displacements fields are calculated. The blade consists of an outer surface and an inner beam.



**Figure 10 Ansys Mechanical Mesh**

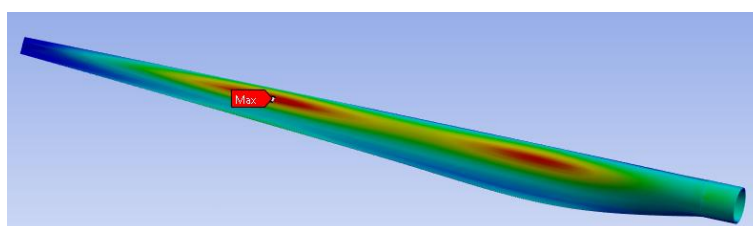


**Figure 11 Ansys Boundary Condition Displacement Constraint**



**Figure 12 Ansys Structural Rotational Velocity**

The mathematical model for static analysis is based on Shell theory. This is a development of Euler-Bernoulli's beam theory. The blade's finite element mesh was designed with an element size of 20 cm. The mesh has several sorts of elements (triangular, tetrahedral, etc.). They took roughly 5,403 finite elements, which is almost 90 times fewer than the Fluent analysis. Initially, the overall displacements are determined. Figure 14 shows that the blade shifts as predicted. The largest displacements occur near the tip of the blade, and as we approach the root of the blade, displacements decrease in all of the analyzed situations. In Table 2, the maximum displacements according to the different materials are given. It is observed that Solvay APC-2/AS4 Carbon has the minimum displacement.



**Figure 13 Stress Plot under 60m/s Inlet Velocity [Solvay APC2/AS4 Carbon Fiber]**

## Crack Propagation and Fatigue Life Analysis of Wind Turbine Blades

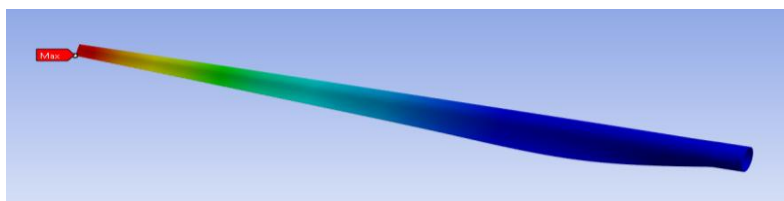


Figure 14 Total Structural Deformation under 60m/s Inlet Velocity [Solvay APC2/AS4 Carbon Fiber]

Table II Material Deflection for 15 m/s Inlet Velocity

Material Deflection	Result from Paper [1]	Results from Simulation
E-glass	0.698 m	0.73 m
Kevlar	0.488 m	0.52 m
Carbon Fiber	0.414 m	0.43 m
S-Glass	0.589 m	0.644 m
S-Glass 2	0.6 m	0.641 m

Table III Material Stresses For 15 m/s Inlet Velocity

Material Stresses	Result from Paper [1]	Results from Simulation
E-glass	30.66 Mpa	32.549 Mpa
Kevlar	32.55 Mpa	35.357 Mpa
Carbon Fiber	34.084 Mpa	36.147 Mpa
S-Glass	31.776 Mpa	33.897 Mpa
S-Glass 2	31.655 Mpa	33.941 Mpa

Table IV Material Deflection for 60 m/s Inlet Velocity

Material Deflection	Result from Paper [1]	Results from Simulation
E-glass	1.567 m	1.456 m
Kevlar	1.115 m	1.057 m
Carbon Fiber	0.945 m	0.891 m
S-Glass	1.322 m	1.268 m
S-Glass 2	1.348 m	1.262 m

Table V Material Stresses For 60 m/s Inlet Velocity

Material Stresses	Result from Paper [1]	Results from Simulation
E-glass	63.22 Mpa	62.77 Mpa
Kevlar	65.47 Mpa	64.815 Mpa
Carbon Fiber	69.26 Mpa	67.99 Mpa
S-Glass	64.45 Mpa	63.96 Mpa
S-Glass 2	64.24 Mpa	63.92 Mpa

### 4.3 Fatigue Analysis

The consistency between the von Mises stresses from the paper[1] and simulation results provides a strong basis for analyzing fatigue life and potential crack initiation points. Areas where the stress exceeds material strength limits may exhibit crack initiation, especially in high-stress regions. This emphasizes the need for local fracture mechanics analysis, as mentioned earlier.

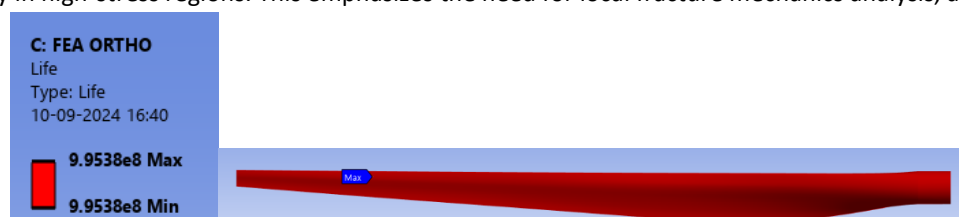


Figure 15 Fatigue Life at 15 m/s and 60m/s Inlet Velocity



## Crack Propagation and Fatigue Life Analysis of Wind Turbine Blades

To assess the blade's performance under more extreme loading conditions, the load was scaled by 20 times. This approach simulates how the materials would behave under excessive wind loads or unexpected extreme operating conditions. When the load was increased, the fatigue life reduced to  $7.94 \times 10^8$  cycles, a decrease in the material's life expectancy. However, this reduction is comparatively moderate, suggesting that the materials retain substantial structural integrity even under amplified load conditions. The materials are resilient, but prolonged exposure to such loads could eventually lead to fatigue failure. The drastic drop from  $9.95 \times 10^8$  cycles to 494.44 cycles when the load is scaled by 20 times illustrates that while the material is well suited for normal operational conditions, excessive loads pose a significant threat. The materials are not designed to withstand such extreme loads for extended periods, and failure would occur rapidly if these conditions were to persist.

This contrast highlights that fatigue failure is highly dependent on the magnitude of the load, and increasing the load significantly reduces the material's ability to resist cyclic stress.

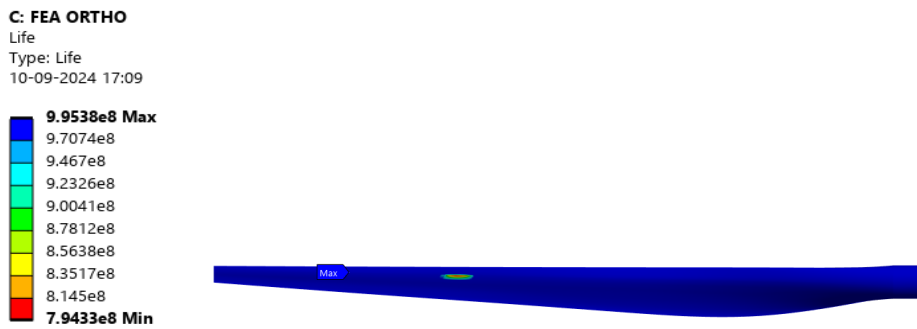


Figure 16 Fatigue Life at 15 m/s Inlet Velocity for Scaled loads

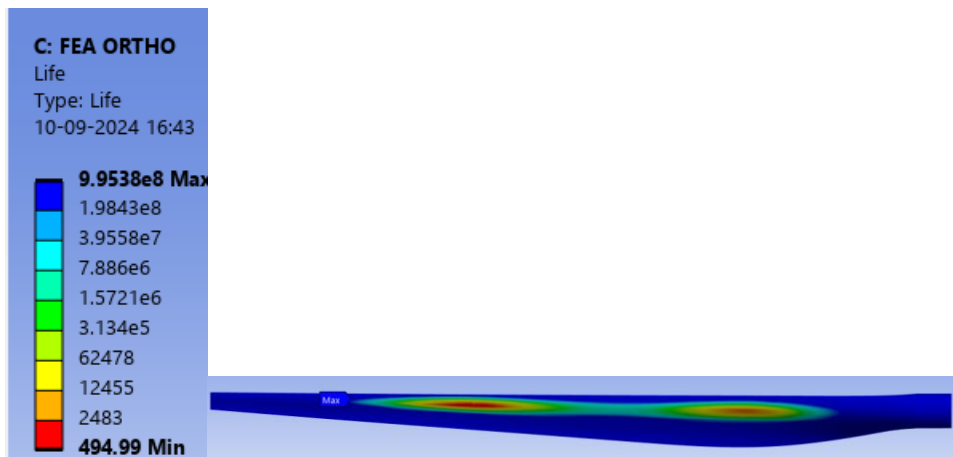


Figure 17 Fatigue Life at 60 m/s Inlet Velocity for Scaled loads

### 4.4 Fracture Analysis

In the context of local analysis of the wind turbine blade, we transformed a high-stress concentration region into a flat plate to simplify and focus the analysis on stress intensity factors and total deformation. This method isolates the crack propagation and its interaction with the stress field, providing more precise insights into the structural integrity of the blade at various crack lengths and wind velocities.

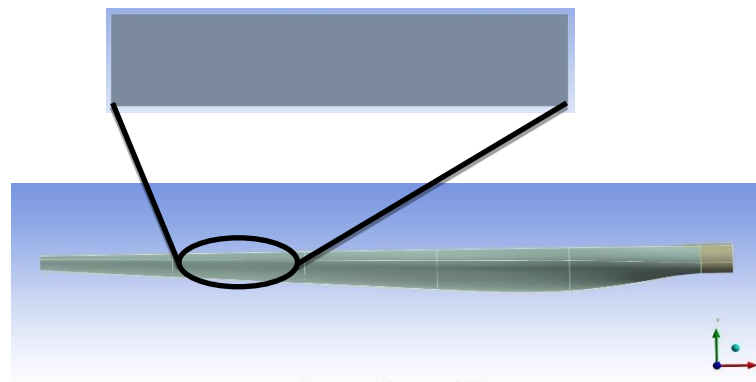
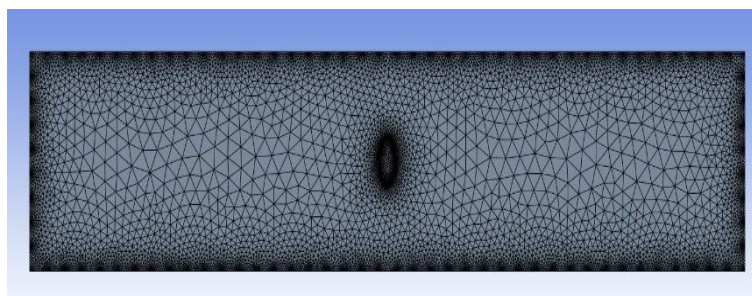


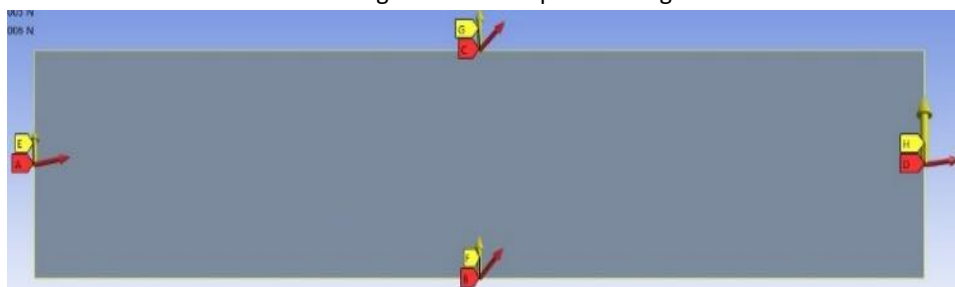
Figure 18 Part of blade considered as a Flat Plate for Local Analysis

## Crack Propagation and Fatigue Life Analysis of Wind Turbine Blades



**Figure 19 Tetrahedron Mesh of Elliptical Crack For the local analysis**

The wind turbine blade section, a tetrahedral mesh was employed to ensure that complex geometries, such as the crack propagation and stress concentration regions, were captured with high accuracy. The choice of a tetrahedral mesh allowed for detailed representation of the curved and irregular surfaces of the plate, providing an accurate approximation of the stress distribution. Mesh Type: Tetrahedral mesh. Total Node Count: 230,456 nodes. The tetrahedral mesh, consisting of 230,456 nodes, was chosen to balance the need for computational efficiency with the accuracy of the results. A denser mesh was applied in regions close to the crack tip and areas of high stress intensity to ensure that small-scale stress variations were captured effectively. This higher node density is especially crucial for calculating stress intensity factors (K1, K2, K3) with high precision, as it minimizes interpolation errors that could occur in regions with complex stress gradients.



**Figure 20 Force and Displacement constraint on Blade**

Boundary Condition for Local Analysis: The constraints define how much the edges of the flat plate can move under specific boundary conditions. Each side of the flat plate has specific displacement components in the X, Y, and Z directions. The values need is applied as boundary conditions to the local flat plate model in the analysis. Displacement and Applied Force boundary conditions need to be applied at the respective side of the flat plate model.

**Table VI Displacement constraint For Inlet 15m/s**

Side number	X in m	Y in m	Z in m
E	2.1792E-04	5.7716E-02	-4.5566e-02
F	-4.1792E-04	5.7716E-02	-4.5566E-02
G	2.1792E-04	5.7685E-02	-6.9255E-03
H	-5.66196E-05	1.1932E-02	-62338E-03

**Table VII Displacement constraint For Inlet 60m/s**

Side number	X in m	Y in m	Z in m
E	4.17E-03	0.12652	-9.746E-02
F	-1.2298E-03	0.12651	-4.221E-02
G	4.179E-03	0.12645	-4.23E-02
H	1.742E-04	6.675E-02	-4.22E-02

**Table VIII Applied Force for Inlet 15m/s**

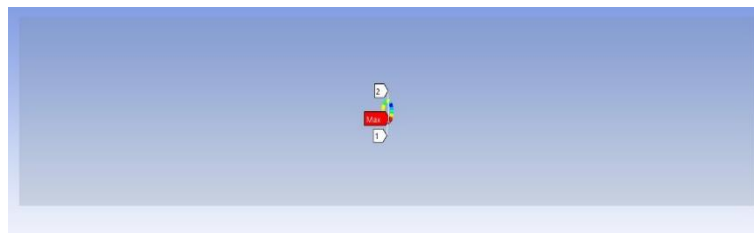
Side number	X in N	Y in N	Z in N
A	6.7668E05	1.18106E05	79022
B	4.6719E05	1.8106E05	79022

## Crack Propagation and Fatigue Life Analysis of Wind Turbine Blades

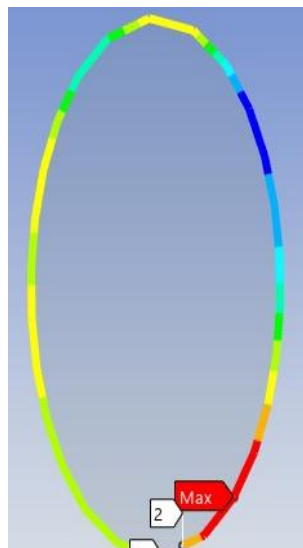
C	5.4415E05	5.288E05	1.86E05
D	1.1596E06	1.3467E05	1.1537E05

**Table IX Applied Force for Inlet 60m/s**

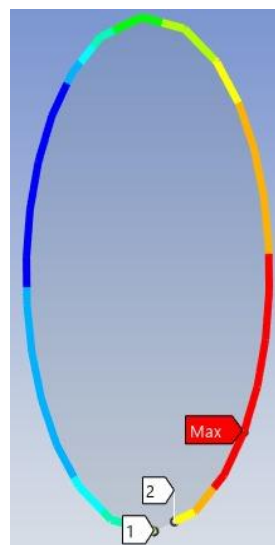
Side number	X in N	Y in N	Z in N
A	3.9593E06	1.65E06	62815
B	-5715.6	1.0376E06	3.5723E05
C	6.290E05	1.013E06	3.1819E06
D	3.2725E06	7.9338E05	3.86E06



**Figure 21 Stiffness Matrix on the Plate**



**Figure 22 Magnified view of Stiffness Matrix K1 of the Plate**



**Figure 23 Magnified view of Stiffness Matrix K2 of the Plate**

## Crack Propagation and Fatigue Life Analysis of Wind Turbine Blades

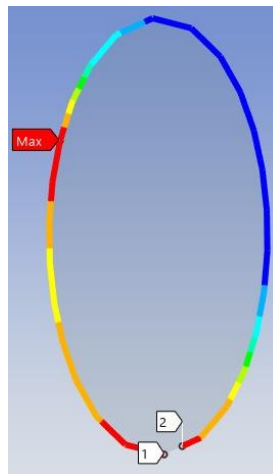


Figure 24 Magnified view of Stiffness Matrix K3 of the Plate

Table X Stress Intensity Factors of various crack length for 15m/s Inlet Velocity

MAJOR AXIS(m)	MINOR AXIS(m)	Stiffness MPa√m	K1	Stiffness MPa√m	K2	Stiffness K3 MPa√m
5e-02	2.5e-02	1.201		3.21		0.8609
2e-02	1e-02	1.0807		1.7869		0.41797
0.1	0.05	2.38		14.648		1.0621
0.2	0.1	0.07194		10.172		0.407
0.3	0.15	0.6577		6.62		0.473
0.4	0.2	0.365		17.99		0.250
0.1	0.04	7.75		18.85		0.092664
0.1	0.5	5.21		10.326		0.818
0.1	4E-02	0.3071		35.963		8.286
0.1001	4E-02	0.345		39.72		6.48
0.1002	4E-02	0.352		39.75		1.234
0.1085	4E-02	0.5106		46.355		8.18
0.107	4E-02	0.497		48.23		8.342
0.106	4E-02	0.469		48.46		12.639
0.10559	4E-02	0.483		49.55		6.804

Table XI Stress Intensity Factors of various crack length for 60 m/s Inlet Velocity

MAJOR AXIS(m)	MINOR AXIS(m)	Stiffness MPa√m	K1	Stiffness K2 MPa√m	Stiffness K3 MPa√m
5e-02	2.5e-02	5.107		8.3751	0.9141
2e-02	1e-02	11.375		3.60	4.46
0.5	0.25	0.08319		2.9167	0.739
0.1	5e-02	5.532		17.20	0.607
0.1	0.5	1.14		34.51	3.533
0.2	0.1	1.89		19.109	0.31548
0.4	0.1	1.6		35.41	1.06
0.5	0.1	0.681		44.52	2.065

At an inlet velocity of 15 m/s, the analysis reveals that crack propagation in the wind turbine blade is predominantly influenced by shear forces, as reflected in high Mode II (K2) values across various crack configurations. For instance, with a major axis of 0.1 m and a minor axis of 0.04 m, the high K2 (35.963 MPa√m) value indicates a significant shear-driven crack propagation, while the twisting component (K3) introduces complexity to the crack path. Tensile forces (K1) play a secondary role, suggesting that blade durability may be enhanced by focusing on shear resistance. This moderate aerodynamic loading scenario suggests the blade is

## Crack Propagation and Fatigue Life Analysis of Wind Turbine Blades

highly susceptible to shear-induced cracking, underscoring the need for robust design considerations to handle mixed-mode stress impacts.

At a higher inlet velocity of 60 m/s, shear forces remain dominant in driving crack propagation, yet tensile stresses also become increasingly influential in some configurations. For example, with a smaller crack (major axis 0.02 m), K1 reaches 11.375 MPavm, indicating a strong tensile opening effect that could accelerate crack propagation. Additionally, larger cracks (major axis 0.5 m) show continued shear dominance (K2 at 44.52 MPavm), while K3 introduces minor twisting effects. The findings suggest that under high-velocity aerodynamic conditions, the blade faces a combination of tensile, shear, and twisting stresses, demanding advanced design features to counter these complex loading patterns and improve fracture resistance

## V. CONCLUSIONS

The fatigue life analysis and fracture mechanics study of the wind turbine blade under cyclic loading provided key insights into its deformation, stress distribution, and crack behavior. The structural analysis highlighted high-stress concentration regions, notably near the blade root and mid-span, where von Mises stresses indicated potential areas for fatigue failure. Fatigue life analysis showed a significant reduction in life cycles, especially under increased loads, with a drop from  $9e09$  to  $7.9e08$  cycles in critical regions. Stress intensity factor analysis revealed that shear stresses (K2, Mode II) are the primary drivers of crack propagation in these areas, suggesting a shear-dominant failure mode under bending and torsional forces. A focused study of the high-stress zones using a flat plate model further underscored the influence of Mode II stresses on crack initiation and growth, indicating that the blade's material may require enhanced shear resistance to withstand cyclic loading and improve fatigue life. This study highlights critical areas for advancing wind turbine blade design, focusing on the dominant role of shear stresses (K2) in crack propagation within composite materials. Future research should consider advanced 3D crack propagation models like cohesive zone modeling and XFEM for a more realistic depiction of cracks in composite layers. Exploring materials optimized for shear resistance, such as hybrid composites, could reduce mode-II related fatigue. A full, non-linear analysis of entire blades would deepen understanding of real-world operational impacts, while experimental validation using scaled prototypes and digital image correlation could confirm findings. Integrating blade dynamics with overall turbine system dynamics through fluid-structure interaction and exploring geometry optimization can help mitigate stress concentrations, ultimately enhancing blade durability and reducing maintenance needs.

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## Central Java KONI Resource Management Strategy towards Maximum Achievement at PON XXI/2024



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**ABSTRACT:** This study aims to find out the process of the Central Java Province KONI organizational resource management strategy in the preparation of PON XXI/2024 Aceh-North Sumatra. The type of research used is qualitative descriptive. Qualitative researchers want to describe or provide a phenomenon as it is or describe the symbol or sign they are researching according to the real thing and in its context. This research was carried out in March 2024. Research occlusion is a place where research is carried out or recognized, which is located in Jatidiri Sports Complex in Karangrejo, Gajahmungkur, Semarang City. KONI Central Java Province has developed a resource management strategy to improve achievements in PON XXI/2024 Aceh-North Sumatra. This strategy includes four main elements: human resources, budget, facilities and infrastructure, and technology. Human resources, both administrators, staff, and athletes, are focused on improving competencies through continuous training. Budget management is acknowledged in a transparent and effective manner to ensure full support for operational and coaching needs. Facilities and infrastructure, including training facilities, are prepared to meet standards to support athletes' performance. In addition, the use of technology is improved for monitoring, evaluation, and data analysis which can accelerate the process of improving performance. With this strategy, Central Java is expected to achieve maximum results in PON XXI/2024.

**KEYWORDS:** Resource strategy, Human resources, Sports achievement

### INTRODUCTION

In a sports organization, both large and small scopes must be able to ensure that all its resources are ready. It arises on the basis of achieving organizational goals. All forms of organizational goals, both small and large-scale, certainly require resources. The most prominent resource in a sports organization is the strength of its human resources. Factors that support business implementation are the availability of competent, qualified, and adequate human resources (Tarigan et al, 2022). In addition to competent human resources, an organization cannot run without financial/budgetary capabilities which is a condition for the organization to run.

No less important than human resources and financial capabilities, adequate infrastructure support is a supporting factor that can help achieve the organization's goals. Sports facilities are supporting resources consisting of all forms and types of equipment and equipment used in sports activities, while sports infrastructure is supporting resources consisting of sports venues in the form of buildings on them and physical boundaries whose status is clear and meets the requirements set for the implementation of sports activity programs (Indrayana & Yuliawan, 2020). Facilities and infrastructure in sports can also create an effective training atmosphere if the ha meets the requirements and sieves to be used. If the training is effective, the process of coaching achievements can be recognized to the maximum.

The last resource in sports organizations is the use of technology in them. In the era of *Society 5.0* All fields, including sports, are required to understand the latest technology to be used to achieve the organization's goals. The use of sports infrastructure will be much more efficient if it is collaborated with developing technology. This is because the data taken will be much more accurate and easy to process for the success evaluation process.

The budget is a democratic tool (*Democratic Steering Instrument*) through which the policy of a region is determined (Ashari, 2004). The budget management process within an organization is the second factor that supports an organization to run well. Without good budget management, the organizational process will not run with maximum. So it can be known that the benefits of the budget in an organization are as a tool for control and planning as well as a benchmark to motivate employees to be better in the activities of the organization (Umaya et al., 2018).



## Central Java KONI Resource Management Strategy towards Maximum Achievement at PON XXI/2024

If viewed from the goal, sports organizations have the main goal, which is to be able to achieve the highest sports achievements in each sport. To achieve that, of course, Peru is recognized as coaching sports in a structured manner. This coaching is acknowledged by sports branches both at the regional and central levels. A coaching and development is not only the full responsibility of the government, of course, the role of various parties is needed to run well (Nugraha et al., 2019)

National Sports Week (PON) is a national sports event organized by the Indonesian National Sports Committee (KONI). PON is held every four years and is attended by all provinces in Indonesia. The National Sports Week was first held in Surakarta City on September 8-12, 1948. PON I carries the mission to show the world that the Indonesian nation in the state of its area being narrowed due to the Renviel Agreement, can still prove that it can hold sports championships on a national scale. The National Sports Week (PON) until this prayer is still a prestigious event for each region to display its best athletes. The National Sports Week (PON) prayer carries the mission so that new superior athletes in each region will always emerge to be able to represent Indonesia in international events. Until 2023, PON has been held 20 times with the last host in 2021, namely Papua Province. DKI Jakarta Province until this prayer is still occupied as the province with the most general champions, which is 11 times. The XXI National Sports Week will be held in 2 provinces, namely Aceh Province and North Sumatra Province. For the first time, PON was held in 2 different regions. This is certainly a challenge for all regions. PON XXI is planned to be held in 2023 on September 8-20, 2024.

Human resources are the main resource in KONI Central Java Province. Human resources at KONI Central Java Province include Administrators, Staff, Members of Sports Branches and Members of Functional Bodies. All of them have their respective roles and must have their own competencies and skills. Competence is the ability in individuals that can be honed in such a way to do work in accordance with organizational goals, this is to achieve an achievement as a reward for work achieved effectively and efficiently (Ramadhany et al., 2021).

### METHODS

The type of research that will be used is qualitative descriptive. Qualitative researchers want to describe or provide phenomena as they are or describe the symbols or signs they are researching according to the real thing and in the context (Yusuf, 2017). Qualitative research is a type of research whose findings are not obtained through statistical procedures or forms of calculations. Qualitative research is descriptive and tends to use inductive analysis. Researchers start from data, and use existing theories as explanatory materials, then end up with hypotheses or theories (Hadi, 2016). Researchers are as key instruments, data source retrieval is acknowledged in a *purposive*, data analysis is inductive and qualitative. The results of qualitative research emphasize meaning more than generalization. According to qualitative research theory, in order for the research to be of high quality, the data collected must be complete, namely primary and secondary data (Sugiyono, 2016).

So the primary data in this study is the Central Java Province KONI Management. As for the secondary data in this study, the Provincial Management of the KONI Sports Branch of Central Java Province. This research was carried out in March 2024. The target of KONI Central Java Province and the location of the research is the place where the research is carried out or recognized, namely in the Jatidiri Sports Complex in Karangrejo, Gajahmungkur, Semarang City

### RESULT AND DISCUSSION

Human Resources data at KONI Central Java Province is divided into several parts, namely the Central Java Province KONI Management, Central Java Province KONI Staff, and Central Java Province KONI Members consisting of the Provincial Government of Sports Branches, Regency/City KONI, and Functional Bodies. The following table will present a recapitulation of the number of KONI members in Central Java Province.

**Table 1: Recapitulation of the Number of KONI Members in Central Java Province**

Number	Member Type	Sum
1	Central Java Province KONI Management	52 people
2	Central Java Province KONI Staff	25 people
3	KONI Regency/City	35 regencies/cities
4	Provincial Management of Sports Branch	68 sports
5	Functional Sports Bodies	6 organizations

Based on the table, the number of members of the Provincial Sports Branch is the largest number among the types of membership. This is in line with KONI's main goal, which is to foster sports achievements.

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The source of the Central Java Province KONI budget is based on the APBD but in the form of grants which are distributed through the Central Java Provincial Disporapar. Of course, to get this grant budget, it must go through a very long process. It starts from the planning process until finally it is distributed to sports branches. As said by the Deputy Chairman III of KONI Central Java Province,

"The source of the Central Java KONI budget is sourced from the APBD in the form of grant funds provided by Central Java Province. The process of applying for grant funds will go through a bureaucratic process that must be passed. It starts from planning, submission to disbursement."

**Table 2: Advantages and Disadvantages of Budget Management in KONI Central Java Province**

It	Excess	Deficiency
1	The budget management process at KONI Central Java Province is open and transparent	The process of accountability for sports branches in reporting the use of the budget is still often late
2	KONI Central Java Province distributes the budget with a priority scale system	KONI Central Java Province has not been firm and consistent in implementing a sanction system for sports that do not comply with the administration
3	KONI Central Java Province utilizes human resources, namely financial staff to support each sport in the field of treasury	The lack of budget provided makes it difficult for KONI Central Java Province to divide the budget according to the existing priority scale
4	KONI Central Java Province seeks to develop a digital-based financial system through the system that is being developed	Sometimes the budget distributed by KONI Central Java Province is still insufficient and even cannot cover sports expenses.

Based on the results of the research admitted at the Central Java Province KONI office and the provincial government of the sports branch, in addition to human resources, there is budget management that is the lifeblood of a sports organization in fostering athletes. The process of coaching athletes with limited budget support will be an obstacle when carrying out the coaching process. It is better if the budget support is good, all coaching processes will go well. In the planning function, the budget is planned and prepared to become a work guideline for all activities carried out (Ramlah et al., 2023). With the number of 60 Central Java sports that qualified for PON XXI/2024 Aceh-North Sumatra, it is a challenge for KONI Central Java Province in distributing the budget. KONI Central Java Province has categorized sports into 4 categories, namely 1st seed, 2nd seed, 3A and 3B seed. For example, the pencak silat sports branch gets the 1st seed category because it gets a good medal in the qualifying round and has more opportunities to get a gold medal at PON XXI/2024 Aceh-North Sumatra. Meanwhile, the handball sports branch is in category 3B. This is not without basis, but with the achievement of the handball sport in the PON qualification round, it gets a ranking pass and the potential to get a medal in PON is different from the superior sports above it. In this way, KONI Central Java Province tries to facilitate all sports in accordance with the achievements given to Central Java.

The Central Java Province KONI budget, which is sourced from the APBD and is in the form of grants derived through the Central Java Provincial Disporapar, requires the Central Java Province KONI to be directly accountable to the Governor of Central Java Province. This accountability process is sometimes an obstacle for KONI Central Java Province. The legal basis for providing sports fund assistance from the Ministry of Youth and Sports to sports organizations is the Regulation of the Minister of Finance Number 168/PMK.05/2015 concerning the Mechanism for the Implementation of the Government Assistance Budget at State Ministries/Institutions (State Gazette of the Republic of Indonesia Year 2015 Number 1340) as amended by the Regulation of the Minister of Finance Number 173/PMK.05/2016 concerning Amendments to the Regulation of the Minister of Finance Number 168/PMK.05/2015 concerning the Implementation Mechanism of the Assistance Budget Government in State Ministries/Institutions (State Gazette of the Republic of Indonesia Year 2016 Number 1745) (Samsudin et al., 2023).

The budget distributed to sports branches requires sports branches to be responsible for the budget to KONI Central Java Province no later than 14 days after the budget is disbursed to the sports branch account. Conditions in the field, such as several sports that are often late in carrying out the accountability process, will have an impact on the next budget management process. Sports branches will not get the next budget when the previous budget has not submitted a report of responsibility. The

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regulations and standards set by the government aim to encourage transparency and accountability in the presentation and management of government financial statements, further so that in the preparation of financial statements there are no mistakes and mistakes so that there is an audit from the Audit Board (BPK) to minimize irregularities in the Budget Realization (RA) report (Rindengan & Kapojos, 2024). In addition to relying on grants from the government, KONI Central Java Province has begun to find a budget that is supportive from external parties. There is no prohibition for KONI to cooperate with external parties to become a sponsor in every activity. This is the first time KONI has admitted it at the PORPROV XVI Pati Raya event. As only in the central government, the existence of PDUK which has the status of a Public Service Agency (BU) at the Ministry of Youth and Sports in the management of Non-Tax State Revenue (PNBP) in the context of developing the sports industry (Triatmoko & Digidowisesiso, 2023).

### CONCLUSION

KONI Central Java Province has developed a resource management strategy to improve achievements in PON XXI/2024 Aceh-North Sumatra. This strategy includes four main elements: human resources, budget, facilities and infrastructure, and technology. Human resources, both administrators, staff, and athletes, are focused on improving competencies through continuous training. Budget management is acknowledged in a transparent and effective manner to ensure full support for operational and coaching needs. Facilities and infrastructure, including training facilities, are prepared to meet standards to support athletes' performance. In addition, the use of technology is improved for monitoring, evaluation, and data analysis which can accelerate the process of improving performance. With this strategy, Central Java is expected to achieve maximum results in PON XXI/2024.

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## The Right to Freedom: Nepal's Journey through History

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**ABSTRACT:** This article studies and reviews the historical evolution of the right to freedom in Nepal. It explores the key political events and constitutional developments that have contributed to the formation of the right to freedom in the country. The article tries to delve into topics such as the autocratic Rana rule, the abolishment of slavery, and sati practices. Furthermore, revolutions against Rana regimes such as anti-Rana movements, the rise and fall of the Panchayat system, and the Maoist insurgency are also discussed. The study also examines Nepal's constitutional history, from early efforts in the 1950s to the promulgation of the Constitution of Nepal 2072 which shines light on the right to freedom for Nepali citizens. The study aims to review the historical records, laws, and movements regarding civil liberties and human rights to understand the changes in Nepal's legal and social construct in the twenty-first century.

**KEYWORDS:** Right to Freedom, Human Rights, Constitution of Nepal, Rana Regime, Panchayat System

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### INTRODUCTION

The right to freedom is the right of an individual to do whatever one likes and wants to do; whether through actions or speech. The freedom should be bound by the law of the land, which basically changes from one country to another. The right to freedom is a fundamental Human Right of every individual, which is protected by international and national laws.

Fears (2007) examines the ideal and reality of freedom from various ages and concludes that freedom is an ideal consisting of three component ideals:

1. National Freedom
2. Political Freedom
3. Individual Freedom

At the national level, freedom can be defined as freedom from foreign control. According to Fears (2007), it is the desire of a nation, ethnic group, or tribe to rule itself. It can also be known as national self-determination. On the other hand, the freedom to vote, hold office, and pass laws can be defined as political freedom. It is the ideal of "consent of the governed" (Fears, 2007).

In its most basic form, individual freedom can be defined as the freedom to live according to one's own choice as long as one does not harm others, or another's nation, and each epoch in history (Fears, 2007). Individual freedom may hold different meanings for different individuals. It is freedom of conscience, freedom of speech, economic freedom, and freedom to choose one's lifestyle (Fears, 2007).

For one to be able to understand freedom properly, one must first have the knowledge about human rights. Human rights are inherent rights of every human. These include the right to life and liberty, the right to property, the right to freedom, the right to happiness, and the right to equality for all people. Moreover, human rights include social, cultural, and economic freedom such as freedom to participate in science and culture, work, and education.

One of the human rights is the right to freedom. Humans live in a society and in the present society people want to be independent and free. At present time it is not easy to chain a person with an invisible chain of slavery, poverty, duty, etc. People are more educated about their rights as humans, which is needed for both their personal and professional development.

### Right to freedom as a human right

Human rights could be generally defined as those rights that are inherent in our nature and without which we cannot live as human beings; so, we can say human right is a right that we get for being a human (Australian Human Rights Commission, 2013).

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These rights have been recognized in international laws and fundamental laws (constitutions) of different countries. Human rights are considered the basic rights that all persons are entitled to.

After World War II, by considering the needs of people, countries of the world gathered together and the Universal Declaration of Human Rights was formed which included the "Right to Freedom" (Universal Declaration of Human Rights, 2024).

### METHODOLOGY

This study is based on the doctrinal research method. Under the doctrinal approach, the methods that are adopted are descriptive, comparative, and analytical. Both primary and secondary sources of information have been collected, studied, and analyzed.

Information has been obtained from the following sources:

Books, articles, reports, official websites of different concerned organizations, internet sites, brochures, journals, etc.

### History of the Right to Freedom in the Context of Nepal

Following are the revolutions by Nepalese people for Freedom.

#### Rana Regime and Right to Freedom

In 1903 B.S, JBR came to power and became the all-powerful Prime Minister of Nepal (AawaajNews, 2020). In the course of the regime, the hereditary prime ministers held all the powers for themselves. They lived in luxury using the public's expenses. Further, they suppressed media, education, and foreign entities. Throughout the regime, the upcoming Rana prime ministers exercised absolute power. Their nature was so autocratic that the reforms they brought were either to expand their luxury or to sustain their autocracy. This led to a development of hatred and distaste for the system by the ordinary people (Pokhrel, 2023). Despite its autocratic rule, people had gained some freedom:

**Muluki Ain 1910:** A written law was made at that time by JBR. The Muluki Ain provided many rights but remained unsatisfactory.

**Abolishment of the sati system:** It is the custom in which the widow is placed on the pyre of her deceased husband and burnt alive (Sharma, 2023). Even though all the limitations on forcing pregnant women and women with young children to practice Sati of the Muluki Ain were imposed by JBR, it did not prohibit the practice completely. Subsequently, Bir Shumsher brought another rule that no woman can be declared as Sati without the permission of the prime minister, or in his absence the higher judicial and legal body (Sharma, 2023). Chandra Shumsher declared the abolition of this practice on 8th July 1920 (Sharma, 2023). His declaration mentioned that the person who encourages or helps or actually burns the Sati, would be sentenced to death for 'murder' (Sharma, 2023).

**Abolishment of the slavery system:** During the Rana regime, slavery was officially made illegal in 1925 (University of Central Arkansas, 2021). The comprehensive speech of Chandra Shumsher on Nov. 28, 1924, represented a genuine desire to abolish this inhuman practice (Shrestha, 2008). Despite the efforts, slavery continued for more than three-fourths of the century. While the constitution of 1990 (2047 B.S) granted the people freedom from slavery, serfdom, or forced labor in any form, there was slavery in the name of traditions like Haliya and Kamaiya and the Nepali society had to wait till July 17, 2000, for its official abolishment (Shrestha, 2008). The establishment of schools and colleges was also done in the Rana period.

#### Anti-Rana Movement

Later, the people were getting fed up with the tyrannical rule of the Ranas and the educated class started to give political awareness to the people against the despotic and totalitarian rule of Ranas. Some voices were raised against the Rana regime in an unorganized way after the First World War, but Chandra Shumsher suppressed them. He also suppressed anti-Rana movements like Makai Parva and Arya Samaj along with movements in the form of the charkha movement, library parva, and Jayatu Sanskritam gained momentum that made people more aware of their rights and encouraged the people to fight against the Rana rule (Kafle, Ghimire, & KC, 2024).

In 1993 B.S., Nepal Praja Parishad was formed by Nepalese democrats. King Tribhuvan, who was controlled by the Ranas, was dissatisfied with his position (University of Central Arkansas, 2021). So naturally, he was in the favour of the democrats. They were plotting and secretly scattering pamphlets against the Ranas. But unfortunately, the leaders of the Nepal Praja Parishad, Sukraraj Shastri and Dharmabhakta Mathema, were caught and executed on the charge of treason after the secret party and the plan was disclosed (University of Central Arkansas, 2021).

Padma Shumsher, the 9th Rana Prime Minister for the first time gave Nepal a written constitution called the "Government of Nepal Act 2004" to check up on the growth of the anti-Rana movement (Manandhar, 2019). This constitution included the right



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to freedom as a fundamental right in 'article 4' (Adhikari, 2023). But this constitution was not satisfactory and was not implemented so, this constitution did not stop the revolution of people.

Many leaders who were involved in the Indian campaign returned and became active in the anti-rana movement. The Nepal communist party, was formed in the year BS 2006 (Thapaliya, 2019). It was in the autumn of the same year when the Nepali National Congress and the Nepali democratic congress merged to form the Nepali Congress.

After the formation of the Congress party, funds were collected from both Nepal and India. It was putting together an army of its own — the Liberation Army (Pokhrel, 2023). The border regions suffered large-scale strikes from the liberation army. They were slowly extending their influence into many parts of the country. The situation in the country had been deteriorating. Mohan Shumsher sent his delegates to India for a talk when he started to realize that the revolution was getting out of control. Previously, such attempts were unsuccessful. The Rana delegates, Nepali congress, and King Tribhuvan signed the tripartite Delhi compromise with the active mediation of the Indian government on Falgun 1. The king then returned to the country on Falgun 7 in his position (Pokhrel, 2023). Then an election for the constituent assembly was agreed to be held that year. The event is marked as the event of democracy in the country.

After the introduction of democracy, the "The Nepal Interim Government Act, 2007" was formed. It was promulgated on 17<sup>th</sup> Chaitra 2007 B.S. It was divided into 7 parts, 73 articles, and 3 schedules. It made many provisions including the fundamental right of people which included the right to freedom of people of Nepal in 'Article 17[2(a-g)].'

### **Period 2007 to 2017**

Since the declaration of democracy in Nepal, party politics in Nepal started with Nepali Congresses' and Nepal Communist Party's leadership. The Delhi agreement was concluded with the committee to form a constitution having the nature of a republican one to rule over the state (South Asia Terrorism Portal, 2001). But, due to the various internal factors like conflict between and among the political parties regarding the authorities of the state and other misconceptions, they did not fulfill the committee made by themselves.

King Mahendra formed a commission to draft the constitution. It was said that the commission rejected the draft on the king's advice because, in those drafts, the executive and legislative rights were provided to the council of ministers rather than the king (Cowan, 2020). The fourth draft was accepted including the amendment in some points (Cowan, 2020).

In this way, Nepalese people got their 3<sup>rd</sup> constitution (Constitution of Nepal) which was a bit more democratic than the previous one. This democratic constitution was promulgated on 1st Falgun 2015 B.S. This constitution included the right to freedom of all citizens as a political right in 'Article 7(a-d)', but, it did not work in the favor of the general people, who still could not get their freedom back.

The King only aimed at having more powers to himself and the public was not considered important. The political parties were inexperienced at that time, leading King Mahendra to move to the extreme to seek more power in the country (Kharel & KC, 2024). People were unaware and there was a sea of illiteracy. Suspicion, disinterest from foreign powers and intervention, corruption, and procrastination were rising. By contrast, the new constitutional assembly was rife with bad blood between political parties. In such conditions, King Mahendra seized democracy and centralized all state powers to himself on 1st Poush, 2017 B.S and he initiated the party less panchayat system from 22nd Poush, 2017 B.S (Kharel & KC, 2024).

### **Panchayat system**

The party less Panchayat system of governance was introduced to Nepal. Even though people could vote for their leaders, the Panchayat system was built on an absolute monarchy and all powers were centralized to the king. Under this system, the King was the head and had the sole power behind all the governmental institutions including the Parliament and the Cabinet. The King banned political parties, and was the executive and military ruler as well. The King himself was in the position of the commander-in-chief. He possessed powers to appoint and dismiss judges of the Supreme Court, appoint members of the Public Service Commission, and change the Constitution as he pleased (Kharel & KC, 2024).

As the fourth constitution of Nepal, the constitution of Nepal 2019 B.S was formed, which included the right to freedom as a fundamental right in 'Article 11[2(a-d)] and gave constitutional recognition to the party-less panchayat system put into practice by King Mahendra.

### **Fall of Panchayat System**

There were many reasons behind the fall of the Panchayat rule. One of the main causes was that even though there were some rights and freedoms given to people in the constitution, it was not practically implemented (Khadka, 1986). The government suppressed any form of protests, but the public was slowly becoming more aware and literate (Khadka, 1986). The public was angered by this suppression. The government was focused on getting more power instead of working for the wellness of the



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citizens and the development of the country. Corruption was rampant in the country. The people were slowly becoming more aware and literate. The public was angered by this suppression from the Panchayat government. The government was focused on getting more power instead of working for the wellness of the citizens and the development of the country. Corruption was rampant in the country.

The constitution made in the panchayat system was promulgated on 1st Poush 2019 B.S, was amended in 2023 B.S, 2032 B.S and 2037 B.S and was finally abandoned by the public movement in 2046 B.S that restored the multi-party system in the country (Manandhar, 2019).

### **Public Movement I (2046)**

The public movement of 2046 B.S carried the sole purpose of throwing the autocratic Panchayat rule which was introduced in 1972 B.S by King Mahendra and bringing the essence of democracy back to the country through the re-establishment of a multi-party system.

The various communist factions united as one and formed the United Left Front. The Nepali Congress and the Nepal Communist Party set aside their different views and together, agreed to fight a revolution against the Panchayati system. The result was that the support from the general public for political parties was starting to increase. The people's movement was announced from 7<sup>th</sup> Falgun 2046 B.S and there were various strikes and protests all around the country. The citizens poured onto the streets disobeying the curfew set by the government (Gyanwali & Khanal, 2023). Finally, on 26<sup>th</sup> Chaitra 2046, King Birendra issued a radio broadcast and declared that the Panchayati system ended and democracy was re-established (Gyanwali & Khanal, 2023). The revolution of 2046 B.S. effectively ended the Panchayati rule.

Many achievements were gained through this movement and one of them was a democratic constitution promulgated in 2047 called the "Constitution of Kingdom of Nepal" which guaranteed fundamental rights like the right of freedom in 'Article 12[2(a-e)]'.

### **Rise of Maoists**

After the end of the panchayat system, Nepal had a democratic constitution and multi-party elections. People had expected that democracy would follow. However, it did not. Unemployment soared, and along with it, disillusionment and dissent. Certain social ills such as corruption, power-grabbing, internal quarreling, nepotism, favoritism, and political leaders who were more interested in personal gains than government stability contributed to widespread dissatisfaction with politics in Nepal, which might largely explain the fast-growing support for the Maoists' cause (Upreti, 2006).

Poverty, unemployment, regional disparities, dependency on foreign aid, unequal foreign trade relations, and slow and unequal development have also been considered reasons for the expansion of the support base for the Maoists. (Upreti, 2006). In 1994, they abandoned their legislative seats and their leaders went underground. Then in February 1996, they declared the People's War, claiming that only a communist state could solve the country's various social and economic ills, giving birth to Maoist Insurgency in the country (Upreti, 2006).

The Maoists started an armed insurgency amidst political instability from the remote hills of the mid-Western region and finally emerged as a threat to the Nepal government. The war against state power became widespread, and the Maoists were able to gain the support of the lower and middle classes.

### **People's Movement II (2062/2063)**

The Maoists armed struggle focused on liberating the people from the severe forms of economic, social, political, and gender oppression and discrimination. After the unfortunate royal massacre of King Birendra and his entire family on Jestha 19, 2058, King Gyanendra dismissed Sher Bahadur Deuba's government and centralized the executive authority in his hand (Shukla, 2005). After that, all political parties were against the palace and monarchy. The Seven Party Alliance (SPA) firmly agreed on the Maoists' twelve-point agreement. They agreed to prepare for the second phase of the mass movement in Mangsir 7th, 2062, and signed the agreement in Delhi (Sijapati, 2009). It led to the Mass Revolution II, which made King Gyanendra reinstate the dissolved House of Representatives. The leaders of the movement demanded the convening of a new Constituent Assembly and power to the people and the monarchy was ended. G.P. Koirala became the prime minister of the country. On Jestha 4th, 2063, a 25-point peace code of conduct agreement was signed between the government and the Maoist party (Sijapati, 2009). Last of all, the Comprehensive Peace Agreement was sealed on Mangsir 5th, 2063 B.S. between the then Prime Minister G.P. Koirala and the Maoist Chairman Prachanda. An interim Government was formed, and the days of unbridled monarchy were over (Sijapati, 2009). "The Interim Constitution of Nepal 2063" B.S was promulgated on 1<sup>st</sup> Magh 2063 B.S in the name of the people by the legislative parliament. This constitution established Nepal as a secular and republican state whose state power is inherent in the people and gives the right to freedom as a fundamental right to all citizens which was guaranteed in 'Article 13[2(a-f)]'.

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### Constitution of Nepal 2072

As the Interim Constitution of Nepal 2063 was made for a temporary period, we needed a permanent and dependable constitution so, "The Constitution of Nepal 2072" was promulgated.

Nepal is now governed according to the Constitution of Nepal, which came into effect on Sept 20, 2015 (Aswin 2, 2072) replacing the Interim Constitution of 2007 (2063). This constitution includes the provision of the right to freedom in Article 17[2(a-g)]. The Constitution was drafted by the Second Constituent Assembly following the failure of the First Constituent Assembly to produce a constitution in its mandated period (Ghimire, 2013).

### FINDINGS

- The right to freedom is a human right as well as a fundamental right.
- During the Rana regime, there were some notable reforms like the Muluki Ain (1910) and the abolition of the Sati and Slavery systems which contributed to development of right to freedom in Nepal.
- With the 1950 democratic revolution and the end of the Rana rule, Nepal experienced a new wave of democratic movements which were essentially movements for freedom of the citizens.
- The Panchayat system was founded on the monarch's complete authority which tried to seize the freedom of the citizens and form an autocratic government. In this system, only the King had all the authority when it came to the main structures of power such as Parliament and Cabinet. It did not help much for right to freedom.
- The Constitution of Nepal 2072 has guaranteed various freedoms to the citizens such as Freedom of Expression, Freedom of Association and others.

### CONCLUSION

Right to freedom is a vast topic. It's development in Nepal has been a remarkable journey. Nepal has seen changes in the right to freedom to the citizens. From sati system and slavery system being a common tradition in the society to providing the right to live with dignity in the country, Nepali citizens have come a long way to have this type of freedom. The political parties have seen a huge difference in how they could be established. During the monarchy and Rana regime, formation of political party was unthinkable or at the very least a really difficult task. With all powers centralized to a single entity, people could not express their views freely. In the latest constitution of Nepal, it has provided the right to association that provides each individual to form political parties and other associations. This is a dramatic change in the country.

Despite significant progress, many challenges still remain. Such as ensuring equitable access to these freedoms and addressing the remnants of historical inequalities. Gender inequality and discrimination on the basis of caste is still seen prevalent in many traditional societies. Government and citizens must work together to abolish these types of inequalities for the better development of the country.

Nonetheless, the journey of right to freedom in Nepal was not an easy one. Continuous determination and support of the mass helped to gain freedom in the country. Nepali citizens must continue to strive to ensure their fundamental right, if it ever gets violated. The study emphasizes that freedom cannot be ensured by just legal systems but needs a societal commitment that requires persistent effort and accountability.

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## The Effect of Skipping Rope and Box Jump Training Towards the Quality of Long Pass of Football Players Seen from the Leg Muscle Power



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**ABSTRACT:** This research aims to determine 1) the effect of skipping rope training on long passes of football players, 2) the effect of box jump training on long passes of football players, 3) the effect of skipping rope and box jump training on long passes of football players, 4) the difference in the effect of leg power on long passes of football players, and 5) analyze the interaction of skipping rope and box jump training and leg muscle strength towards long passes of football players. The type of this research was an experiment using a 2 x 2 factorial design. The method used a survey with a data collection technique using a long pass kicking ability test. The research population was the football athletes at SSB Mataram Utama U16 (U16 players of Mataram Utama Football School) totaling 16 students. Research sampling was carried out with total sampling or saturated samples. The instrument used to measure long passes used the Bobby Carlton long pass test and power used the Standing Board Jump. The data analysis technique used the paired sample t test, t test and two-way ANOVA test. The results of the first hypothesis test analysis obtain a t count value  $>$  t table (3.182), it can be concluded that there is an effect of skipping rope training on the quality of long passes of football players. The results of the second hypothesis test analysis obtain a t count value  $>$  t table (3.182), it can be concluded that there is a significant effect of box jump training on the quality of long passes in football. The results of the third hypothesis test study obtain a calculated F value = 4.763 and a significant value of 0.025, it can be concluded that there is a significant difference between skipping rope and box jump training on the quality of long passes. The results of the fourth hypothesis test study obtain a calculated F value = 24.583 and a significant value of 0.000, it can be concluded that there is a significant difference in the quality of long passes in terms of leg muscle strength. The results of the fifth hypothesis test study show that the interaction of skipping rope and box jump training and leg muscle strength on the quality of long passes have a significant value (0.005)  $>$  0.05. The results conclude that there is an interaction between skipping rope and box jump training and leg muscle strength on the quality of long passes

**KEYWORDS:** Skipping rope exercise, box jump, long pass quality, leg power, football

### I. INTRODUCTION

Football, widely regarded as one of the most popular sports today, captivates audiences with its unique blend of skill, determination, and dynamic action. The allure of the game lies in the players' ability to showcase technical ball control, exhibit intense effort, and employ strategic moves that often leave spectators in awe. A footballer is expected to possess fundamental skills and is required to master essential techniques in order to perform optimally on the field. As Putra and Hariyanto (2022) suggest, the core skills of football are defined by a player's ability to consistently demonstrate proficiency and successfully execute a variety of techniques essential to the sport. The physical condition requirement that is needed to achieve the maximum long pass target is leg muscle strength. The leg muscles are undeniably one of the most critical components for football players, particularly in executing kicking techniques [1]. Long pass is a technique that every soccer player must have. Long passes have the advantage of accelerating the flow of the ball from back to front compared to using a short pass. In addition, the long pass also has the disadvantage that the percentage of success received by team players is 50:50 compared to the short pass. We took an example at the EURO 2024 tournament yesterday, the long pass statistics were quite noteworthy, namely in the England vs Slovakia match, Kyle Walker took a total of 13 kicks with 8 successful kicks. Kyle made the highest total of long passes at EURO 2024 which was 60 kicks with 47 successful kicks.

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Long kicks are especially important in fast and aggressive types of play with long balls. A long kick is not just a simple kick. Physical aspects are required into perform long-distance ball kicking skills include running speed, step rhythm, agility, strength, and balance [2]. Leg muscle strength is a component that has an important role in the success of *long passing* in soccer games [3]. Leg muscle explosive power is important because player who want to kick long pass and want to know towards where the ball should go must pay attention to the explosive power of the leg muscle [4]. Some research at among them conducted by Mufti Alfian showed that there was an effect of leg *power* training on the quality of passing in football. And also research by Diky Pratama Putra showed the results of the effect of pliometric training on longpass in football. Based on the background that has been stated above, the researcher is interested in conducting research with the title shown above.

## II. MATERIAL AND METHOD

This research employs an experimental approach characterised by a 2 x 2 factorial design. According to Hardani et al. (2020: 353), factorial design serves as an adaptation of true experimental design, incorporating considerations for potential moderator variables that may influence the effects of the independent variable on the dependent variable. In this experimental study, two distinct groups were subjected to different treatments: one group received training involving skipping rope and box jumps, while the other experienced variations in power levels—high and low. Below is the proposed research design for this experimental investigation.

The place of research is at the Mataram Utama training field. The research time was conducted in May. *Treatment* was carried out with a frequency of training 2 times a week. In general, the population can be classified into three types, namely by population size, by population characteristics, and by other differences [5]. The population in this study were 16 soccer players at SSB Mataram Utama U16.

Population in research is very important, because it is a source of information. Experts have definitions that differ slightly from one another, but in principle have the same substance [6]. Sampling in this study was carried out using a *total sampling* technique or saturated sample, namely using the entire population of SSB Mataram Utama U16 soccer players to be sampled, totaling 16 players. Saturated sample itself is included in the part of *non-probability sampling*.

The leg muscle *power* test instrument uses the *Standing Board Jump* [7] for children aged 10 years to college students, men and women used to measure leg *power*, by jumping forward. The validity coefficient is 0.607 and reliability is 0.963 with a high category. For the *long pass* test instrument using the *Bobby Charlton* hull kick ability test has a reliability of 0.833 which is sought using the two-split formula, besides that it is also used by [8] which has a validity of 0.851 and a reliability of 0.823. The data analysis technique used in this study using SPSS 20 is by using *two-way ANOVA* (*two-way ANOVA*).

## III. RESULT AND DISCUSSION RESULT

The purpose of this study was to determine the effect of *skipping rope* and *box jump* training on the quality of *long pass* football players in terms of leg *power*. The description of the research results can be described as follows:

### 1. Data of Athletes Trained using Exercise Skipping Rope With High Power (A1B1)

The statistical results of research on athletes trained using *skipping rope* training with high *power* can be seen in the table below:

**Table 1. Data Statistics of Athletes Trained Using Skipping Rope Training with High Power**

Respondents	Pretest A1B1	osttest A1B1
A	37,88	40,23
B	35,55	39,5
C	40,21	44,15
D	33,32	35,22
Mean	36,74	39,77
Median	36,71	39,86
Mode	33.32	35.22
Std. Deviation	2,97	3,66
Minimum	33,32	35,22
Maximum	40,21	44,15

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Based on the results of the above research, the average value at *pretest* was 36.74, and the average *posttest* was 39.77. to determine the magnitude of the improvement in the quality of *long passes* of soccer players trained with *skipping rope* training with high *power* in this study using the percentage increase formula. Based on the results of the above research obtained an increase in the quality of *long passes* of soccer players trained with *skipping rope* training with high *power* obtained by 8.26%.

### 2. Data on Athletes Trained Using Box Jump With High Power (A2B1)

The results of statistical research data on athletes trained using *box jump* training with high *power* can be seen in the table below:

**Table 2. Data Statistics of Athletes Trained Using Box Jump Training With High Power**

Respondents	Pretest A2B1	Posttest A2B1
A	38,45	40,4
B	35,11	38,05
C	38,02	40,15
D	40,04	42,55
Mean	37,90	40,29
Median	38,23	40,27
Mode	35.11 <sup>a</sup>	38.05 <sup>a</sup>
Std. Deviation	2,06	1,84
Minimum	35,11	38,05
Maximum	40,04	42,55
Sum	151,62	161,15

Based on the results of the above research, the average value at *pretest* was 37.91, and the average *posttest* was 40.28. To determine the amount of *box jump* training with high *power* in this study using the percentage increase formula. Based on the results the above research obtained Box Jump training with high power was obtained 6.28%.

### 3. Data on Athletes Trained Using Skipping Rope with Low Power

The results of statistical research data on athletes trained using *skipping rope* training with low *power* can be seen in the table below:

**Table 3. Data Statistics of Athletes Trained Using Skipping Rope Training with Low Power**

Respondents	Pretest A1B2	Posttest A1B2
A	33,45	38,7
B	35,11	40,22
C	36,02	40,65
D	32,04	39,4
Mean	34,15	39,74
Median	34,28	39,81
Mode	32.04 <sup>a</sup>	38.70 <sup>a</sup>
Std. Deviation	1,77	0,86
Minimum	32,04	38,70
Maximum	36,02	40,65
Sum	136,62	158,97



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Based on the results of the above research, the average value obtained during the *pretest* was 34.15, and the average *posttest* was 39.74. To determine the magnitude of the increase in athletes trained using *skipping rope* training with low *power* in this study using the percentage increase formula. Based on the results of the above research, the increase in athletes trained using *skipping rope* training with low *power* was obtained at 16.36%.

### 4. Data of Athletes Trained Using Exercise Box Jump with Low Power

The research results of athletes trained using *box jump* training with low *power* can be seen in the table below:

**Table 4. Data Statistics of Athletes Trained Using Box Jump with Low Power**

Respondents	Pretest A2B2	osttest A2B2
A	30,25	32,45
B	33,45	35
C	35,11	37,11
D	35,75	38,05
Mean	33,640	35,65
Median	34,28	36,05
Mode	30.25 <sup>a</sup>	32.45 <sup>a</sup>
Std. Deviation	2,46	2,48
Minimum	30,25	32,45
Maximum	35,75	38,05
Sum	134,56	142,61

Based on the results of the above research, the average value obtained during the *pretest* was 14.05 and the average *posttest* was 13.62. To determine the magnitude of the increase in athletes trained using *box jump* training with low *power* in this study using the percentage increase formula. Based on the results of the above research obtained an increase in athletes trained using *box jump* training with low *power* obtained by 5.98%.

### Normality Test

The purpose of the normality test is to determine whether the data obtained from each variable being analyzed actually follows a normal distribution pattern or not. The variable normality test was carried out using the *Saphiro Wilk* formula. The rules used to determine whether a distribution is normal or not are  $p > 0.05$  the distribution is normal, and if  $p < 0.05$  the distribution is abnormal.

**Table 5. Normality Test**

Variables		<i>p</i>	<i>Si g.</i>	Description
Group 1 (A1B1)	<i>Pretest</i>	0,968	0,05	Normal
	<i>Post test</i>	0,873	0,05	Normal
Group (A2B1) 2	<i>Pretest</i>	0,679	0,05	Normal
	<i>Post test</i>	0,824	0,05	Normal
Group (A1B2) 3	<i>Pretest</i>	0,834	0,05	Normal
	<i>Post test</i>	0,820	0,05	Normal
Group (A2B2) 4	<i>Pretest</i>	0,466	0,05	Normal
	<i>Post test</i>	0,720	0,05	Normal

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From the table above, it shows that the significance value ( $p$ ) of all variables is greater than 0.05, so the data is normally distributed. Because all data are normally distributed, the analysis can proceed with parametric statistical analysis.

### Homogeneity Test

The homogeneity test is useful for testing the similarity of the sample is same of not, the variant of the sample taken from the population. The criteria for homogeneity if the significant level of the count ( $p$ ) > 0.05 is declared homogeneous, if the significant level of the count ( $p$ ) < 0.05 the test is said to be inhomogeneous. The results of the homogeneity test of this study can be seen in the following table:

**Table 6. Levene's Test of Equality of Error Variances**

F	df1	df2	Sig.
2,816	3	12	0,394

Based on the data table above, the value of the significant level (0.394) > 0.05 can be concluded that the variance is homogeneous.

### Hypothesis Test

#### 1. First Hypothesis

The first hypothesis test in this study is to determine the effect of *skipping rope* training on the quality of *long passes* of soccer players in this study using the t test (*Paired sample t test*).

Pretest - posttest	df	t table	t Count	P	Sig 5 %
High power	3	3,18 2	5,69 0	0, 011	0,05
Low power	3	3,18 2	9,22 7	0, 003	0,05

Based on the results of the t test analysis above, the value of  $t_{count} > t_{tabel}$  (3.182), and the value of  $p <$  from 0.05, these results indicate that the value of  $t_{count}$  is greater than  $t_{tabel}$ , thus it means that there is an effect of *skipping rope* training on the quality of *long pass* football players.

#### 2. Second Hypothesis

The second hypothesis test in this study is to determine the significant effect of *box jump* training on the quality of *long passes* of soccer players in this study using the t test (*paired smpel t test*).

Pretest - posttest	df	t table	t Count	P	Sig 5%
High power	3	3,18 2	10,8 57	0,002	0,05
Low power	3	3,18 2	12,1 02	0,001	0,05

Based on the results of the t test analysis above, the value of  $t_{count} > t_{tabel}$  (3.182), and the value of  $p <$  from 0.05, these results indicate that the value of  $t_{count}$  is greater than  $t_{tabel}$ , thus meaning that there is a significant effect of *box jump* training.

#### 3. Third Hypothesis

Hypothesis testing was conducted to determine the significant difference between *skipping rope* and *box jump* training on *long pass* quality. Hypothesis testing in this study used *two-way* variance analysis (*Two Way Anova*) at a significant level  $\alpha = 0.05$ .

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	31.176	3	10,392	14,295	,000
Intercept	169,455	1	169,455	233,090	,00 0
Power Limbs	17,872	1	17,872	24,583	,00 0

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Exercise	4,763	1	4,763	6,552	,025
Leg power* Exercise	8,541	1	8,541	11,748	,005
Error	8,724	12	,727		
Total	209,355	16			
Corrected Total	39,900	15			

Based on the results of the research on the F test and the results of table 7 above, the results obtained the value of F count = 4.763 and a significant value of 0.025, these results show that the significance value is smaller than the level  $\alpha = 0.05$  so that it can be interpreted if there is a significant difference between *skipping rope* and *box jump* training on *long pass* quality.

4. Fourth Hypothesis

Testing the fourth hypothesis in this study to determine significant differences in *long pass* quality in terms of leg muscle strength, using *two-way* variance analysis (*Two Way Anova*) at a significant level  $\alpha = 0.05$

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	31.176 <sup>a</sup>	3	10,392	14,295	,000
Intercept	169,455	1	169,455	233,090	,000
Power Limbs	17,872	1	17,872	24,583	,000
Exercise	4,763	1	4,763	6,552	,025
Leg power* Exercise	8,541	1	8,541	11,748	,005
Error	8,724	12	,727		
Total	209,355	16			
Corrected Total	39,900	15			

Based on the results of the research on the F test and the results of table 8 above, it can be obtained that the value of F count = 24.583 and the significant value is 0.000. these results show that the significance value is smaller than the level  $\alpha = 0.05$  so that it can be interpreted if there is a significant difference in the quality of *long passes* in terms of leg muscle power.

5. Fifth Hypothesis

The fifth hypothesis test is to determine the interaction of *skipping rope* and *box jump* training and leg muscle strength on *long pass* quality. This hypothesis test uses two-way ANOVA.

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	31.176 <sup>a</sup>	3	10,392	14,295	,000
Intercept	169,455	1	169,455	233,090	,000

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pt	5		55	90	0
Power	17,872	1	17,87	24,58	,00
Tungka			2	3	0
i					
Exercise	4,763	1	4,763	6,552	,02
					5
Power	8,541	1	8,541	11,74	,00
limbs				8	5
*					
Exercise					
Error	8,724	1	,727		
		2			
Total	209,35	1			
	5	6			
Correct	39,900	1			
ed		5			
Total					

The results of the research in the table above show that the interaction of *skipping rope* and *box jump* training and leg muscle power on the quality of *long passes* (\*) has a value of 0.05, 0.05 and 0.05, respectively.

### DISCUSSION

Various kinds of basic techniques that exist in soccer games, one of which is the *long pass* kick. This *Long Pass* is a form of long distance pass kick to teammates, to do a good *long pass* a soccer player must have good physical condition, namely leg power and accuracy in fielding. Therefore there needs to be intensive training to support the improvement of long passes

### IV. CONCLUSION

Based on the results of the research and the previous discussion, it can be obtained:

1. Based on the results of the analysis of the first hypothesis test, the value of  $t_{count} > t_{tabel}$  (3.182), it can be concluded that there is an effect of *skipping rope* training on the quality of *long passes* of soccer players.
2. Based on the results of the analysis of the second hypothesis test, the value of  $t_{count} > t_{tabel}$  (3.182), it can be concluded that there is a significant effect of *box jump* training on the quality of *long pass* football.
3. Based on the results of the third hypothesis test research, the results of the F value count = 4.763 and the significant value is 0.025, it can be concluded that there is a significant difference between *skipping rope* and *box jump* training on *long pass* quality.
4. Based on the results of the fourth hypothesis test research, the value of F count = 24.583 and a significant value of 0.000, it can be concluded that there is a significant difference in the quality of *long passes* in terms of leg muscle strength.

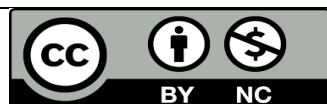
The results of the research on the fifth hypothesis test showed that the interaction of *skipping rope* and *box jump* training and leg muscle strength on the quality of the *long pass* (\*) had a significant value (0.005) > 0.05. These results concluded that there was an interaction of *skipping rope* and *box jump* training and leg muscle strength on the quality of *long passes*.

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## Analysis of the Skills of Petanque in Sleman Regency

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**ABSTRACT:** Mastery of basic skills must be possessed to achieve performance, including on Petanque. This research is held to analyze skills of Petanque in Sleman regency. The research is a quantitative research that describes research results found. Data collecting technique is held in some steps, they are preparation of instruments for shooting and pointing, and the second step is collecting data in the field by using observation and taking notes of results reached by the samples. Samples of the research are the 18 Petanque athletes in Sleman regency which are elected by using purposive sampling technique. Data analysis technique in the research is frequency descriptive analysis technique using 5 categorizations. The result of data analysis shows that pointing skill is 29.61, and shooting skill is 24.28. Based on the result of data analysis, we can conclude that basic skills of Petanque in Sleman regency is fair for pointing and poor for shooting. The research result can be used for evaluation to the committees, coaches, and the athletes in applying appropriate approaches and methods of practice in order to achieve better achievement.

**KEYWORDS:** petanque, shooting skills, pointing skills.

### INTRODUCTION

Petanque is a traditional sport from France and copied by Fédération Internationale de Pétanque et Jeu Provençal (FIPJP). Petanque is done by throwing an iron ball as near as with a wooden ball that is called as jack in the distance of 6 to 10 meters, and the legs have to stand in a small circle. This sport has 13 numbers of match. To win the match, the player should have the skills of pointing and shooting (Suwiwa et al., 2022). Pointing is done to make the iron ball get as close as possible to the wooden ball (jack), while shooting skill is done to set apart the iron ball from the jack or remove the iron balls around the jack. The player can do them in both squat and stand-up positions in a small circle.

In Petanque, a player can be as a pointer or shooter or a middle (pointing-shooting). By having those roles, it will be easier to have a team based on the player composition needed. In fact, there are many coaches that give a training to the athletes homogeneously without paying attention to their strength. More tournaments and competitions held, it needs to have a consistent evaluation and can be measured to determine the player's skills in competitive level. Petanque skill test can be used to know and evaluate the process of the training done by an athlete.

Test and measurement will help a coach to hold a more specific training program based on the athletes' ability in their role as a pointer, shooter, and a middle as well. Besides, a test and measurement can be used to evaluate the athletes' weaknesses in a certain distance. Therefore, a more effective and efficient training is needed in order to get a better result (Phytanza et al., 2022). A test is held to classify, find a better training method, measure the athletes' progress, and to assess objectively.

The test of Petanque is important for selecting and athlete breeding (Sutrisna et al., 2018). The test of sport skills can be used to monitor the athletes progress time by time. It gives a better understanding about how far practice and training can contribute to the improvement of skills and performance of sport. Therefore, skill assessment will ease a Petanque coach in measuring the Petanque athletes objectively so that the choosing of talented athletes will be optimal.

A research that uses a deep analysis mechanism to the basic skill or Petanque is done by (Cahyono & Nurcholis, 2018) analyze back swing and release shooting carreau in the shooting distance of 7 meters. A research about the effectivity assessment of a certain equipment in shooting accuracy improvement was also held by (Lubis et al., 2021). Some those researches have not held a comprehensive on the athletes' basic competence so that the difference with the research that will be held is to have a deep analysis to overall Petanque basic techniques.

The research is expected to be a comprehensive beginning base in deciding Petanque athlete's practice program, as a



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recommendation for the athletes and coaches about the basic technique that needs further improvement. The purpose of the research is to know the Petanque athletes' skills in Sleman regency in shooting and pointing. The choosing of the two components is held since shooting and pointing skills in Petanque are the basic skills that must be mastered by the athletes.

### RESEARCH METHODS

According to the design used in the research, the variables in the research is the skill in Petanque. The focus in the research is pointing and shooting in playing Petanque.

### RESULTS AND DISCUSSION

The research result that is analyzed by using frequency distribution analysis technique shows that the highest score for pointing is 45 with the average of 29.61, while the lowest score is 17. Besides, the highest pointing score is 49 with the average of 27.27, while the lowest score is 11.

Table 1. The Distribution of Petanque Athletes' Score of Sleman Regency

	Amount of the sample	Highest score	Lowest score	Average	Deviation standard	Category
Pointing	18	45	17	29.61	7.85	Fair
Shooting	18	49	11	27.27	7.20	Fair

#### 1. The analysis of Pointing Skill Frequency Distribution

From the test and measurement of the 18 athletes, it is found that the lowest pointing score is 17, while the highest pointing score is 45, and the average is 29.61.

Table 2. The Analysis of Pointing Skill Frequency Distribution

No	Interval	Category	Frequency	Percentage
1	$41.06 < X$	Very high	1	6%
2	$33.43 < X < 41.06$	High	5	28%
3	$25.80 < X < 33.43$	Fair	7	39%
4	$18.16 < X < 25.80$	Low	4	22%
5	$X < 18.16$	Very low	1	6%
Total			18	100%

The pointing skill of Petanque athletes of Sleman regency in the category of "fair" has the biggest proportion, that is 39% or 7 athletes, while in the category of "high" is 28% or 5 athletes, and 22% are in the category of "low". According to the average of 29.61, it can be concluded that pointing skill of Petanque athletes of Sleman regency is "fair".

#### 2. Analysis of Shooting Skill Frequency Distribution

The measurement of shooting skill uses the same sample of 18 athletes. According to the measurement of shooting skill, it can be found that the lowest score of shooting skill is 11, while the highest score is 49, and the average of shooting score is 27.28.

Tabel 3. Distribusi Frekuensi Keterampilan Shooting Atlet Petanque

Number	Interval	Category	Frequency	Percentage
1	$44.99 < X$	Very high	1	6%
2	$35.66 < X < 44.99$	High	1	6%
3	$26.34 < X < 35.66$	Fair	5	28%
4	$17.01 < X < 26.34$	Low	6	33%
5	$X < 17.01$	Very Low	5	28%
Total			18	100%

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The categorization shows that athletes that are in the category of “very low” is 28% or 5 athletes, however there are many athletes that are in the category of “low”, that is 33% (6 athletes). Besides, in the category of “high” is 6% or 1 athlete, and in another category, the percentage is less than the categories described before. When it is reviewed from the average, that is 27.28, the shooting skill of Petanque athletes’ of Sleman regency is in the category of “fair”.

Based on the percentage descriptive analysis by using the five categorizations, there should be an attention especially for Sleman regency Petanque coach and committee, because the basic skill of Petanque as the measuring variable in the research is the absolute skill that athlete has own. According to the athletes’ skill that are in the category of “fair”, it can not be reliable to achieve the higher achievement. The accomplishment of Petanque depends on a lot of factors, for instance the physical factor or the anthropometry and the physical condition of the athlete, such as the height, balance, wrist, arm length, accuracy and eyes coordination with the hand (Badaru et al., 2021; Hanief & Purnomo, 2019; Rabani & Nurhidayat, 2021). Besides, the elevation standpoint of each movement of hand in pointing and shooting will take effect very much (Cahyono & Nurcholis, 2018).

The result of the study proves that in playing Petanque is not as simple as what we imagine, in which we only throw the iron ball and easily get the point. It needs a concentration and physical components that are proper to get the achievement, as it is needed in the other sports.

Petanque also needs practices like the other sports, such imagery practice. By doing imagery practice, the athlete’s shooting skill in Petanque will be better, compared to athlete with no imagery practice (Dini & Syafutra, 2021; Lubis & Permadi, 2020). There are many factors that are influential on the achievement of skill in playing Petanque, especially on pointing and shooting skill. The research is held only to describe the basic skill of Petanque in general and does not discuss about the support so that the skill can be done well. Next, a research study about athlete’s psychological and physiological condition will be held so that it can support the athletes’ performance in pointing and shooting skill, so that it can extend the field of study deeper in the research. The implication of the research is expected to be able to be a reference for the coach in coaching Petanque, moreover on the step of athlete recruitment, by paying attention to the two components, shooting and pointing.

## CONCLUSION

According to the data analysis and the discussion, we can conclude that the skills of Petanque athletes of Sleman regency in both shooting and pointing are in the category of “fair”, so it needs some refinement in both skills to achieve a better performance. The result of the research can be used as the evaluation material for the athletes and coach to revise the techniques, practice programs, and approach done in the practices as well. Besides, the result of the research can be a new section to hold a deeper research about the skills of Petanque, especially pointing and shooting techniques.

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## Artificial Intelligence in Dentistry: The New Opportunity to Discover



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**ABSTRACT:** Artificial intelligence (AI) is revolutionizing the field of dentistry by enabling advanced diagnostic, treatment planning, and procedural precision. From automated radiographic analysis to robotic-assisted surgeries, AI technologies enhance efficiency and accuracy in patient care. AI-powered imaging tools improve early detection of oral diseases, such as caries, periodontal conditions, and malignancies, by analyzing patterns beyond human capability. In restorative dentistry, AI aids in designing prosthetics and optimizing implant placement with unprecedented precision, reducing complications and improving patient outcomes. Robotic surgery systems leverage AI for minimally invasive procedures, offering greater accuracy, reduced operative times, and safer manipulation of delicate anatomical structures. Additionally, AI facilitates personalized treatment by analyzing large datasets to tailor interventions to individual patient needs. Its applications extend to patient management systems, streamlining appointment scheduling, and predictive analytics for treatment outcomes. As AI continues to evolve, ethical considerations, data privacy, and training integration remain critical for its successful adoption. The synergy between AI and dentistry promises a transformative impact, enhancing both clinical practice and patient experience. This review helps us to recognize the artificial intelligence application in different fields of dentistry.

### INTRODUCTION

The term artificial intelligence (AI) describes computer programs that are able to carry out sophisticated operations that were previously exclusive to humans, such as problem-solving, thinking, and decision-making.

These days, "AI" refers to a broad spectrum of technologies that underpin many of the products and services we use on a daily basis, from chatbots that offer real-time customer care to apps that suggest TV series. During the 1956 Dartmouth conference, John McCarthy first proposed artificial intelligence, or AI as it is now more often known. 2. The simulation of human intelligence processes by machines, particularly computer systems, is known as artificial intelligence (AI). AI uses machines and computers to simulate how the human mind makes decisions and solves problems. 3. Artificial intelligence's history dates back to the era when the question "Are machines capable of thought?" The final three decades of the 20th century saw a lull in the development of artificial intelligence. One Numerous industrial domains, including financial analysis, smart cities, robots, and cars, have embraced artificial intelligence. Medical and dental imaging diagnostics, decision support, precision and digital medicine, drug development, wearable technology, hospital monitoring, and robotics are just a few examples of how it has been applied in these fields. AI is frequently seen as a useful tool to assist clinicians and dentists in lightening their workload. AI may learn from various information sources (multi-modal data) to identify diseases beyond human capabilities, in addition to diagnosing diseases using a single information source targeted at a particular ailment.. For example, fundus photographs with other medical data such as age, gender, BMI, smoking habits, blood pressure, and the likelihood of diabetes has been used to predict heart disease.<sup>2</sup>

AI in dentistry has begun to take off in recent years, just like in other industries. Applications of AI in dentistry can be divided into four categories: diagnosis, treatment planning, decision-making, and result prediction. The most widely used AI use in dentistry is for diagnosis. AI can diagnose patients more quickly and accurately, which will lessen the strain for dentists. On the one hand, dentists are using computer systems more and more to make choices. Conversely, dental computer programs are growing increasingly sophisticated, precise, and dependable. AI research is now being conducted in all areas of dentistry.<sup>3</sup>. AI applications in the dental field are still very new. Nonetheless, the advancement of these technologies has affected dental imaging, robotic

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assistance, and diagnostics, caries detection, radiography and pathology, and electronic recordkeeping. In line with the expansion of other dental specialties, endodontic AI research has increased.<sup>4</sup>

This review will enlighten the latest advancement in the field of dentistry and will help us to utilize its potential benefits and cope with the challenges in upcoming future with its application.

### **Participation of Artificial Intelligence in Dentistry**

The field of dentistry has witnessed a significant surge in the adoption of artificial intelligence (AI) technologies in recent years. AI can assist dentists in various aspects, such as streamlining clinical documentation, aiding in diagnostic processes through image analysis, and supporting clinical decision-making, including treatment planning and execution. Research highlights numerous advantages of AI in dentistry, particularly its ability to integrate data from imaging techniques with other sources, such as clinical records and patient histories. This capability enhances diagnostic accuracy. However, the widespread implementation of AI in dentistry remains a topic of debate, as recent studies have flagged concerns about possible adverse effects<sup>5</sup>.

AI is also enhancing imaging quality, which contributes to more accurate diagnoses and effective treatment planning. For instance, the introduction of CBCT technology has proven beneficial for both dentists and patients. It allows precise measurements, such as identifying canal locations, evaluating the proximity of teeth to the mandibular canal, and assessing bone availability for implants. These advancements have led to reduced procedure times and less invasive treatment approaches<sup>6</sup>.

### **Role of Artificial Intelligence in Patient Management**

#### **Administrative Support**

Artificial intelligence (AI) streamlines administrative tasks in dental practices, such as scheduling and organizing routine appointments to suit both patients and dentists. It also simplifies handling paperwork and insurance processes. AI can manage complex responsibilities, such as alerting dentists about a patient's allergies or medical conditions and sending reminders for smoking cessation programs. Additionally, AI has proven effective in emergency teleassistance during dental crises, particularly when healthcare providers are unavailable<sup>7</sup>.

#### **Diagnosis and Treatment of Dental Diseases**

AI is widely used in maxillofacial radiography to improve diagnostic accuracy. Techniques like Artificial Neural Networks (ANNs) are applied for classification, detection, and segmentation. Classification helps determine the presence or type of pathology, detection identifies disease progression, and segmentation isolates anatomical structures or abnormalities in images from modalities such as X-rays, CT, MRI, and ultrasound<sup>8</sup>. AI facilitates diagnosing conditions like dental caries, periodontal disease, odontogenic cysts, and temporomandibular joint disorders by combining clinical and radiological data to suggest differential diagnoses<sup>9</sup>.

#### **Restorative Dentistry**

AI plays a critical role in restorative dentistry, particularly in detecting dental caries. Studies highlight its effectiveness in screening for caries using various techniques. In root canal therapy, AI assists in determining appropriate working lengths, preventing complications like apical foramen damage or inadequate microbial control<sup>10</sup>. Additionally, AI enhances the detection of vertical root fractures, particularly with CBCT data, which outperforms traditional radiography. A dynamic navigation system proposed by Chong et al. in 2019 combines CBCT with AI to guide drill paths for precise procedures<sup>11</sup>.

#### **Prosthetic Dentistry**

AI has transformed prosthetic dentistry by integrating anthropometric data, patient preferences, and digital design systems. Tools like RaPiD combine computer-aided design (CAD) with knowledge-based systems for crafting esthetic dental prostheses. From crowns to bridges, AI-powered algorithms aid in fabricating fixed and removable dental prosthetics<sup>12</sup>. In implant planning, AI merges CBCT and intraoral scans to map the mandibular canal and evaluate bone height, enabling precise placement. AI also streamlines the design and production of maxillofacial prostheses, ensuring functional and aesthetic restoration for patients with facial injuries or abnormalities<sup>13</sup>.

#### **Implant Dentistry**

In implantology, AI supports every stage, from diagnosis to restoration. It creates 3D jaw and tooth models, automates tooth segmentation, and provides guided implant placement. AI also predicts implant outcomes, monitors implant health, and anticipates maintenance or replacement needs. These innovations enhance treatment accuracy and long-term success rates<sup>14</sup>.

#### **Orthodontics**

AI assists in orthodontic treatment planning and future needs assessment. Thanathornwong et al. demonstrated that AI could analyze data from adolescents (ages 14–19) to predict future orthodontic needs by correlating variables like overjet, overbite, and crossbite<sup>15</sup>. For complex cases, AI models, including deep learning (DL), detect asymmetries in the maxilla, aiding treatment of conditions like cleft lip and palate<sup>16</sup>.

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### Oral Surgery

The development of robotic-assisted surgery is one of AI's most significant contributions to oral surgery. AI-driven systems enhance accuracy in procedures such as dental implant placement, tumor removal, biopsies, and TMJ surgeries. Image-guided cranial surgery reduces operation time, improves precision, and ensures safe handling of delicate structures. Robotic surgeons, supervised by human experts, perform semi-automated surgeries, offering improved outcomes even in challenging scenarios<sup>17</sup>.

### CONCLUSION

**Artificial intelligence (AI) is revolutionizing the field of dentistry**, offering numerous benefits that enhance both clinical care and operational efficiency. From improving diagnostic accuracy through advanced imaging analysis to enabling personalized treatment plans and even assisting in complex dental procedures, AI is proving to be a powerful tool for dental professionals. It aids in reducing human error, predicting dental conditions before they become severe, and streamlining administrative tasks, allowing dentists to focus more on patient care.

However, as with any technological advancement, the integration of AI in dentistry comes with challenges, including data privacy concerns, the need for proper training, and ethical considerations regarding the potential for bias. To fully realize the benefits of AI, dental professionals must embrace its capabilities while ensuring that proper safeguards are in place.

Looking ahead, the future of AI in dentistry is bright, with continued innovation expected in diagnostic tools, robotic systems, personalized care, and patient experience. As technology evolves, AI has the potential to not only improve patient outcomes but also shape the future of dental practice, education, and research, making dentistry more efficient, accessible, and effective for everyone.

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## Ease of Establishment of Micro and Small Business Individual Companies in Supporting Tourism Businesses after the Enactment of the Job Creation Law



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**ABSTRACT:** To support the economic growth of the Indonesian people in general and the Balinese people in particular, most of whom are in the tourism sector, the Government has enacted several laws and regulations, including Law Number 11 of 2020 concerning Job Creation. The enactment of the Job Creation Law provides discretion to micro and small businesses in terms of establishing a legal entity whose establishment does not require a notary deed, and even the founder and shareholder only need one person. Companies that meet the criteria for micro and small businesses will receive the facilities as stipulated in the Job Creation Law. This will be very beneficial for Shareholders of Individual Companies.

**KEYWORDS:** Legal Entity, Individual Company, Limited Liability Company, Job Creation Law

### 1. BACKGROUND

Tourism business is one of the businesses relied on by the majority of Balinese people who are one of the tourist destinations of choice for the world community. Bali managed to get fourth place in the 2020 Popular Destinations in the World award because it is considered like a fantasy. In addition to offering its natural beauty, Bali is also fully supported by supporting tourism facilities. The tourism sector in Indonesia has grown and developed into a very important industry, and can be relied on to increase the country's foreign exchange. Due to the rapid number of tourists enjoying tourist attractions in Indonesia, here are some types of tourism service businesses that are most in demand in Indonesia in general, especially Bali.

Tourism service businesses are one of the most potential business opportunities in Indonesia. In fact, almost all tourism services in Indonesia are in great demand. The popularity of this business cannot be separated from the fact that Indonesia has extraordinary natural beauty, along with the diversity and uniqueness of its culture which is now an attraction for domestic and foreign tourists.

To support the economic growth of the Indonesian people in general and the Balinese people in particular, the Government has enacted several laws and regulations, including Law Number 11 of 2020 concerning Job Creation. Throughout 2021, the Constitutional Court has conducted a judicial review of the Job Creation Law 11 times. A year after it was submitted, in November 2021 the Constitutional Court then stated that Law Number 11 of 2020 was conditionally unconstitutional. The Constitutional Court considered Law Number 11 of 2020 to be formally flawed because the discussion process did not comply with the rules and did not fulfill the element of openness. In the decision, the Constitutional Court gave the lawmakers time to revise its contents within two years from the time the decision was read.

The Constitutional Court considered the Law to be formally flawed because the discussion process did not comply with the rules and did not fulfill the element of openness. In the decision, the Constitutional Court gave the lawmakers time to revise its contents within two years from the time the decision was read. This confirms that if no improvements are made within two years, the Job Creation Law will automatically be declared permanently conditionally unconstitutional. In response to the Constitutional Court's decision, the Government then issued Government Regulation in Lieu of Law Number 2 of 2022 concerning Job Creation on December 30, 2022, which was then officially changed into a law after being ratified by the DPR in the 19th plenary

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session of Session Period IV of the 2022-2023 session year into Law Number 6 of 2023 concerning the Stipulation of Government Regulation in Lieu of Law Number 2 of 2022 concerning Job Creation into Law.

The Job Creation Law was formed with the hope of job creation in accordance with the objectives stated in Article 3 letter a of the Job Creation Law, namely creating and increasing employment opportunities by providing easy protection and empowerment for Cooperatives and Micro, Small and Medium Enterprises as well as national industry and trade as an effort to be able to absorb the widest possible Indonesian workforce while still paying attention to balance and progress between regions in the national economic unity. The initial paragraph emphasizes Cooperatives and Micro, Small and Medium Enterprises, so that it is interpreted that Cooperatives and Micro, Small and Medium Enterprises will be the focus for receiving special treatment in terms of ease of doing business and facilitation from the government, especially from Financing Institutions. Regarding tourism, with the existence of the Job Creation Law, it is hoped that a new business entity will be created that can increase economic growth in the tourism business sector, by forming a limited liability company. The enactment of the Job Creation Law provides facilities or convenience for the community in establishing a Limited Liability Company.

### **2. METHODS**

The research method used to compile this article is to use normative legal research. Normative legal research is research aimed at obtaining objective law (legal norms), namely by conducting research on legal issues and obtaining subjective law (rights and obligations) (Hardijan Rusli, 2006 : 50). Normative legal research in this paper is to study document studies, namely using various secondary legal materials such as legislation, legal theory, and can be in the form of scholars opinions relating to the subject matter

### **3. RESULT AND DISCUSSION**

#### **Types of Tourism Businesses in Indonesia**

Tourism is a dynamic activity that involves many people and enlivens various business fields. Tourism is regulated in a separate Law, namely Law Number 10 of 2009 concerning Tourism (hereinafter referred to as the Tourism Law). Article 1 number 3 states that Tourism is a variety of tourism activities and is supported by various facilities and services provided by the community, entrepreneurs, the Government, and the Regional Government. Furthermore, Article 1 number 4 regulates that Tourism is all activities related to tourism and is multidimensional and multidisciplinary in nature that emerges as a manifestation of the needs of each person and country and the interaction between tourists and the local community, fellow tourists, the Government, the Regional Government, and entrepreneurs. Regarding Tourism businesses, it is regulated in Article 1 number 7 of the Tourism Law which stipulates that Tourism Business is a business that provides goods and/or services to fulfill the needs of tourists and organize tourism.

Article 14 paragraph (1) of the Tourism Law explains that the scope of tourism business types includes:

- a. Tourist attractions are businesses whose activities manage natural tourist attractions, cultural tourist attractions, and artificial/human-built tourist attractions.
- b. Tourism areas are businesses whose activities build and/or manage areas with a certain area to meet tourism needs.
- c. Tourism transportation services are special businesses that provide transportation for tourism needs and activities, not regular/public transportation.
- d. Tourism travel services are travel bureau businesses and travel agent businesses. Travel bureau businesses include travel planning services and/or services and organizing religious trips. Travel agent businesses include travel reservation services, such as ticket reservations and accommodation reservations and handling travel documentation.
- e. Food and beverage services are food and beverage provision services equipped with equipment and supplies for the manufacturing process, which can be in the form of restaurants, cafes, catering services, and bars/drink shops.
- f. Accommodation provision is a business that provides lodging services that can be equipped with other tourism services. Accommodation provision businesses can be in the form of hotels, villas, tourist cottages, campsites, caravan stops, and other accommodations used for tourism purposes.
- g. Organizing entertainment and recreation activities is a business whose scope of activities is in the form of performing arts businesses, game arenas, karaoke, cinemas, and other entertainment and recreation activities aimed at tourism.
- h. Organizing meetings, incentive trips, conferences, and exhibitions is a business that provides services for a meeting of a group of people, organizing trips for employees and business partners as compensation for their achievements, and organizing exhibitions in order to disseminate information and promotion of goods and services on a national, regional, and international scale.

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- i. Tourism information services are businesses that provide data, news, features, photos, videos, and research results regarding tourism that are distributed in the form of printed and/or electronic materials.
- j. Tourism consulting services are businesses that provide advice and recommendations regarding feasibility studies, planning, business management, research, and marketing in the tourism sector.
- k. Tour guide services are businesses that provide and/or coordinate tour guides to meet the needs of tourists and/or travel agencies.
- l. Water tourism is a business that organizes water tourism and sports, including the provision of facilities and infrastructure and other services that are managed commercially in sea waters, beaches, rivers, lakes, and reservoirs.
- m. Spa is a treatment business that provides services with a combination of water therapy, aroma therapy, massage, spices, healthy food/drink services, and physical activity with the aim of balancing the body and soul while still paying attention to the traditions and culture of the Indonesian nation.

Supporting businesses in the tourism industry include souvenir businesses, tourism education, tourism police, and other businesses such as money changers, banks, health clinics, and telecommunications businesses. The debate about whether tourism in Indonesia is just a business activity or is already an industry has been going on since the ratification of Law Number 9 of 1990 concerning Tourism until the ratification of Law Number 10 of 2009 concerning Tourism. From an economic perspective, industry is defined as a group or individual who independently produces a product, both tangible and intangible. Renowned marketing expert, Kottler, said that other components of the industry are the revenue earned, tourism, and producing and selling the resulting product.<sup>1</sup>

### Form of Business Entity in Indonesia

The term "company" is a term that replaces the term "trader" as regulated in Articles 2 to 5 of the old WvK. The term company that replaces the term trader has a broader meaning. Many people used to run companies in the sense according to S. 1938 No. 276, but were not included in the definition of a trader according to Article 2 of the Commercial Code.<sup>2</sup>

According to the law makers, a company is an act carried out continuously, openly, in a certain position and to seek profit.<sup>3</sup> Activities carried out with the intention of seeking profit are included in economic activities. The formulations of the definition of a company above are strengthened by many experts in the field of Commercial Law or Business Law, such as Sri Redjeki Hartono who stated that economic activities are essentially activities of running a company, namely an activity that contains the understanding that the activities in question must be carried out :<sup>4</sup>

- a. Continuously in the sense of not being interrupted;
- b. Openly in the sense of being legal (not illegal); and
- c. The activity is carried out in order to gain profit, either for oneself or others.

Business entities in Indonesia are of various types. Business entities are divided into two large categories, namely legal entities and non-legal entities. Non-legal entities consist of Partnership Firms, Limited Partnerships (CV), Sole Proprietorships, or Trading Businesses (UD). Legal entities are Limited Liability Companies (PT) and Cooperatives. In the Indonesian legal system, this type of business entity is more strictly regulated with separate laws and regulations for each type of legal entity.

Regulations regarding legal entities are also regulated in the Civil Code. Basically, the Burgerlijk Wetboek (BW) does not regulate the term legal entity. The term used according to BW is Zedelijk Lichaam. According to BW or the Civil Code, what is meant by a legal entity or rechtspersoon is a group of people who in legal traffic act as if they were a single individual or corporatie.<sup>5</sup>

Partnership companies can be in the form of partnerships or bodies that are not incorporated and partnerships/bodies that are incorporated. Partnership companies that are not incorporated are basically companies that are established and owned by private parties. Partnership companies that are not incorporated are companies that are in the form of partnerships or associations that are carried out and owned by two or more people, which can be in the form of Civil Partnerships, Firm Partnerships (Fa) and Limited Partnerships (Commanditaire Venootschaap abbreviated as CV). Partnership Companies that are incorporated are partnerships or bodies that can be legal subjects, namely anything that can bear rights and obligations. Something that can be a legal subject is a human being (natuurlijkpersoon) and a legal entity (rechts-persoon).<sup>6</sup>

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<sup>1</sup> Violetta Simatupang, 2009, Pengaturan Hukum Kepariwisata Indonesia, P.T. Alumni, Bandung, h. 96.

<sup>2</sup> R. Soekardono, 1983, *Hukum Dagang Indonesia*, Dian Rakyat, Jakarta, h. 19.

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A Limited Liability Company is an association or body consisting of several shareholders and has capital that is separate from the assets of the owner or founder and the company's assets. This company is established based on an agreement and carries out business activities with authorized capital that is entirely divided into shares and has met the requirements stipulated by law.<sup>7</sup> The normative regulation of the term Limited Liability Company (PT) can be found in Law Number 40 of 2007 concerning Limited Liability Companies (PT) specifically in Article 1 paragraph (1), which reads:

"A Limited Liability Company, hereinafter referred to as a company, is a legal entity that is a capital association, established based on an agreement, conducting business activities with authorized capital that is entirely divided into shares and meets the requirements stipulated in this law and its implementing regulations".

From the above definition, it can be given the criteria that a Limited Liability Company (PT) is a legal entity that is established based on an agreement and has assets that are separate from the assets and capital consisting of shares so that the responsibility of shareholders is limited to the number of shares they have entered.

According to Satjipto Rahardjo, this legal entity as a legal subject is the result of a fictitious construction of the law which is then accepted, treated and protected as the law provides protection for humans.<sup>8</sup> According to legal doctrine, a body will be a legal entity if it meets the following criteria or requirements:

- 1) Having separate assets
- 2) Having a specific purpose
- 3) Having its own interests, and
- 4) Having a regular organization.

A Limited Liability Company, formerly known as *Naamloze Vennootschaap* (NV), is a partnership to run a business that has capital consisting of shares, the owners of which have as many shares as they own. Because its capital consists of shares that can be bought and sold, changes in company ownership can be made without having to dissolve the company. A limited liability company is a vehicle for carrying out business activities, which limits the liability of the capital owner, namely the number of shares owned. so that this form of business is widely enjoyed, especially for companies with large capital. The ease of attracting funds from the public by selling shares is also an encouragement to establish a business entity in the form of a limited liability company.<sup>9</sup>

The form of a limited liability company is very popular with the public because in general a limited liability company has the ability to develop itself, is able to conduct capitalization and is a potential vehicle for obtaining profits both for its own institution and for its supporters (shareholders).<sup>10</sup>

From all the Business Entities in Indonesia such as Firms (Fa), Limited Partnerships (CV), Cooperatives and so on, Limited Liability Companies, hereinafter referred to as *Perusahaan*, are the form of economic activity business entities that receive the highest portion of attention. Limited Liability Companies (PT) are the most preferred form of economic activity business today, in addition to limited liability, limited liability companies also provide convenience for their owners (shareholders) to transfer their company (to anyone) by selling all the shares they own in the company. In principle, the establishment of a Limited Liability Company Based on Article 7 paragraph (1) of Law Number 40 of 2007 concerning Limited Liability Companies (hereinafter referred to as the Limited Liability Company Law), the Establishment of a Limited Liability Company (PT) must be made by 2 (two) or more people in the form of an authentic deed in this case a notarial deed. Furthermore, in Articles 32 and 33 of Law Number 40 of 2007 concerning Limited Liability Companies. The establishment of a limited liability company must have authorized capital, issued capital and paid-up capital contained in the articles of association and bylaws which must be approved by the Minister of Law and Human Rights. This legal entity business entity has a unique character, namely the name of the Limited Liability Company (PT) must not be the same as or similar to other companies or the same as the names of other well-known companies, if the name is the same then its approval will be rejected by the Minister of Law and Human Rights. If the limited liability company has not obtained legal entity status, then all partners, both founders, directors and commissioners, are jointly and severally liable for any legal acts and losses suffered by the Company.

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<sup>7</sup> Sudaryat, 2008, *Hukum Bisnis "Suatu Pengantar"*, Jendela Mas Pustaka, Bandung, h. 32.

<sup>8</sup> Satjipto Rahardjo, 1996, *Ilmu Hukum*, Citra Aditya bakti, Bandung, h.69.

<sup>9</sup> Badriyah Rifai Amirudin, *Artikel Pendidikan Network ; Peran Komisaris Independen dalam Mewujudkan Good Corporate Governance di Tubuh Perusahaan Publik*, <http://researchengines.com/badriyahamirudin>.

<sup>10</sup> Agus Budiarto, 2002, *Kedudukan Hukum dan Tanggung Jawab Pendiri Perseroan Terbatas*, Ghalia Indonesia, Jakarta, h. 13.

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### **Perbandingan ketentuan Perseroan Terbatas dalam Undang-Undang Nomor 40 Tahun 2007 tentang Perseroan Terbatas dengan Undang-undang Nomor 6 Tahun 2023 tentang Penetapan Peraturan Pemerintah Pengganti Undang-Undang Nomor 2 Tahun 2022 tentang Cipta Kerja menjadi Undang-Undang**

The purpose of enacting Law Number 6 of 2023 concerning the Stipulation of Government Regulation in Lieu of Law Number 2 of 2022 concerning Job Creation into Law (hereinafter referred to as the Job Creation Law), is to create the widest possible employment opportunities for the Indonesian people evenly. This is done in order to fulfill a decent living through the following points:

1. Ease, Protection and Empowerment of MSMEs and Cooperatives;
2. Improving the investment ecosystem;
3. Ease of doing business;
4. Improving worker protection and welfare; and
5. Central Government Investment and acceleration of national strategic projects.

In achieving these goals, there are fundamental differences between the Limited Liability Company Law and the Job Creation Law.

#### **a. Definition**

The Limited Liability Company Law stipulates that a Limited Liability Company, hereinafter referred to as a Company, is a legal entity that is a capital association, established based on an agreement, conducting business activities with authorized capital that is entirely divided into shares and meets the requirements set out in this Law and its implementing regulations. Meanwhile, in the Job Creation Law, a Limited Liability Company, hereinafter referred to as a Company, is a legal entity that is a capital association, established based on an agreement, conducting business activities with authorized capital that is entirely divided into shares or an individual Legal Entity that meets the criteria for Micro and Small Businesses as regulated in the laws and regulations concerning Micro and Small Businesses.

#### **b. How to Obtain PT Status as a Legal Entity**

Article 7 paragraph (4) of the Limited Liability Company Law

A company obtains legal entity status on the date of issuance of the Minister's Decree regarding the issuance of the Minister's Decree regarding the ratification of the Company's legal entity.

Article 7 paragraph (4) of the Job Creation Law:

A company obtains legal entity status after being registered with the Minister and obtaining proof of registration.

#### **c. Shareholders**

Article 7 paragraph (7) of the Limited Liability Company Law

The provisions requiring a Company to be established by 2 (two) or more persons as referred to in paragraph (1), paragraph (5), and paragraph (6) do not apply to:

- a. A limited liability company whose shares are wholly owned by the state;
- b. A company that manages a stock exchange, a clearing and guarantee institution, a depository and settlement institution, and other institutions as regulated in the Capital Market Law.

Article 7 paragraph (7) of the Job Creation Law

The provisions requiring a Company to be established by 2 (two) or more persons as referred to in paragraph (1), paragraph (5), and paragraph (6) do not apply to:

- a. A limited liability company whose shares are wholly owned by the state;
- b. A regionally-owned enterprise;
- c. A village-owned enterprise;
- d. A company that manages a stock exchange, a clearing and guarantee institution, a depository and settlement institution, and other institutions in accordance with the Capital Market Law; or
- e. A company that meets the criteria for Micro and Small Enterprises.

In the Limited Liability Company Law, there is actually a 1 person Shareholder, namely for a Limited Liability Company whose entire shares are owned by the state; as well as a Company that manages a stock exchange, Clearing and guarantee institution, storage and settlement institution, and other institutions as regulated in the Capital Articles Law. However, in the Job Creation Law, the spirit of which is to create jobs and provide convenience for the community to create a business opportunity, then in the Job Creation Law, a company with share ownership of a Limited Liability Company is only one person, namely for a Company that meets the criteria for Micro and Small Businesses.

#### **d. Company Capital**

Article 32 of the Limited Liability Company Law



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1. The authorized capital of the Company is at least IDR 50,000,000.00 (fifty million rupiah).
2. Laws that regulate certain business activities may determine the minimum amount of the Company's capital which is greater than the provisions of the authorized capital as referred to in paragraph (1).
3. Changes to the amount of authorized capital as referred to in paragraph (1) are stipulated by Government Regulation. Article 32 of the Job Creation Law
1. The Company is required to have authorized capital of the Company.
2. The amount of authorized capital of the Company as referred to in paragraph (1) is determined based on the decision of the Company's founders.
3. Further provisions regarding the authorized capital of the Company are stipulated in Government Regulation.

### **d. Insertion in Article 153: 153A to 153J of the Job Creation Law**

#### **Article 153A**

A company that meets the criteria of Micro and Small Businesses can be established by 1 (one) person, which is established based on a statement of establishment.

#### **Article 153B**

The statement of establishment is registered electronically with the Minister by filling in the form.

#### **Article 153C**

Changes to the Statement of Establishment are determined by the General Meeting of Shareholders and notified to the Minister.

#### **Article 153D**

The Job Creation Law still uses the nomenclature "Board of Directors" to refer to the management of a Sole Proprietorship.

#### **Article 153E**

Shareholders in a Sole Proprietorship are individuals, not legal entities. One person can only establish one Sole Proprietorship in the Micro and Small Business category in one year.

#### **Article 153F**

The Board of Directors of the Company for Micro and Small Businesses must prepare financial reports in order to realize good Corporate Governance.

#### **Article 153 G**

The dissolution of a Company for Micro and Small Businesses as referred to in Article 153A is carried out by a General Meeting of Shareholders which is stated in a statement of dissolution and notified electronically to the Minister.

#### **Article 153 H**

In the event that the Company for Micro and Small Businesses no longer meets the criteria of Micro and Small Businesses as referred to in Article 153A, the Company must change its status to a Limited Liability Company as referred to in the provisions of applicable laws and regulations.

#### **Article 153 I**

The Company for Micro and Small Businesses is given a reduction in costs related to the establishment of a legal entity.

#### **Pasal 153 J**

- 1) Shareholders of the Company for Micro and Small Businesses are not personally liable for obligations made in the name of the Company and are not liable for losses of the Company exceeding the shares owned.
- 2) The provisions as referred to in paragraph (1) do not apply if:
  - a. the relevant shareholder, either directly or indirectly in bad faith
  - b. exploits the Company for personal gain;
  - c. the relevant shareholder is involved in an unlawful act committed by the Company; or
  - d. the relevant shareholder, either directly or indirectly in an unlawful manner uses the Company's assets, resulting in the Company's assets being insufficient to pay off the Company's debts.

### **Companies that meet the criteria for Micro and Small Enterprises based on Government Regulation Number 8 of 2021 in Supporting Tourism Service Businesses**

In order to establish a Company in the Tourism business sector as referred to in Article 14 paragraph (1) of the Tourism Law, which has characteristics that can be considered the safest, because there is a separation of personal wealth and Company wealth, the community can establish a Limited Liability Company as mandated by the Job Creation Law. Provisions regarding the criteria for a Limited Liability Company to be able to use the facilities in the form of the ease of establishment mentioned above,

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are regulated in Government Regulation Number 8 of 2021 concerning the Authorized Capital of Companies and Registration of the Establishment, Amendments, and Dissolution of Companies that Meet the Criteria for Micro and Small Businesses, which in Article 2 stipulates that:

- a. Companies established by 2 (two) or more people; and
- b. Individual companies established by 1 (one) person.

Establishment of an Individual Company by filling out the Statement of Establishment in Indonesian, which contains:

- a. name and domicile of the individual Company;
- b. period of establishment of the individual Company;
- c. intent and purpose and business activities of the individual Company;
- d. amount of authorized capital, issued capital, and paid-up capital;
- e. nominal value and number of shares;
- f. address of the individual Company; and
- g. full name, place and date of birth, occupation, residence, population registration number, and taxpayer identification number of the founder, director and shareholder of the individual Company.

As for individual companies, they must change their legal status to become a Company if:

- a. the shareholders become more than 1 (one) person: and/or
- b. do not meet the criteria for micro and small businesses as stipulated in the provisions of laws and regulations regarding micro and small businesses.
- c. Individual companies before becoming Companies as referred to in paragraph (1) make changes to their status through a notarial deed and are registered electronically with the Minister.
- d. Changes to status as referred to in paragraph (2) are carried out in accordance with the provisions of laws and regulations regarding Companies.

Although a Sole Proprietorship can be established by one person as an effort by the government to simplify the process of establishing a Limited Liability Company, the number of Shares of a Sole Proprietorship cannot be single, but must be more than one. Because the principle of the Limited Liability Company remains as a capital association. The number of shares of more than one is also useful when the Sole Proprietorship with the criteria of Micro and Small Businesses changes to an ordinary Limited Liability Company as regulated by the Limited Liability Company Law.

As for the organs in the Sole Proprietorship contained in the Job Creation Law, the Sole Proprietorship adheres to the concept of a one-tier system, namely the company is run by one organ, namely the board of directors (board of directors) which also carries out management and supervision functions. In a two-tier system, there is an organ that manages the company, namely the board of directors and there is an organ that carries out supervision (board of commissioners), as adopted by the Limited Liability Company Law. In a Sole Proprietorship that adheres to a one-tier system, it is not possible to appoint commissioners as company supervisors and does not have a General Meeting of Shareholders organ.

The terms One-Tier System and Two-Tier System are not found in laws and regulations in Indonesia. The term is found in Council Regulation (EC) No. 2157/2001 and Hungarian Act IV of 2006 which allow companies to use the concept of a one-tier system or two-tier system. In Council Regulation No. 2157/2001 and in Hungarian Act IV of 2006, in principle it is explained that in the one-tier system concept the company is run by one organ, namely the board of directors which also carries out management and supervisory functions.

Article 21 of Hungarian Act IV of 2006 which reads:

“The articles of association of public limited companies may also contain provisions to tender management and supervisory functions upon the board of directors (public or private limited companies operated by the one-tier system). Such a (public or private) limited company shall have no supervisory board, and the members of the board of directors shall be treated as executive officers.”

Meanwhile, in the two-tier system, there are organs that manage the company, namely the management organ and the organ that carries out supervision (supervisory organ). The management organ is appointed and dismissed by the supervisory organ. Article 39 paragraph (2) and Article 40 paragraph (1) of Council Regulation No. 2157/2001:

Article 39 paragraph (2):

“The member or members of the management organ shall be appointed and removed by the supervisory organ.”

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Article 41 paragraph (1):

“The supervisory organ shall supervise the work of the management organ. It may not itself exercise the power to manage the SE.”

Based on the definition of one-tier system and two-tier system, when associated with the Limited Liability Company Law applicable in Indonesia, then Indonesia is a two-tier system. This is because in Indonesia, the authority to manage the company and supervision is separated, which has been known as the Board of Directors and the Board of Commissioners. In this case, the Board of Directors has more authority to manage the company, while the Board of Commissioners has more of a supervisory role.

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- 1) Civil Code.
- 2) Commercial Code.
- 3) Law Number 9 of 1990 concerning Tourism
- 4) Law Number 10 of 2009 concerning Tourism
- 5) Law Number 40 of 2007 concerning Limited Liability Companies
- 6) Law Number 11 of 2020 concerning Job Creation
- 7) Government Regulation in Lieu of Law Number 2 of 2022 concerning Job Creation
- 8) Law Number 6 of 2023 concerning Stipulation of Government Regulation in Lieu of Law Number 2 of 2022 concerning Job Creation into Law
- 9) Law Number 6 of 2023 concerning Stipulation of Government Regulation in Lieu of Law Number 2 of 2022 concerning Job Creation



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## Effect of Operational Capital Management on Economic Performance of Nigerian Banking Sector



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**ABSTRACT:** This study conducted the effect of working capital management on financial performance of listed deposit money banks in Nigeria. Working capital is a very important element for the sustainability of an organization like deposit money banks. During the assessment the focus was on evaluating working capital through key indicators such as the current ratio, ratios of cash to deposits as well as loans to deposits. Moreover, metrics like Return on Equity (ROE) and Return on Asset (ROA) were employed to evaluate financial performance. An *expost-facto* research design was employed. The study population comprised of twenty-two deposit money banks out of which only 10 were purposively selected for sampling. Secondary data was utilized, and financial statements spanning a period of 10 years (2013 – 2022) were scrutinized. Panel Ordinary Least Square (OLS) was employed as a technique for data analysis. The results demonstrated that working capital had a considerable impact on ROE ( $p=0.000024$  0.05) and ROA ( $p=0.000001$  0.05). Thus, the study came to the conclusion that working capital significantly affects financial. Hence, it was recommended that banks in Nigeria should look for a way of balance between working capital and financial performance.

**KEYWORDS:** Current ratio, Economic performance, Operational capital management, Return on assets, Return on equity.

### 1.0 INTRODUCTION

Nigeria's financial system relies heavily on deposit money banks (DMBs), which provide a range of financial services including deposit collection, lending, and economic growth promotion. It is impossible to overestimate the significance of deposit money banks in a country since they play a key role in the expansion and development of that country and hold important financial positions.

A stable macroeconomic environment depends on a sound, viable, and competent banking sector of any economy (Ademiju, 2022). Effective financial resource management is critical to these institutions because it affects their capacity to maintain viability and competitiveness as well as their ability to support the general stability of the Nigerian economy. The effective management of operational capital and the optimal utilization of debt financing are essential for the sustained financial performance and stability of DMBs. The Nigerian banking sector has undergone significant reforms and regulatory changes in recent years. These reforms aimed to enhance the soundness, stability, and efficiency of the sector. However, challenges are including liquidity management, non-performing loans, and the overall impact on financial performance.

Commercial banks are the major financial institutions that play quite an important role in the economic development in the domains of investments and saving as well (Panigrahi, et al., 2022). Banks are major players in the nation's financial and economic life since they provide capital for trade and industry (Maharjan, 2023). A bank must always have cash balances in hand in order to pay its depositors upon demand or when the amounts credited to them becomes due. It must also keep a proportion of its assets in forms that can readily be converted into cash. Only in this way the confidence in the banking system can be maintained.

Operational capital as a working capital is important and plays a vital role in a company's management structure. In this regard, working capital and liquidity have been likened to a blood, circulating in the vessels of a business unit and required for the survival of that unit. Experience has demonstrated that ineffective working capital management is a major cause of financial troubles and insolvency for the majority of organisations (Osuji & Agbada, 2020). Thus, in order to ensure the expansion, financial success, and

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long-term viability of their organisations, managers ought to be able to put into practice an efficient working capital management strategy policy.

Ajorsu et al., (2020) provide that one of the most widely used method by firms to measure and evaluate risks and returns associated with liquidity management are cash flow cycles. Through cash flow cycles management, bank managers are able to identify the areas that require further improvement to enhance future cash flow.

This study attempts to give a thorough examination of the relationship between operational capital management as a working capital management and the economic performance of deposit money banks in Nigeria, taking into account the gaps in the literature and the dynamic nature of the Nigerian banking system.

The importance of financing decisions cannot be over emphasized since many of the factors that contribute to business failure can be addressed using strategies and financial decisions that drive growth and the achievement of organizational objectives.

### Objectives of the study

The main objective of the study is to investigate how working capital affects Nigerian deposit money banks' financial results between 2013 and 2024. The specific objectives are to:

- i. to examine the effect of working capital management on the return on asset (ROA) of listed Nigerian deposit money; and
- ii. to investigate the influence of working capital management on the return on equity (ROE) of listed Nigerian deposit money banks

## 2.0 LITERATURE REVIEW

### 2.1 Conceptual Review.

#### 2.1.1 Working Capital Management

The management of working capital has a significant impact on the liquidity of banks and other organisations. Working capital management, which is concerned with how well a company can handle its short-term assets and commitments (Said, 2020) to ensure the smooth running of its daily activities, is a crucial aspect of financial management. It is crucial to an organization's overall success and financial stability.

The goal of working capital management, according to Gitman (2018), is to keep current assets like cash, marketable securities, receivables, and inventory in perfect balance with current liabilities like accounts payable and short-term loans. Working capital management focuses on variations in current asset and current liability management as well as the relationships that exist between them. The purpose of working capital is to obtain a desired level of net working capital by managing current assets and current liabilities as effectively as feasible. Therefore, net working capital is the quantitative difference between current assets and current liabilities for an organisation (Panigrahi, et al., 2022).

If a business or bank is unable to keep its net working capital at a sufficient level, it would be insolvent and if not corrected would be commensurate with bankruptcy (Peprah & Riziki, 2019).

The study measured the working capital management with current ratio, loan to deposit ratio and cash to deposit ratio.

#### 2.1.2 Current Ratio

The current ratio is a measurement technique for determining the ability of banks to be able to pay their debt withing a year. This expresses how banks maximise the current assets to satisfy their debts and payables. Current ratio implies that whether a business entity's current assets are sufficient whether or not to pay the current obligations. This calculates the amount of liquidity that any business entity in terms of its short-term working capital requirement (Tafa & Toleshi, 2023). It is computed using:

$$\text{Current ratio} = \frac{\text{Current Asset}}{\text{Current Liability}}$$

#### 2.1.3 Loan to Deposit Ratio

The loan to deposit ratio (LDR), a measurement method, determines a bank's liquidity by comparing all of its loans to all of its deposits during the same time period. The LDR is expressed as a percentage. The loan-to-deposit ratio reveals how the bank used depositors' funds for its clients (Nagian,2020). In the event that the ratio is unduly high, the bank could not have enough liquidity to cover any unexpected funding requests. That being said, if the ratio is too low, the bank may not be earning as much as it could.

The formular using is:

$$\text{LDR} = \frac{\text{Total loan}}{\text{Total deposit}}$$

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### 2.1.4 Cash to Deposit Ratio

The cash deposit ratio is the proportion of loans made by a bank to total deposits it has collected. According to Suman Goel (2019), the cash to deposit ratio is the proportion of a bank's loans to the total amount of deposits it has collected. It measures the percentage of core funds that a bank devotes to lending, which is the main purpose of banks. It is calculated using;

$$\text{Cash to deposit ratio} = \frac{\text{Total cash}}{\text{Total deposit}}$$

### 2.1.5 Financial Performance

Financial performance is the measuring of a firm's plans and actions in financial terms (Akaji, Uwadiator & Agubata, 2021). Bank performance is evaluated in relation to the organization's performance criteria. Performance is made up of elements such as effectiveness and efficiency in addition to production and competitiveness. Training can help individuals perform better on an individual basis. Typically, a variety of financial statistics are used to illustrate performance, including the growth rates of total assets, loans, and earnings. (Omali, Okeke & Obiora, 2021). The following metrics are used to indicate a company's or bank's performance: earnings per share, net profit margin, return on equity, return on investment, return on asset, and return on capital utilised. Return on equity (ROE) (Ihenyen & Joseph, 2023), which measures how well a bank uses invested capital, and return on asset (ROA), which indicates how profitable bank assets are, were the two metrics used in the study to assess the financial performance of deposit money banks in Nigeria.

## 2.2 Theoretical Review

This study reviews theory-off theory, For the purpose of supporting its research, this study accord on the trade-off theory.

### 2.2.1 Trade-Off Theory

In 1958, Franco Modigliani and Merton Miller presented the idea, arguing that companies could optimise their debt-to-equity ratio to lower their weighted average cost of capital and improve their capital structure. The idea was criticised for failing to consider non-financial factors such as social. According to the trade-off theory of capital structure, a business weighs the costs and advantages of using varying debt and equity funding levels to determine how much of each to use (Panigrahi, et al., 2022).

## 2.3 Empirical Review

Ademiju (2022), investigated on financial performance and working capital management of Nigeria's listed commercial banks. The research design used in the study was ex-post facto, and content analysis of audited financial statements as of 2021 was employed. Results of the investigation indicate RT and LT are positively correlated to PT while cash conversion cycle is negatively correlated to PT. The average ROA for the banks over the period and across the listed deposit money banks in Nigeria are 12.8% with a maximum of 63%. The minimum return on asset is -140%, with standard deviation of 20%.

Additionally, Orlu et al. (2022) looked at the relationship between the debt capital and financial performance of Nigerian commercial banks. The study also looked at how much a listed commercial bank's debt capital affects its financial performance. It was an ex-post factor design research. According to the results, there will be a greater return on equity, assets, and investments the more quoted commercial banks appropriately combine debt with equity.

In addition, Iklmatu, et al., (2023), review the effect of managing working capital on the profitability of the company. The study used a conceptual approach, gathering data from secondary sources to examine conceptual and definitional difficulties related to profitability and working capital management.

Marvis et al. (2019) looked into the impact of equity capital financing on the corporate financial performance of Nigerian deposit money banks. To collect, examine, and evaluate the pertinent data, the study used an ex post facto research design. The results show that ROE and EVA both positively impact the corporate financial performance of Nigerian deposit money companies.

Williams, et al., (2022), investigated the relationship between the working capital and profitability of twenty-five (25) Ghanaian commercial banks from 2016 to 2018. Panel data was used as the approach. Information about the connection between working capital management and profitability was provided by the Ghanaian Bank. Through the use of the current ratio, the results demonstrated a negative relationship between working capital management and profitability.

Moreover, Ochei, et al., (2021) examined the relationship between the management of working capital in Nigerian deposit money institutions. The study utilizes a regression analysis in which panel data was used. The findings showed that the major reason banks hold much liquid asset is to guard against a rise in demand or unplanned situation. It recommends that direct policies are implemented to ensure that high volume cash transactions are highly reduced.

Eze, et al., (2020) looked at the connection between Nigerian firm performance and working capital management in a different study. To determine the potential firm's unique working capital management strategy in the selected Nigerian listed enterprises, a panel data analysis was used. According to the survey, effective cash management is essential for any company hoping to maintain growth.



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## 3.0 METHODOLOGY

### 3.1 Research Design

The study employs an ex post facto research design. This will enable the design to describe the underlying relationship between the variables.

### 3.2 Research Population

The twenty-two (22) deposit money banks in Nigeria that make up the study's population are divided into three (3) groups.

### 3.3 Sampling Techniques and Sampling Size

Purposive selection technique employed to choose ten deposits banks that are listed and selected based on their capital, listing status on the Nigerian stock exchange, and information updates. The ten (10) banks selected are Guarantee Trust Bank, Access Bank, Zenith Bank, First Bank, Wema Bank, Sterling Bank, UBA, Union bank, Stanbic IBTC and Fidelity bank.

### 3.4 Data Analysis

The mean, median, standard deviation, skewness, and kurtosis are the descriptive statistics used to measure the variables in this study project. The OLS, or ordinary least square in the form of multiple regression analysis was applied. Regression was chosen as a tool for hypotheses tests, owing to the fact that it is an appropriate parametric (involving assumptions) tool that estimates the effect of one or more variables on another.

### 3.5 Model specification.

To evaluate how working capital management strategies affect the listed deposit money banks in Nigeria in terms of their financial performance. The model is modified as below:

$$Y_1 = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + E \dots \dots \dots \text{Eq. (3.5.1)}$$

$$Y_2 = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + E \dots \dots \dots \text{Eq. (3.5.2)}$$

Where;  $Y_1$  = Return on Assets;  $Y_2$  = Return on Equity;  $\beta_0$  = Constant term;  $\beta_1 X_1$  = Current ratio;  $\beta_2 X_2$  = Loan to deposit ratio;  $\beta_3 X_3$  = Cash deposit ratio; E = Error Term

## 4.0 DATA ANALYSIS

### 4.1 Descriptive Statistics Result

**Table 4.1: Descriptive analysis of Observed Variables**

	ROA	ROE	CR	CDR	LDR
Mean	0.063751	0.601032	2.807962	3.209571	1.513245
Median	0.014919	0.117979	1.319284	0.240257	0.514598
Maximum	1.300572	23.82316	5.291569	54.47628	50.61112
Minimum	0.002375	0.010497	0.021714	0.001257	0.000570
Std. Dev.	0.170462	2.720764	82.06244	9.642998	6.544237
Skewness	4.955484	7.320410	3.770773	4.020120	6.755561
Kurtosis	31.40413	58.76139	18.61389	18.89641	47.80657
Jarque-Bera	3770.924	13848.69	1252.785	1322.255	9125.747
Probability	0.000000	0.000000	0.000000	0.000000	0.000000
Sum	6.375054	60.10324	2807.962	320.9571	151.3245
Sum Sq. Dev.	2.876688	732.8529	666690.1	9205.754	4239.877
Observations	100	100	100	100	100

Source: Researcher’s computation, 2024.

Descriptive statistics explains the overall nature of the data set. The aim of this is to look at the average value of every parameter, together with the Jarque-Bera statistics and the maximum, minimum, and standard deviation. For every parameter, the mean value is positive, but the standard deviation of all the parameters is large indicating that they can deviate extensively within the period under review. The minimum and maximum value shows the least and highest value of the data set while the Jarque-Bera

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statistics shows whether the data set are normally distributed. From indications, the data set are not normally distributed but there is no need for worry considering the sample size of the observation which is greater than 30.

### 4.2 Correlation Analysis

**Table 4.2: Correlation among the Observed Variables**

Variables	ROA	ROE	CR	CDR	LDR
ROA	1.000				
ROE	0.671	1.000			
CR	-0.089	-0.058	1.000		
CDR	-0.059	-0.044	-0.106	1.000	
LDR	-0.023	0.003	-0.039	0.076	1.000

Source: Researcher's computation 2024

Correlation seeks to establish the relationship between two or more variables. The result shows that ROA has strong positive relationship with ROE and is statistically significant but the relationship with CR, CDR and LDR is negative although it is not statistically significant. ROE is also seen to, despite the fact that none of them are statistically significant, have a negative association with CR and CDR but a favorable link with LDR. Furthermore, there is a negative correlation between CR and CDR and LDR, although there is no statistically significant correlation between CDR and LDR.

### Result of the Hausman Test

This study uses fixed effect and random effect models in a panel research design must be used, with the Hausman test being used to determine which model is superior. Based on the two models that were employed in this investigation, the Hausman test results are listed below. The Hausman test's decision criterion states that a fixed effect model will be applied if the probability value is less than 5% and a random effect model will be applied otherwise.

### Return on Assets

Correlated Random Effects - Hausman Test

Equation: Untitled

Test period random effects

Test Summary		Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Period random		5.543779	3	0.0092
Variable	Fixed	Random	Var(Diff.)	Prob.
CR	0.000159	-0.000201	0.000000	0.6020
CDR	-0.001012	-0.001195	0.000001	0.7455
LDR	-0.001644	-0.000564	0.000001	0.9748

### Return on Equity

Correlated Random Effects - Hausman Test

Equation: Untitled

Test cross-section random effects

Test Summary		Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random		4.392096	3	0.0419
Variable	Fixed	Random	Var(Diff.)	Prob.
CR	0.000154	-0.001056	0.000017	0.7669

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CDR	-0.004927	-0.007430	0.000071	0.7661
LDR	0.001628	0.001210	0.000105	0.9674

From the result of both models, it is evidenced that both p values are less than 5% confirming the support of the fixed effect model estimation

### Hypotheses

Table 5. After the Hausman test are conducted, the hypotheses are now tested using the fixed effect model estimation as follows:

Variable	ROA	ROE
CR	0.000159* (0.004889)	0.000154*** (0.024551)
CDR	-0.001012 (-0.641244)	-0.004927* (0.161579)
LDR	-0.001644*** (-0.735834)	0.001628* (0.037735)
C	0.069442** (4.025081)	0.610051* (1.830587)
R <sup>2</sup>	0.48	0.24
Prob	0.000000***	0.014941**

Source: Author's Computation 2024

**Denote** \*, \*\*, \*\*\* indicate level of significance at 1%, 5% and 10% significant level

**NB:** t-statistics are in parentheses

The regression result that describes the relationship between the performance of deposit money banks in Nigeria and working capital management is displayed in Table 5 above. Two models were examined (ROA and ROE). The first model shows that CR has a favorable effect on ROA, although CDR and LDR have an adverse effect. This demonstrates that the current ratio has a favorable impact on ROA, whereas the loan to deposit and cash to deposit ratios have a negative impact. Nonetheless, the sum of all the parameters' effects is very important in explaining ROA. ( $p = 0.000000*** < 0.05$ ,  $R^2 = 0.479831$ ).

However, in relation to the second model, CR and LDR shows a positive effect on ROE but CDR still shows a negative effect on ROE. This indicate that a change in CR and LDR will improve ROE but not significantly. However, the prob value of the model shows 0.014941\*\* meaning that all the parameters used are significant in explaining ROE. This shows the fitness of the model which is a necessary condition for the approval of a regression model.

### DISCUSSION OF RESULT

The result indicates that the current ratio, cash to deposit ratio, and loan to deposit ratio accurately forecast the financial performance of deposit money institutions with respect to ROA and ROE.

Although CR positively affects ROA and ROE in both scenarios, LDR, which has a favorable impact on ROE, also has a negative impact on ROA indicating that the impact of loan to impact of the deposit ratio on financial success varies depending on the metric. This implies that a higher loan-to-deposit ratio could result in lower returns on assets as well as higher returns on equity. These findings highlight how important it is to properly balance deposits and loans in order to improve overall financial success. Furthermore, money to deposit ratio shows a negative effect on both ROA and ROE. This shows that CDR is not adequately managed by the banks as it negatively affects both profitability and shareholder value. Banks should focus on improving their cash management strategies to make sure they have adequate cash on hand to fulfill their commitments and optimize their profits. Through efficient cash and loan-to-deposit ratio management to deposit ratio, banks can achieve a balance that will optimize their financial performance and ultimately benefit their stakeholders.

This outcome is consistent with the research conducted by Ademiju (2022). The study's conclusions show that whereas cash conversion cycle and payable turnover (PT) are negatively connected, receivable turnover (RT) and inventory turnover (IT) are positively correlated. Over the time and for all mentioned deposit money, the average return on assets (ROA) for the banks in Nigeria are 12.8% with a maximum of 63%. However, the result is inconsistent with Iklimatu, et al., (2023).

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In contrast, Williams, et al., (2022), who conducted research on the relationship between working capital and profitability of 25 commercial banks in Ghana between 2016 and 2018, has a different viewpoint. They found an adverse relationship between profitability and working capital management, as indicated by the current ratio. This is due to negative relationship in the result and implied that as the return of asset increases, the working capital decreases. This may be because the banks prioritize investing their surplus funds in income-generating assets rather than keeping them as working capital. Moreover, the study also suggests that the banks may be effectively managing their working capital by optimizing their present liabilities and assets to guarantee profitability. These conflicting results underline the need for more investigation and analysis in various sectors and situations by highlighting the complexity and unpredictability of the relationship between working capital management and organisations' profitability.

### 5.0 CONCLUSION AND RECOMMENDATIONS

In conclusion, it was discovered that the loan-to-deposit and cash-to-deposit ratios may adequately account for the combined impact of current ratio on the financial performance of deposit-money banks in Nigeria. The study's findings indicate that while the cash to deposit ratio has a major impact on deposit money banks' financial performance, there is a positive relationship between the current ratio and financial performance. On the other hand, the loan to deposit ratio has contradictory effect on financial performance. The report suggests that banks in Nigeria should place a high priority on maintaining a healthy current ratio in order to guarantee enough liquidity and the capacity to fulfill short-term obligations. They should as an excessively high ratio can indicate potential credit risk and negatively impact financial performance. Therefore, banks should aim for a balanced loan portfolio and implement effective risk management strategies. Furthermore, the study suggests that banks should continuously evaluate and improve their overall operational efficiency, including streamlining processes, reducing costs, and adopting technology solutions. This can help banks optimize their operations and enhance their competitive advantage in the market. This paper tries to close gap on the bank performance and working capital. This paper also very important for regulators, policy makers, users, managers, academicians, investors, analysts, professional bodies and regulatory bodies.

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## Exploring Phytotherapeutic Alternatives for Reye Syndrome: Potential for Safe and Effective Treatment



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**ABSTRACT:** Reye syndrome is a rare, acute, and potentially life-threatening condition marked by rapid liver and brain damage, primarily affecting children and adolescents following viral infections like influenza or varicella. Though the exact cause remains unclear, studies indicate a strong association with the use of aspirin and other salicylates during viral infections, which may disrupt mitochondrial function and lead to hepatic steatosis and encephalopathy. Given the risks of aspirin use in susceptible populations, exploring natural anti-inflammatory alternatives is essential. Turmeric (*Curcuma longa*), ginger (*Zingiber officinale*), *Boswellia serrata*, *Pinus pinaster*, and *Paeonia lactiflora* possess notable anti-inflammatory, hepatoprotective, and neuroprotective properties, potentially mitigating inflammation without salicylate risks. Curcumin in turmeric and gingerol in ginger exhibit antioxidant and anti-inflammatory effects by modulating inflammatory pathways. Boswellia's boswellic acids, *Pinus pinaster*'s proanthocyanidins, and *Paeonia lactiflora*, paeoniflorin further contribute to immune modulation and neuroprotection. This review discusses these natural alternatives' mechanisms and their potential role in preventing and managing inflammation in children at risk of Reye syndrome, highlighting the need for further studies to validate their safety and efficacy in pediatric populations.

**KEYWORDS:** Reye syndrome, viral infection, Aspirin, Natural Anti-inflammatory

### I. INTRODUCTION

Reye syndrome (RS) is a rare and severe metabolic disorder that primarily affects children. First identified in 1963, RS is characterized by acute encephalopathy and fatty degeneration of the liver, often following viral infections like influenza and chickenpox (Crocker, 1982). While the incidence of RS has declined since the 1970s, its severity, leading to death in 30-40% of cases due to brainstem dysfunction, remains a significant concern. The decrease in RS cases is largely attributed to health advisories against the use of aspirin in children with viral illnesses, which were linked to the syndrome (Schorr, 2007; Soumerai, et al., 2002)).

The exact cause of RS remains unclear, but it is believed to result from an abnormal response to viral infections in genetically predisposed individuals, potentially triggered by external factors such as aspirin use. Modern diagnostic criteria, established by the CDC in 1990, define RS by three key features: acute non-inflammatory encephalopathy, hepatopathy (documented by liver biopsy or increased enzyme levels), and no alternative explanation for the symptoms (Ferretti et al., 2021).

Despite its reduction, Reye syndrome remains relevant in pediatric care, particularly when encephalopathy and liver dysfunction are present following viral infections (Choronomydz et al., 2017). Misdiagnosis can occur, as other metabolic disorders such as fatty acid oxidation defects or urea cycle abnormalities can mimic RS. An accurate and comprehensive diagnostic evaluation is crucial, especially in cases with atypical presentations or a family history suggestive of Reye-like syndromes (Hou et al., 1996; Belay et al., 1999).



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Reye-like syndrome refers to conditions with similar clinical features to RS, such as encephalopathy and liver damage, but with distinct etiologies, often linked to inherited metabolic disorders. These conditions share a common mitochondrial dysfunction and metabolic disturbances, differentiating them from classic RS, which is primarily triggered by viral infections and aspirin use (Heubi et al., 1987; Pribozic et al., 2021).

Idiopathic Reye syndrome occurs in genetically predisposed individuals and is usually triggered by external factors like viral infections, toxins, or medications such as salicylates. Although the exact cause remains unknown, these environmental triggers likely exacerbate an underlying metabolic vulnerability. The overlap in symptoms between idiopathic Reye syndrome and Reye-like syndromes complicates diagnosis, emphasizing the need for continued research to refine diagnostic criteria and treatment strategies (Casteels-Van Daele et al., 2000).

For classic RS, treatment remains largely supportive, aiming to manage severe symptoms such as cerebral oedema and liver dysfunction. Medications like glycerol, mannitol, and dexamethasone may help alleviate brain swelling and inflammation. Non-steroidal anti-inflammatory drugs (NSAIDs) are avoided, as they can worsen the condition. The prognosis varies based on the severity of the disease and the timeliness of treatment, underlining the importance of early detection and intervention (Courtenay & Butler, 2002; Miller & Arsenault 1983).

In addition to conventional therapies, there is growing interest in natural anti-inflammatory alternatives, particularly for supporting liver function and reducing neuroinflammation in RS. Phytochemicals from plants such as turmeric, ginger, boswellia, and pine bark extract offer potent anti-inflammatory and antioxidant properties. These compounds have been shown to modulate inflammatory pathways, reduce oxidative stress, and protect mitochondrial function, potentially providing a safer alternative to traditional treatments like aspirin. Turmeric's active ingredient, curcumin, for example, has demonstrated hepatoprotective effects and may help mitigate liver damage. Ginger, with its bioactive compounds, can further alleviate inflammation and support neuroprotection. Similarly, Boswellic acids and pine bark's proanthocyanidins have exhibited anti-inflammatory and neuroprotective properties, which could complement traditional therapies by reducing brain swelling and supporting metabolic function (Marino et al., 2022; Ballaz & Bourin, 2023).

These natural compounds could serve as adjuncts to supportive care, offering additional benefits in managing Reye syndrome while reducing the risks associated with conventional drugs. However, clinical validation and further research are essential to confirm their safety and efficacy in pediatric populations.

## II. CAUSES OF REYE SYNDROME

The exact cause of Reye syndrome remains elusive, but it is generally agreed upon that a combination of viral infections, genetic predisposition, and certain environmental factors particularly aspirin use contribute to its development.

### A. *Viral Infections as Primary Triggers*

Reye syndrome often follows viral infections, especially those caused by influenza A and B and varicella-zoster virus. These viruses are thought to disrupt cellular metabolism in mitochondria, which are responsible for energy production in cells, particularly in the liver and brain. Mitochondrial dysfunction leads to impaired fatty acid metabolism, causing the accumulation of toxic substances such as ammonia and free fatty acids in the bloodstream. Ammonia, in particular, is neurotoxic, contributing to brain swelling (encephalopathy) seen in Reye syndrome. In addition to mitochondrial dysfunction, viral infections can also affect the immune system, triggering an abnormal inflammatory response. This immune reaction can damage liver cells, brain tissue, and other organs. The inflammatory response may exacerbate mitochondrial dysfunction, increasing the body's vulnerability to metabolic stress. This combination of metabolic and immune system dysfunction is thought to play a central role in the development of Reye syndrome. The exact cause of Reye syndrome remains unclear, but these viral infections, along with potential genetic predispositions and the use of aspirin, appear to contribute to the syndrome's development. Although the incidence has decreased significantly due to public health campaigns discouraging aspirin use in children with viral illnesses, Reye syndrome remains a serious concern, especially in cases involving neurological and hepatic complications. Early diagnosis and appropriate treatment are crucial to managing the condition and improving outcomes (Pugliese et al., 2008; Crocker & Bagnell, 1981).

### B. *Role of Aspirin (Salicylate) Use*

Reye syndrome is a rare but serious condition that primarily affects children and adolescents, characterized by acute encephalopathy and fatty degeneration of the liver (Chornomydz et al., 2017; Soumerai et al., 2002). One of the most well-established risk factors for Reye syndrome is the use of aspirin (salicylates) during viral infections, particularly influenza and chickenpox (Casteels-Van Daele et al., 2000). The connection between aspirin and Reye syndrome was first recognized in the late 1970s and early 1980s, following several studies that linked the use of aspirin in children with these viral infections to the

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development of Reye syndrome (Van Bever, et al., 2004). Although the precise mechanism by which aspirin contributes to the development of Reye syndrome is not fully understood, several theories exist (Largent, 2015). It is believed that aspirin interferes with mitochondrial function within liver cells. Mitochondria play a crucial role in cellular energy production and fatty acid metabolism. In individuals with Reye syndrome, aspirin may disrupt mitochondrial function, impairing the liver's ability to oxidize fatty acids. This disruption results in an accumulation of free fatty acids and other toxic substances within the liver, which can lead to liver damage and an inflammatory response (Heubi et al., 1987). Additionally, this metabolic disturbance may contribute to encephalopathy, as toxic substances such as ammonia build up in the bloodstream and affect the brain (Visentin et al., 1995).

The link between aspirin use and Reye syndrome became evident in the 1980s, and health authorities, including the Centers for Disease Control and Prevention (CDC) and the U.S. Surgeon General, issued warnings against the use of aspirin in children and adolescents with viral illnesses. Public health campaigns were launched, advising parents and healthcare providers to avoid giving aspirin to children with conditions such as influenza and chickenpox. As a result of these efforts, the incidence of Reye syndrome dropped significantly, and cases of the syndrome became much less common in the years following these public health advisories. As a result of the established link between aspirin and Reye syndrome, current medical guidelines strongly advise against the use of aspirin in children and teenagers with viral infections, unless specifically prescribed by a healthcare provider for certain medical conditions. Alternative medications, such as acetaminophen or ibuprofen, are recommended for treating fever and pain in children, as these do not carry the same risk of triggering Reye syndrome (Arrowsmith et al., 1985; Schror, 2007).

### C. Genetic Predisposition and Metabolic Vulnerabilities

Reye syndrome (RS) is a rare but severe condition that predominantly affects children and is characterized by acute encephalopathy and fatty degeneration of the liver. While environmental factors, such as viral infections and aspirin use, are well-established triggers, there is growing evidence that genetic predisposition may play a significant role in making certain children more susceptible to the syndrome (Ferretti et al., 2021).

Research suggests that some children may inherit metabolic disorders that predispose them to Reye syndrome. These conditions, which often involve defects in mitochondrial function or in the enzymes responsible for metabolic processes, can remain asymptomatic until they are triggered by external factors like viral infections or the use of salicylates (such as aspirin). These inherited conditions are thought to impair the body's ability to manage metabolic stress, making the individual more vulnerable to the toxic effects of metabolic disruptions. One of the most commonly implicated genetic factors is fatty acid oxidation disorders. These disorders involve defects in the enzymes responsible for breaking down long-chain fatty acids, which are critical for energy production, particularly during times of fasting or illness. When these metabolic pathways are impaired, fatty acids and their byproducts can accumulate in the body, leading to toxic levels of metabolites like ammonia and free fatty acids, which are detrimental to liver and brain function (Brown et al., 1982; Visentin et al., 1995)

In periods of increased metabolic demand, such as during a viral infection or fasting, the body typically increases its reliance on fat metabolism for energy. In individuals with fatty acid oxidation disorders, however, the body cannot effectively oxidize fatty acids, leading to an accumulation of these substances. This overload places additional stress on the liver and the brain, which are the primary organs affected in Reye syndrome. The build-up of toxic metabolites in the bloodstream can lead to liver dysfunction, encephalopathy (brain swelling), and, in severe cases, brainstem dysfunction, which is often fatal.

### D. Mitochondrial Enzyme Deficiencies:

Mitochondrial enzyme deficiencies refer to genetic conditions where specific enzymes within the mitochondria are absent, defective, or functioning improperly. Mitochondria are the cell's primary source of energy production, particularly through oxidative phosphorylation, which generates ATP (adenosine triphosphate) from nutrients like fats, carbohydrates, and proteins (De Vivo, 1978). These organelles are essential for providing the energy required by cells, especially during periods of metabolic stress, such as illness or fasting. In Reye syndrome, mitochondrial dysfunction plays a critical role in the disease's pathogenesis. While the exact cause remains unclear, impaired mitochondrial function is strongly associated with RS. During metabolic stress, such as a viral infection or the use of aspirin in children, the body increases its reliance on mitochondrial energy production to meet the heightened demands for energy (Treem 1994). When mitochondrial enzymes are defective or deficient, ATP generation, especially from fatty acids, becomes inefficient. This inefficiency causes several key problems: First, fatty acids accumulate in the liver because the impaired mitochondrial function, particularly in fatty acid oxidation, prevents their proper metabolism, leading to fatty liver, a hallmark of Reye syndrome. Second, mitochondrial dysfunction can impair the urea cycle, causing ammonia, a toxic by-product of protein metabolism, to build up in the bloodstream (Pribozic et al., 2021). Elevated ammonia levels lead to encephalopathy, brain swelling, and cognitive disturbances. Finally, the combined impact on the liver and brain results in severe damage, as both organs rely heavily on mitochondrial energy production. The liver's inability to detoxify and the brain's lack of

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sufficient energy for normal function contribute to the characteristic symptoms of agitation, delirium, and coma, which can be fatal in severe cases (Pranzatelli & Darryl, 1987;Chornomydz et al., 2017).

### E. Other Environmental and Metabolic Triggers

In addition to viral infections and aspirin use, other environmental and metabolic factors may increase the risk of Reye syndrome in genetically susceptible individuals. Exposure to specific chemicals such as pesticides, household cleaning agents, and certain medications—has been suggested as a possible contributing factor. These substances may exacerbate mitochondrial dysfunction, particularly in those with underlying metabolic vulnerabilities. Metabolic stressors, like fasting or low-calorie diets during periods of illness, are also thought to impact the body's ability to handle energy demands. When the body is already stressed, restricted calorie intake can further strain mitochondria, especially in individuals with enzyme deficiencies or fatty acid oxidation disorders. This additional metabolic burden could amplify the risk of mitochondrial damage, leading to the characteristic symptoms of Reye syndrome, such as liver dysfunction and encephalopathy. Considering these triggers, preventive guidelines often emphasize minimizing environmental exposures and maintaining adequate nutrition during illness for children with known metabolic risks. Awareness of these additional risk factors may help in the management and prevention of Reye syndrome, particularly in genetically predisposed populations (Prandota, 2002;Thaler, 1975).

## II. NATURAL ALTERNATE TO ASPIRIN

Turmeric (*Curcuma longa*), with its active compound curcumin, is a potent natural option for managing inflammation, particularly beneficial for those susceptible to Reye syndrome. Unlike aspirin, which poses a risk of mitochondrial dysfunction, curcumin provides strong anti-inflammatory and antioxidant effects without compromising cellular health. This makes turmeric a safer choice for individuals sensitive to inflammation (Ulbricht et al., 2011).

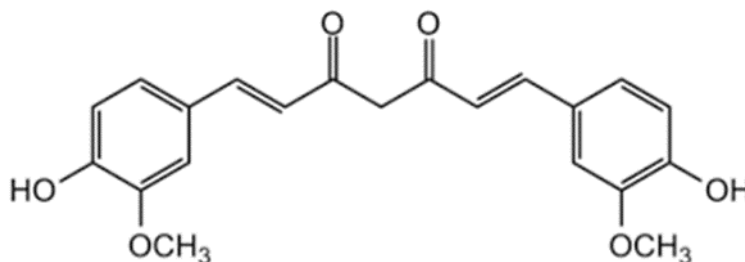


Figure 1. Curcumin

Curcumin's anti-inflammatory action works by targeting pathways like NF- $\kappa$ B and STAT3, which are critical in regulating inflammatory responses. Unlike salicylates, curcumin does not broadly inhibit COX enzymes, thereby avoiding potential mitochondrial disruption. Instead, it reduces inflammation by decreasing levels of pro-inflammatory cytokines, such as TNF- $\alpha$ , IL-6, and IL-1 $\beta$ , achieving a balanced anti-inflammatory effect (Islam et al., 2024).

Additionally, curcumin's antioxidant properties play a key role in protecting mitochondria from oxidative damage. By neutralizing free radicals, curcumin helps stabilize mitochondrial membranes and preserves cellular functions, reducing metabolic stress on liver and brain cells. This is particularly valuable in Reye syndrome, where mitochondrial health is a central concern, as curcumin minimizes oxidative and inflammatory damage without disrupting energy production. Curcumin is generally safe for both adults and children, with a low risk of adverse effects even with prolonged use. It provides relief from inflammation in conditions such as arthritis and post-viral inflammation and can be combined with herbs like ginger for enhanced effects. Since turmeric contains only about 3-5% curcumin, supplements with added piperine or bioavailable formulations are often used to maximize curcumin's absorption and effectiveness (Sharifi Rad et al., 2020).

With its targeted anti-inflammatory action and mitochondrial safety, curcumin offers a natural, effective option for managing mild inflammation without the risks associated with aspirin, making it a valuable alternative for individuals vulnerable to Reye syndrome (Peng et al., 2021).

Ginger (*Zingiber officinale*) is widely valued for its natural anti-inflammatory and analgesic effects, making it a promising alternative to aspirin, especially for individuals prone to conditions like Reye syndrome. This is primarily due to ginger's bioactive compounds, notably gingerol, shogaol, and paradol, which reduce pain and inflammation effectively while preserving mitochondrial integrity (Gurib Fakim, 2006; Semwal et al., 2015).

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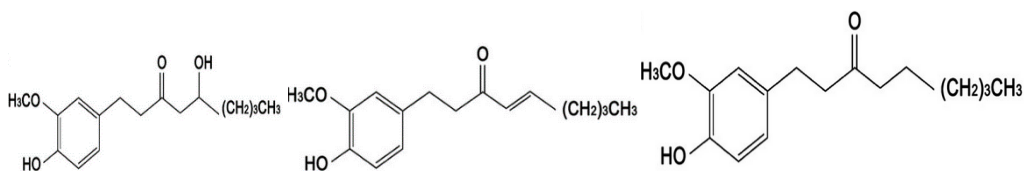


Figure 2. Gingerol, Shogaol, and Paradol

The anti-inflammatory action of ginger is attributed to its compounds' ability to inhibit inflammatory cytokines and mediators, such as prostaglandins and leukotrienes, without significantly affecting COX enzymes in a way that could damage mitochondria. Gingerol, in particular, has been shown to suppress NF- $\kappa$ B—a key player in the inflammatory process—thereby moderating the immune response and reducing inflammation gently. Unlike aspirin and other salicylates, which may compromise mitochondrial function, ginger has shown protective effects on cellular health by scavenging free radicals and reducing oxidative stress. This action helps stabilize mitochondrial membranes and supports energy production, making ginger a safer option for those at risk of Reye syndrome (Azeez et al., 2021; Islam et al., 2024).

Ginger's efficacy in pain relief has been demonstrated in conditions such as arthritis, muscle pain, and post-viral inflammation, with studies comparing its effects favorably to NSAIDs. Ginger effectively reduces prostaglandin levels, thereby alleviating pain and swelling without the gastrointestinal or mitochondrial risks often seen with conventional NSAIDs (Mashhadi et al., 2013).

Ginger is generally safe for both adults and children, commonly consumed in moderate amounts as teas, food, or standardized extracts. It is highly versatile available fresh, dried, or in capsule form and is compatible with other natural anti-inflammatory agents like turmeric. For children recovering from viral infections, ginger tea offers a gentle, easy-to-digest option that reduces inflammation without harming mitochondrial health. With its anti-inflammatory properties, mitochondrial safety, and ease of use, ginger is a valuable natural alternative for managing pain and inflammation, particularly for individuals at risk of Reye syndrome. Its targeted action on inflammatory pathways and lack of mitochondrial toxicity allow it to provide safe, effective relief (Chillemi & Michael, 2013).

*Boswellia serrata*, also known as Indian frankincense, is a tree resin that has garnered attention for its potent anti-inflammatory properties, primarily due to compounds called boswellic acids. These acids, particularly acetyl-11-keto-beta-boswellic acid (AKBA), offer effective inflammation relief, making *Boswellia* a promising alternative to aspirin, especially for individuals at risk of Reye syndrome where mitochondrial integrity is a concern (Siddiqui, 2011; Moreillon, 2010).

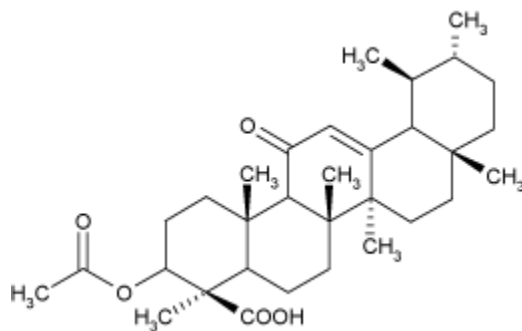


Figure 3. Acetyl-11-keto-beta-boswellic acid

Unlike aspirin, which broadly inhibits COX enzymes and may contribute to mitochondrial dysfunction, *Boswellia* selectively inhibits the enzyme 5-lipoxygenase (5-LOX), which plays a key role in the production of leukotrienes—molecules linked to chronic inflammation, especially in respiratory and joint conditions. This targeted action reduces inflammation by decreasing leukotriene synthesis, without impairing mitochondrial energy production or fatty acid oxidation. Additionally, *Boswellia*'s antioxidant properties provide further cellular protection, helping to neutralize oxidative stress that can damage mitochondria (Ammon, 2016; Dey et al., 2022).

*Boswellia* has shown promise in treating inflammatory conditions like asthma, arthritis, and inflammatory bowel disease (IBD). In asthma, for instance, its ability to lower leukotriene levels helps alleviate bronchial inflammation, reducing symptoms like wheezing and shortness of breath. In joint conditions such as osteoarthritis, *Boswellia* relieves pain and improves function without the gastrointestinal side effects often associated with NSAIDs (Biagi et al., 2023).

Generally well-tolerated, *Boswellia* is available in capsules, powders, and standardized extracts, with typical dosages around 300-500 mg taken two to three times daily. For children or individuals prone to inflammation-related sensitivities, consulting a

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healthcare provider is advisable, especially if *Boswellia* is combined with other anti-inflammatory herbs like ginger or turmeric (Belcaro, 2016; Micozzi, 2018).

With its selective action on the 5-LOX pathway, safety in mitochondrial function, and wide anti-inflammatory uses, *Boswellia* offers a viable natural alternative to aspirin for those managing inflammation in conditions such as respiratory and joint issues. Its profile aligns well with the safety needs of those vulnerable to mitochondrial toxicity, such as individuals at risk of Reye syndrome.

*Pinus pinaster*, commonly known as the French maritime pine, is native to the Mediterranean region and recognized for its medicinal properties. The bark of this tree yields Pycnogenol, a standardized natural extract widely studied for its potent antioxidant and anti-inflammatory effects. Pycnogenol contains a rich profile of bioactive compounds, including phenolic acids, catechin, and taxifolin, which contribute to its health benefits. Known for its cardiovascular support, Pycnogenol has shown a safer profile than aspirin, especially regarding bleeding risks.

Reye syndrome, a rare but serious condition in children, is characterized by brain and liver inflammation, often following viral infections. Aspirin is linked to an increased risk of Reye syndrome in children, making alternatives essential. Pycnogenol offers similar anti-inflammatory effects without increasing bleeding time, making it a safer option. Its antioxidant compounds can neutralize free radicals, potentially reducing the oxidative damage that exacerbates brain and liver symptoms in Reye syndrome. Pycnogenol has been shown to help stabilize liver enzymes and offer neuroprotection, possibly alleviating encephalopathy severity (Rohdewald, 2005; Weichmann & Rohdewald, 2024)

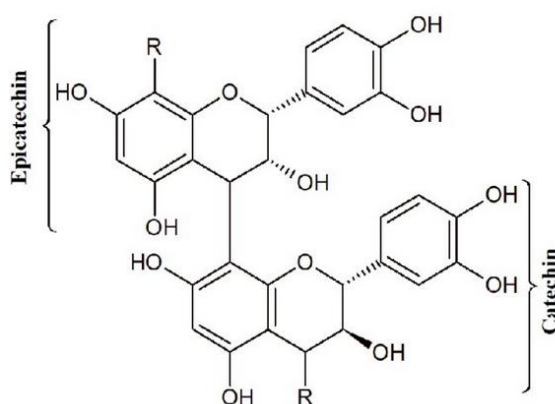


Figure 4. Pycnogenol

Additionally, Pycnogenol's hepatoprotective effects may support liver function by reducing markers of liver damage, helping prevent the metabolic imbalances that contribute to Reye syndrome's progression. Its sustained antioxidant effects offer potential for lasting symptom relief, particularly in managing inflammation without adverse bleeding risks. Although more research is needed to confirm its effectiveness specifically in Reye syndrome, Pycnogenol shows promise as a supportive, natural therapeutic agent for managing symptoms while reducing cardiovascular and oxidative risks associated with the condition (Ferreira-Santos et al., 2020; Shao et al., 2022).

*Paeonia lactiflora* contains active compounds such as paeoniflorin, which has demonstrated anti-inflammatory, antioxidant, and hepatoprotective effects in some studies. It has been used in traditional medicine for conditions involving liver diseases and inflammatory disorders (Xin et al., 2019).

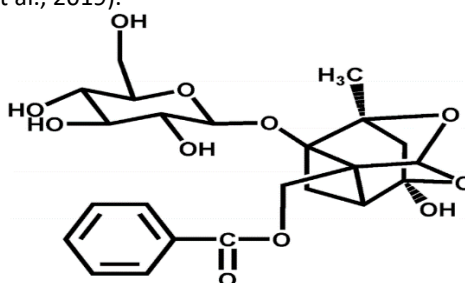


Figure 4. Paeoniflorin

Given that Reye syndrome involves liver dysfunction and brain inflammation, *Paeonia lactiflora* properties may offer supportive care, especially in reducing oxidative stress and inflammation. *Paeonia suffruticosa* has been traditionally used to treat liver



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conditions, pain, and inflammatory disorders (Lim, 2014; Ma et al., 2018). Some studies suggest that it can help with liver protection and improve blood circulation, which may help in cases where liver function is compromised, as in Reye syndrome. These herbs should not replace conventional treatments or be used without the guidance of a healthcare professional, particularly because the primary cause of Reye syndrome is linked to mitochondrial dysfunction triggered by viral infections and aspirin use. Herbal remedies can be considered as complementary but not curative options, and early intervention in Reye syndrome is crucial to prevent severe complications.

### III. CONCLUSIONS

In conclusion, Reye syndrome remains a serious concern in pediatric care due to its potential for rapid liver and brain damage, especially following viral infections. Given the association with aspirin use, the exploration of natural anti-inflammatory alternatives is crucial. Compounds found in turmeric, ginger, *Boswellia*, *Pinus pinaster*, and *Paeonia lactiflora* offer promising anti-inflammatory, hepatoprotective, and neuroprotective properties, presenting safer options for managing inflammation in children at risk of Reye syndrome. These natural agents may provide effective support by reducing inflammation and protecting mitochondrial function without the risks associated with salicylates. However, further research is essential to confirm their safety and efficacy in pediatric applications.

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## Teaching For Engagement: A Practice to Foster Lessons in the Central Senatorial District of Cross River State, Nigeria



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**ABSTRACT:** Teaching for engagement is an innovative strategy that places the learner at the fore of education. It is an approach which promotes active learning among children in primary schools. A multi-site case study was undertaken to explore the ways teachers conducted teaching for engagement to affect classroom lessons in three state primary schools located in Abi, Ikom and Boki Local Government Areas (LGAs) of Cross River State, Nigeria. Three (3) research questions were posed for the study. Six (6) teachers were selected from three primary schools across these LGAs for the study. Based on the social inclusion theory data was analyzed thematically. Findings were based on stated research questions and indicate that practitioner's choice of instructional strategy and promotion of learner voice affect engagement at lesson; huge workload on teachers and poor knowledge of pedagogy hinder engagement. It was recommended that emphasis should be on learner-centredness during classroom instruction, and that competent teachers have to be recruited to work in primary schools within the context.

**KEYWORDS:** teaching for engagement, teachers, teaching, participation, classroom lessons.

### INTRODUCTION

Teaching generates significant results insofar as it is engaging. Classroom instruction often presents a situation where a teacher meets the learner for educational purposes. The interaction which ensues from such a meeting usually creates a lopsided relationship. A situation which the teacher assumes the role of or is being regarded as 'all-knowing' is likely to keep the pupil at the sideline of the learning process, and the lesson unexciting. Modern teaching practices nonetheless are moving away from passivity to rather foster classroom environment where opportunity for learner participation abounds. It is an approach for provisioning education whereby teaching is being performed in ways that take cognizance of the value of pupils' contributions in enhancing knowledge generation and dissemination. By building partnerships with learners indicates that not only does the teacher have confidence and trust on pupils to co-create knowledge; he or she believes that the learner is also able to facilitate its impartation. Nowadays human curiosity motivates children to pursue measures that can assist them prevent practices that cause them to become compliant to the dictates of a teacher in the classroom. Such a change in behaviour probably alters the instructional procedure from being a lone affair to one that encourages mutual exchanges between the teacher and learner.

The task of teaching is quite an interesting one that can produce memorable experiences in the learners. Directed teaching cannot be said to have a connection to substantial positive experiences in classroom lessons. However, quite a number of teachers make it look arduous perhaps because they do not have the skills to share their responsibilities with pupils. Long held beliefs that question the competence and capacity of a child have continued to undermine the role of the pupil in improving school programmes. Educators do not seem to overcome diffidence regarding the quality of a child's inputs to alleviate any difficulties that may arise during the implementation of a lesson.

Much has been learnt over the past twenty years about engagement in the field of education. The rise in popularity of the concept connects its potentials to address educational challenges such as dictatorial teaching, poor learning outcomes, low interest, low achievement, school dropout, passivity in class activities among pupils and alienation (Chapman, Laird, Ifill & KewalRamani, 2011; Fredricks, 2015). In recent times engagement has achieved prominence in research and acceptance in education policy as an effective teaching approach for learner performance to thrive in school. Researchers such as Willms (2003), Fredrick, Blumenfeld & Paris (2004), Taylor and Parsons (2011), Power, Rhys, Taylor & Waldron (2018), Fielding (2004, 2008, 2012) and Ewa (2019) have

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made strong propositions in their work in favour of the concept. Although semantic variations might occur in the views of these researchers about the issue, there is however a consensus among them. Such an agreement about the term is much akin to the perspective of Trowler (2010) who conceptualised the concept as providing the chance for children to be active and make efforts to contribute at lessons.

Also, engagement has legitimacy in education. As enshrined in the national policy on education (NPE), the Federal Government of Nigeria (2013) declares that teaching and learning in the primary school shall be participatory and child centred. This national policy statement for primary education draws from the article 12 of the United Nations Convention on the Rights of the Child that states: “the child has the right to express his or her opinion freely and to have that opinion taken into account in any matter, including education, or procedure affecting the child” (United Nations Centre for Human Rights/UNICEF, 1990, pp. 3-12). Teaching for engagement places the pupil on the centre stage. Emphasis is on ensuring learner performance thrives. Teachers who support this practice are mindful about what they do, what do pupils do and how they do it to create spaces for co-operation to develop ideas and share knowledge for mutual benefit. Gavala and Flett (2005) and Johnson, Soldner, Leonard, Alvarez, Inkelas, Rowan-Kenyon & Longerbeam (2007) are of the view that engaging teachers are welcoming, support learning, facilitate collaboration, recognise and respect the diversity among children. Engaged pupils on the other hand often demonstrate readiness to learn, competency, autonomy and enjoy learning. Engagement mediates instruction and the reaction towards instruction by pupils, aimed at ensuring learning (Eccles, 2016).

It is implicit that motivation, interest, curiosity are vital to pupil engagement. It suggests that a lack of these factors or insufficiency of them results in low engagement or simply disengagement of the children in lessons in the classroom. Learner engagement takes place on a continuum from disengaged to engaged and vice versa (Bryson and Hand, 2007). Both disengagement and engagement of children in lessons occur in opposite directions. Failures on the part of such factors as family, teachers, school environment and education policy to make provisions for engagement are likely to weaken enthusiasm in children to learn. Lower performance, poor achievement, isolation, boredom, dissatisfaction with learning and dropout are often the final results of disengagement among school children (Willms, 2000).

Teaching for engagement is a participation procedure where teachers and pupils implement classroom lessons co-operatively to benefit the learner. Teaching for engagement recognises the child as having the agency to work with educators to co-create and share knowledge in classroom settings. It implies that didactic teaching practices promotes passive learning and is ineffective children’s education. The United Nations Convention on the Rights of the Child (UNCRC) and national governments including Nigeria, in recognition of the importance of juvenile education, legitimised engagement as a strategy to encourage the active participation of children in their local primary schools.

Educational practices have advanced. Prevalent practices in education allow the teachers to orchestrate virtually all activities in the classroom while pupils are expected to be compliant. New teaching strategies have emerged to ensure the learner takes more responsibility for what he is learning in the classroom and how he is learning it. Engagement is the latest approach whereby pupils are given the opportunity to be active during lessons for their academic performances to thrive. It is referred to as teaching for engagement. It acknowledges the fact that classroom programmes do not involve teachers alone. Besides, it is in realization of the fact that teachers are not omniscient. Pupils co-partner with teachers to co-create knowledge, share knowledge and implement lessons in ways that make teaching and learning effective and enjoyable. This connects the social inclusion (World Bank, 2013; Woodcock, 2013) postulation which supports the creation of opportunities for collaboration to enable children work with teachers to enhance teaching and learning.

In spite of these, teacher perceptions culturally about childhood tend to affect the opportunities they provide children to engage in classroom lessons in schools located in the central senatorial district of Cross River State, Nigeria. The understanding of teaching engagement among teachers seems to influence teachers’ behaviours in relation to their abilities to ensure children are engaged during classroom instruction within the context. These tend to affect learning among the children, their motivation towards creativity, to make contributions at lessons, to complete tasks, and even to attend school regularly.

### **PURPOSE OF THE STUDY**

The study explored the ways teachers conducted teaching for engagement to affect classroom lessons in three state primary schools located in Abi, Ikom and Boki local government areas of Cross River State, Nigeria. In specific terms, the study examined:

1. How practitioners conduct teaching for engagement to affect classroom lessons in primary schools;
2. The constraints to teaching for engagement during classroom lessons in primary schools;
3. Available measures to address the barriers to teaching for engagement among teachers to affect classroom lessons in primary schools.

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## RESEARCH QUESTIONS

The research will address the following questions:

1. How do practitioners conduct teaching for engagement to affect classroom lessons in primary schools?
2. What are the constraints to teaching for engagement during classroom lessons in primary schools?
3. What measures are available to address the constraints to teaching for engagement among these teachers to affect classroom lessons?

## RESEARCH METHODS

Since the research is focused on exploration, the qualitative research (Creswell, 2003) was employed. It allowed the conduct of real-world research and use of textual data so as to understand the overall issue under research from the perspective of the teachers and researchers. There tends to be unsubstantial application of qualitative methodologies, as an aspect of empirical procedures, in the field of Education in Nigeria. The present research helped to fill in the gap. In consequence, the quantitative method favouring the application of mathematical models in data collection and analysis is hereby jettisoned as it is not helpful herein. In addition, the quantitative research method is becoming an outmoded methodology in educational research, thus the paradigm is shifting today to the qualitative model.

## RESEARCH DESIGN

The multi-site case study (Creswell, 2003) was adopted for the study. This aligned with the qualitative direction of this study. It enabled the explanation and description of research contexts in details. Moreover, it made the researcher to be immersed in the culture of the participants in order to collect rich data. As such, other research designs that focus on quantification e.g. survey, ex-post facto etc are jettisoned.

## AREA OF STUDY

The study took place in public primary schools in three LGAs in the central senatorial district of Cross River State, namely, Abi, Ikom and Boki. These councils are among the six (6) LGAs that make up the senatorial districts in the state. These geographical locations are predominantly rural except for Ikom town that is suburban. Many public primary schools are established across these places. Teachers, including males and females, work in these schools. A considerable number of these teachers have the Nigerian Certificate of Education (NCE) as the minimum educational qualification according to the education policy of Nigeria. They include both young and veteran teachers who have spent from 3 to 30 years in service.

## POPULATION

Over 300 teachers, including males and females, served in about sixty primary schools sited in these places (Cross River State Universal Basic Education Board, 2023).

## SAMPLING THE TEACHERS AND THE SAMPLE

Male and female teachers across the schools were purposely recruited (Creswell, 2003) to participate in the study. Participants were drawn in such a way that ensured effective management of data. The sample included teachers aged from 25 to 50 years who have spent 3 and 10 years in service so that the research can benefit from their various experiences in regard to the overall issue under inquiry. Six (6) teachers from three primary schools, one each in Abi, Ikom and Boki constituted the sample size. Participants included one male and female educator per school. The sampling procedure allowed for a targeted, easy, equal selection of participants and also facilitated selection of teachers who could provide rich data to support the study.

## PILOT STUDY

A pilot study was conducted to trial the methods. This pilot study is to gauge how appropriate the methods are for the primary study. Six teachers, including three males and three females, in one public primary school outside the research area participated. The researcher had to step out from the research site to conduct the pilot study so as to prevent bias. Outcomes of the pilot study indicated that the participant observation and semi-structured interview were suitable for use in the main research.

## COLLECTING THE DATA

Lessons learnt from the pilot study led to the jettisoning of the observational method. Poor researcher skill, limited time and other extraneous issues discouraged the use of observation to generate data. Only the semi structured interviews (Robson, 20005; Asim, Idaka & Eni, 2017) were consequently deployed for that purpose. It enabled the researcher to ask pre-decided questions using an

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interview schedule. Participants were interviewed in turns in their schools. Meetings for interview were agreed upon between the inquirer and interviewees ahead of time. Interviews were conducted on the teachers during their free periods so as not to interrupt their classroom programmes.

### DATA ANALYSIS

The case schools constituted the units of analysis (Robson, 2005; Stake, 2006). Data that emanated from the semi-structured interviews were transcribed and organised into meaningful themes in accordance with the three research questions stated above. The audio recorder used to record the interviews was listened to repeatedly to familiarise with data and code them thereafter. Data was coded and re-coded to find similarities, variations and uniqueness in outcomes, structure and patterns. Data was then transcribed thoroughly and transcripts read repeatedly to search for meanings, patterns and evidence and develop key themes from the texts.

Thematic analysis (Robson, 2005; Creswell, 2009) were therefore used to analyse textual data collected from the participants. Themes were developed based on the piece(s) of information that occurred dominantly in the texts in relation to each of the three research questions. Patterns were identified, analysed and reported within data collected from the participants (Braun and Clarke, 2006). As such, the development of themes was data-driven. Data sets were organised in order in which they are connected to a theme for analysis. The themes was linked to the data themselves; not based on researcher analytic preconceptions (Braun and Clarke, 2006). Moving from these semantic content of the data (Braun and Clarke, 2006), progress was made towards interpretation by examining the ideas, views and theories that shaped the themes. Commentaries were included to the themes based on the understandings derived from data so as to address the research questions (Miles and Huberman, 1994).

### ESTABLISHING TRUSTWORTHINESS

Trustworthiness in qualitative research such as this one was ensured via a process of credibility, dependability, confirmability and transferability (Creswell, 2006). It is what is often being referred to as validation of instrument in which such principles as validity, reliability and generalisability apply to evaluate quantitative studies. For qualitative studies, however, the four canons listed above were applied during access to and analysis of data so as to establish trustworthiness. This allowed for the conduct of research audit trail to ensure the processes, procedures and events being followed to access and analyse data are conducted with minimum error and fraud. Also, this is to help build confidence in the data and findings.

### ETHICAL ISSUES

Approval was received from the funding agency (TETFund) before this study commenced. Authorities at the Cross River State State Universal Basic Education Board (CRS-SUBEB) helped to identify state primary schools in Abi, Ikom and Boki. The researchers negotiated access to the case school with the head teachers. Teachers gave informed consent to participate. Teachers are adults and can self-consent to participate in research. Interview questions were worded in ways that would not raise emotive issues. Observations were conducted during classroom lessons. The identities of participants are pseudonymised and their data held confidentially. Data is preserved by the lead researcher and kept safely in a locker, USBs and password protected personal laptops.

### RESEARCH FINDINGS

Analyses of data are covered under this sub-section. Work herein focused on three research questions stated above. The analyses of data are based on the themes which have been inductively developed from the interview transcript. Excerpts of the interviews are being presented as quotes to support the analyses. In consequence, data analyses are presented under the following subjects:

1. Practitioners' conduct of teaching for engagement during classroom lessons in primary schools.
2. Barriers to teaching for engagement during classroom lessons in primary schools.
3. Measures available to address the constraints to teaching for engagement among teachers during classroom lessons in primary schools.
4. Main findings

#### 1. PRACTITIONERS' CONDUCT OF TEACHING FOR ENGAGEMENT DURING CLASSROOM LESSONS IN PRIMARY SCHOOLS

The following were the activities with teachers and the outcomes for the above research question:

##### *Practitioner's choice of instructional strategy during classroom lessons*

Findings arising from data suggest that some of the educators view teaching for engagement as having:

- a. A link to the concept of behavioural engagement
- b. Ambivalence about the notion.

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Statements such as ‘methods that spark interest and attention among pupils’ , ‘children would like to give answers to teacher questions’ are a signification of behavioural engagement. It points to the way teachers conceive teaching for engagement in context, as a practice that ensures lively classroom activities in which both teachers and children are able to share thoughts and ideas to enhance education. Responses from other teachers that the subject-matter involves ‘making children to talk during lessons’ indicate a lack of clarity among the respondents regarding the issue. For some of the teachers, a participatory lesson is determined by children’s talk in the classroom. Evidence of these can be seen in the following statements from the teachers:

Teacher A:

I understand the idea to mean using methods than spark interest and attention among pupils. When that happens, children would like to give answers to teacher question in the classroom.

Teacher B:

When there is an engaging lesson it has to do with making children to talk during lessons.

Teacher C:

As for me, I can work with them and encourage them to ask me questions in the classroom.

Teacher D:

Sometimes it is difficult to know how to make a pupil to be engaged at lesson.

Teacher E:

. . . teachers can make them pay attention to what he or she is teaching.

Teacher F:

. . . yes it is like making the children to take part . . . in what is going on in the classroom.

### **Promoting learner voice at lesson**

Views from the educators give a sense about their level of understanding about the concept of learner voice in regard to pupil engagement during lesson. The perspectives they shared on this issue indicate that teachers perceive children’s engagement at lesson as when they are able to air their opinions, make inputs and ask questions to seek clarifications to certain grey areas during instruction. Being able to share their perspectives suggest that the children have developed interests in and pay attention to the teacher during lesson. It is a behaviour that connects the affective component of engagement as it has to with them showing interest in and enjoying the lesson. Findings from this part suggest engagement as:

1. *Pupil voice during lesson*
2. *A Connection to affective engagement in lesson*

This is indicative in the following teachers’ statements:

Teacher A:

As the teacher is teaching they can ask some questions for the teacher to . . . to clarify the issue for them.

Teacher C:

Asking questions show that they are participating in the classroom . . . especially those who have the courage to do so.

Teacher D:

You find out that they are engaged when they . . . don’t sleep as the lessons is being taught by the teacher.

Teacher E:

When we (the teachers) make them to laugh while the lesson is going on.

Teacher F:

Engaging them is when the teacher delivers instruction in such a way that the pupils can share their ideas in order to improve the lesson . . .

## **2. BARRIERS TO TEACHING FOR ENGAGEMENT DURING CLASSROOM LESSONS IN PRIMARY SCHOOL**

Below are the activities involving tutors and the outcomes for this research question?



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### ***Huge workload on teachers***

It was found that educators in public primary schools in Nigeria are usually saddled with huge tasks. They are often made to work in overpopulated classrooms, given plenty of subjects to teach alone and within a short time.

Evidence of this can be seen from the statements of the following teachers:

Teacher A:

Teachers are made to teach plenty of subjects each in the primary schools. For that the person be hurrying to teach to cover the syllabus for each subject you are handling, and there will very limited time to make children to ask series of questions that will would delay you. Also, our classrooms are crowded with pupils. What time will the teacher have to teach that number of subjects, attend to the needs of each of the children under his care and engage them during lesson? That is the problem!

Teacher B:

When teaching a classroom that is large is population it is impossible for the teacher create time for children to make inputs during lesson. It saps the teacher's energy to teach a large class and then still make them active during teaching and learning. The teacher will be so stressed to work like that.

### ***Poor knowledge of pedagogy***

A significant number of teachers, particularly the young ones, have poor teaching skills, knowledge of concepts, abilities to apply technology-based instructional materials. Quite a number of schools do not have modern teaching equipment. The very few that do manage to have them do not have teachers who possess the technical know-how to operate them. Poor technical ability is one issue that affects even the veteran teachers because they too are not exposed these tools. All of these hinder active participation of learners at lesson. This can be deciphered from the statements of some of the teachers:

Teacher A:

Nowadays teaching involves the use [of] modern instructional materials like computers, projectors. Who among the teachers in rural areas can operate these equipment?

Teacher B:

. . . There are colleagues who do not know what to teach in some topics. Sometimes what they teach is scanty and that leaves a lot areas uncovered. When as a teacher you pass instruction in a way that the interest of the children is not aroused how then do you expect them to develop an interest to engage in the lesson? Nothing can discourage learner participation like when a child discovers that you as the teacher cannot teach well.

### **3. MEASURES AVAILABLE TO ADDRESS THE CONSTRAINTS TO TEACHING FOR ENGAGEMENT AMONG TEACHERS DURING CLASSROOM LESSONS IN PRIMARY SCHOOLS**

While speaking with teachers the following were the outcomes for this research questions:

#### ***Emphasizing learner-centredness during classroom instruction***

It was found that the application of child-centred practices is a key to enabling teachers teach to engage the children during lessons. The teacher does this by regarding the pupils as partners in education. See the following statements from some of the teachers:

Teacher C:

Place the child first when teaching . . . .

Teacher D:

You can get them to participate when you, may be, use things like games to inspire them to play while learning

#### ***Recruit competent teachers***

This is a finding that indicates that competent teachers vary from qualified teachers. Being competent implies having the knowledge, skills, experience and enthusiasm to work with pupils in school whereas being qualified is just about having a certificate or licence to work as a teacher. This can be read further from the statements of the teachers:

Teacher B:

Government needs to emphasize competence over qualification during teacher employment

Teacher E:

Primary schools, as the foundation of education, need teachers who have knowledge, skills and are compassionate while working with children.

Teacher F:

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There should be retraining of teachers to make the incompetent ones competent because teaching involves developing future leaders for the nation. I say this because many of [my] colleagues have the paper qualification but in practice they are not fit to teach.

### 4. MAIN FINDINGS

The following findings arise from data analyses for stated research questions as follows:

*Research question 1:* practitioner's choice of instructional strategy during classroom lessons, and promotion of learner voice at lesson;

*Research question 2:* huge workload on teachers, and poor knowledge of pedagogy

*Research question 3:* emphasis on learner-centredness during classroom instruction, and the recruitment of competent teachers.

### DISCUSSION OF FINDINGS

The main findings of the research are being discussed based on research questions as follows:

#### Research question one

##### ***Practitioner's choice of instructional strategy during classroom lessons***

Evidence found in data collected from the teachers for research question 1 indicates the teaching method being plays a significant the level at which it can inspire learner engagement during instruction. In other words, some teaching approaches hold minimum abilities to trigger engagement while others can substantially promote active participation in children when applied by teachers in the classroom. In the words of teacher A on the issue, Teacher A: *I understand the idea to mean using methods than spark interest and attention among pupils. . . .* It means deploying methods innovatively to raise participation. Such methods can spark interest, enable self-directed learning and promote positive outcomes in the learners (Al Mandalawi, 2024). Couple with that, it is a demonstration of teacher dexterity and belief that an engaging lesson is a sure way to enhance performance in teaching and learning.

##### ***Promotion of learner voice at lesson***

Learner voice is one innovative strategy that bolsters teaching for engagement. This procedure highlights recognition and value for the views of learners in helping the teacher make the instruction participator. As shown in data, even the teachers concur that learner voice is an approach facilitates teaching for engagement in primary schools. In the words of teacher F: *engaging them is when the teacher delivers instruction in such a way that the pupils can share their ideas in order to improve the lesson . . . .* This confirms the theories of notable learner voice proponents such as Fredrick, Blumenfeld & Paris (2004), Taylor and Parsons (2011), Power, Rhys, Taylor & Waldron (2018), Fielding (2004, 2008, 2012) and Ewa (2019). These researchers and writers stated that the concept involves listening to the views of pupils, appreciating them and allowing them to make a difference in education.

#### Research question two

##### ***Huge workload on teachers***

Engagement of learners would suffer setbacks when the teacher is assigned plenty of work to do. By carrying a heavy task the teacher would already feel stressed and unable to deliver lessons to spur the pupils to become active. Teacher B stated that: *when teaching a classroom that is large is population it is impossible for the teacher create time for children to make inputs during lesson. It saps the teacher's energy to teach a large class and then still make them active during teaching and learning. The teacher will be so stressed to work like that.* This statement reveals that many teachers are unable to engage children during lessons in the context because they are made to work under the weight of large class configurations, subjects and other administrative role they may be called upon to perform from time to time. Teaching to engage pupils in a large class size wears down teacher effectiveness. Growing pupil population often comes with diversity and complexities in the process of teaching and assessing the learners. Most times the teachers find it quite difficult to cope. For that the use of active learning methods by the teacher can be pushed down the priority order for the directed instructional strategy to ensure that the teacher is able to cover the content of his or her subjects. Obviously in such circumstances it is likely that will only allow limited interaction between them and the children (Exeter, Ameratunga, Ratima, Morton, Dickson, Hsu & Jackson, 2010).

##### ***Poor knowledge of pedagogy***

There is evidence to show that many teachers in the context do not have enough knowledge of the subject matter of their subjects and are also not having good skills to teach. For example, teacher B stated: *. . . there are colleagues who do not know what to teach in some topics.* Teaching involves possessing the logic of teaching and able to practice teaching effectively. Since teaching requires interaction with learners, it is possible that a teacher who lacks these abilities cannot engage the learners in critical and analytical debates and deliberations. Learner engagement is disadvantaged when there is limited teacher conceptual knowledge.

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From the point of view of teacher-learner interaction in a Mathematics lesson, Dauda and Abidin (2012), stated that learner poor performance in the subject has been attributed to teacher knowledge of subject matter lesson presentation which makes students become passive and have less interaction with each other in doing mathematical tasks (*also see* Ntibi, Neji & Agube, 2020).

### Research question three

#### *Emphasis on learner-centredness during classroom instruction*

Teaching approaches that prioritize learner participation and needs is one way to tackle passive learning. Such methods enable the teacher to create a lively environment allowing the learners to become active during lesson. Adding to this, one of the educators, teacher D opined thus: *you can get them to participate when you, may be, use things like games to inspire them to play while learning.* In this way, according to teacher D, *the teacher would place the child first when teaching.*

#### *The recruitment of competent teachers*

Evidence from data generated from the teachers suggests that a measure for addressing the use of passive instructional strategies is by recruiting teachers who are not only qualified, but also competent to teach. For instance, teacher E suggested the *primary schools, as the foundation of education, need teachers who have knowledge, skills and are compassionate while working with children.* It is on that note teacher B suggested that *government needs to emphasize competence over qualification during teacher employment.* Competent teachers are effective in teaching, enabling an increased opportunity for interaction for pupils during lessons.

## CONCLUSION

Engagement in classroom instruction implies that the teacher is able to select and execute active learning methods to foster an exciting interaction during lesson. As this happens, learners feel the need to make useful contributions to improve the knowledge being imparted and the manner in which the impartation is being conducted by the educator. Classroom always reflects the existence of a diverse pupil population and each of them with his challenges and needs. A participatory classroom environment helps to spark activities among them, including the sharing of ideas to enrich learning. However, in some situations teaching causes passive behavioural expressions from the children in the classroom due to multivariate factors, including the teachers, pupils and environment.

## RECOMMENDATIONS

Based on the findings, the following recommendations were made based on the opinions of the practitioners to address the problems:

1. Teachers are to always focus applying learner centred approached during teaching and learning;
2. Government should always insist on the employment of teachers who qualified and are competent to teach.

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## The Influence of Tiktok Content Marketing, Customer Experience, and Reviews on the Loyalty Intention toward Local Fashion Brands



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**ABSTRACT:** This study examines the effect of content marketing, customer experience, and online customer reviews on the loyalty intention toward local fashion brands on TikTok Shop. The population in this study were TikTok shop users. The data for this research were collected using primary sources through a quantitative approach. A purposive sampling technique was employed to select TikTok Shop users as the research subjects. Out of 233 respondents who completed the questionnaire, an outlier analysis was conducted, resulting in 182 valid data points for further analysis. The analysis model used is multiple linear regression with IBM SPSS version 25. The regression analysis revealed that content marketing has a significant and positive effect on loyalty intention, as indicated by a positive coefficient. In addition, good customer experience is shown to significantly impact loyalty intention. Online customer reviews also show a significant influence, although slightly lower than content marketing and customer experience.

**KEYWORDS:** Content marketing, customer experience, online customer review, loyalty intention, local fashion brands

### I. INTRODUCTION

Social media plays a pivotal role as a digital marketing tool for businesses (Antasari et al., 2024). Marketing activities are driven by social media's impact on customer perceived value, brand awareness, and trust, which collectively contribute to fostering brand loyalty (Hapsari et al., 2023). One digital platform that is increasingly popular and has great potential is TikTok Shop, an ecommerce service integrated with the TikTok social media application. Local fashion brands can utilize TikTok Shop's multimedia content features to reach a wider audience. TikTok Shop enables local fashion brands to utilize its distinctive features, such as engaging video content, direct consumer interaction, and online reviews, to enhance consumer engagement, trust, and loyalty. Unlike traditional e-commerce platforms, TikTok Shop offers interactive and creative tools, including short videos, challenges, and visual effects, which help brands foster deeper connections with their audience (Alalwan, 2018; Tran, 2021).

TikTok Shop offers advantages in transaction activities, with users perceiving its features as having minimal associated risks (Sa'adah et al., 2022). A positive online interaction with local brands through social media enhances consumer buying interest. Such experiences foster favorable impressions, significantly influencing purchasing decisions (Rahman et al., 2018). The success of sales on TikTok Shop relies not only on product quality but also on the brand's capability to produce engaging marketing content (Lemon & Verhoef, 2016). In the digital age, content marketing has emerged as a pivotal strategy, enabling brands to attract and retain customers by delivering relevant and valuable content (Hollebeek & Macky, 2019).

Likewise, customer experience has long been recognized as a key factor in building customer loyalty (Lemon & Verhoef, 2016). Customer experience encompasses all interactions consumers have with a brand. Positive experiences can significantly enhance customer satisfaction and foster loyalty (Lemon & Verhoef, 2016). Platforms like TikTok Shop bring a new dimension to customer experience, combining social, entertainment, and shopping aspects in one. Nonetheless, past research, such as by McLean and Wilson (2016), has not fully addressed the complexity of user experiences on platforms like TikTok Shop, although online customer reviews, particularly in the form of short videos, have become an increasingly important source of information for consumers during the purchase decision-making process (Filiari et al., 2018). According to Zhang and Wu (2023), these reviews have a significant positive effect on loyalty intentions. On TikTok, reviews often come in the form of videos that offer a more engaging and informative perspective on fashion products, yet the impact of these video reviews on consumer trust and loyalty toward



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local fashion brands remains underexplored. While previous research, such as that by Zhu and Zhang (2010), has examined the role of online reviews in purchasing decisions, the specific influence of TikTok's short video reviews on consumer behavior requires further investigation.

Hollebeek and Macky (2019) found a positive relationship between content marketing and loyalty intention. However, Koay et al. (2020) highlight that the impact of content marketing on consumers varies depending on the type of content and the platform used. Similarly, Becker and Jaakkola (2020) argue that the relationship between customer experience and customer loyalty is not always linear, as it can be influenced by a range of factors. Keyser et al. (2020) further emphasize that the effect of customer experience is contingent on the quality of touchpoints and the context in which the experience occurs. Additionally, Zhao et al. (2021) found that certain features of online reviews significantly influence customer satisfaction. Wang et al. (2023) suggest that not all information in reviews carries the same weight; reviews that present information in a structured and engaging manner tend to have a greater impact on customer perceptions.

Most previous research has explored the influence of content marketing, customer experience, and online customer reviews separately (Tyrväinen et al., 2023; Mutambik, 2023; Macheka et al., 2024). These studies indicate a gap in research that integrates these three factors within the context of e-commerce platforms like TikTok Shop. On TikTok Shop, content marketing, customer experience, and online customer reviews are closely intertwined with the overall user experience of local fashion brands. Therefore, this study seeks to address this gap by examining how these three factors influence customer loyalty intentions toward local fashion brands on TikTok Shop. By understanding these dynamics, this study aims to provide valuable insights for marketing practitioners and local fashion brands, helping them optimize their strategies for the rapidly growing TikTok Shop.

## **II. LITERATURE REVIEW**

### **A. Content Marketing**

Content marketing is a strategy focused on creating and distributing relevant, valuable, and consistent content to attract and retain customers (Holliman & Rowley, 2014). It plays a crucial role in the digital age by emphasizing value creation and customer engagement (Bokariya et al., 2021). Over time, content marketing has shifted from traditional persuasive advertising to providing valuable information to consumers (Forrest, 2019; Le & Kalela, 2020). This approach is gaining prominence, especially on social media platforms, where the focus is on sharing engaging content to build relationships with consumers (Plessis, 2017).

Companies utilizing content marketing can leverage it as a powerful tool for brand strategy and customer relationship management (Odongo, 2016). Several studies have demonstrated that effective content marketing influences consumer loyalty intentions. High-quality, visually appealing content that entertains customers plays a vital role in fostering engagement, which ultimately drives brand loyalty and affection (Bazi et al., 2023). Moreover, social media marketing activities positively impact brand loyalty through enhanced community and brand engagement (Abdullah & Faisal, 2022). These findings align with Jafarova and Tolon (2022), who assert that content marketing on social media positively affects brand loyalty and purchase intention.

*H1. Content marketing has a positive effect on the loyalty intention toward local fashion brands on TikTok Shop*

### **B. Customer Experience**

Customer experience is a key concept in marketing, encompassing customers' subjective responses to both direct and indirect interactions with a company (Meyer & Schwager, 2007). Positive experiences fostered by companies can significantly influence consumer perceptions, emotions, and behaviors, ultimately impacting loyalty intention (Brakus et al., 2009; Klaus & Maklan, 2013). It plays a critical role in shaping customer satisfaction, loyalty, and purchasing behavior. Research indicates that factors such as familiarity, user experience, and social commerce features have a positive effect on consumer perceptions of ease of use, while also enhancing trust and purchase intentions (Hajli et al., 2017). In today's competitive business environment, customer experience has emerged as a crucial differentiator (Shaw et al., 2010; Drotskies & Herbst Fj, 2010).

Understanding and managing customer experience throughout the business journey is vital for companies (Lemon & Verhoef, 2016). Customer experience is recognized as an essential management tool due to its substantial influence on consumer behavior (Berry et al., 2002; Lemon & Verhoef, 2016). It encompasses all interactions between customers and the company during the purchasing process. Previous studies have consistently demonstrated a positive relationship between customer experience and loyalty intention. For instance, Kim and Choi (2013) found that the quality of customer experience—shaped by service outcomes, interactions, and peer-to-peer engagement—has a direct impact on customer loyalty. Similarly, research by Simanjuntak and Purba (2020) and Stein and Ramaseshan (2019) corroborates the positive and significant connection between customer



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experience and loyalty. These findings underscore the importance of enhancing customer experience to drive loyalty and longterm engagement.

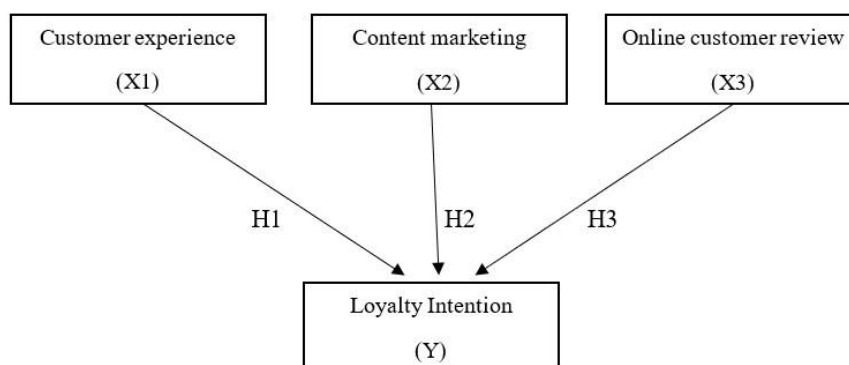
*H2. Customer experience has a positive effect on the loyalty intention of local shop brands on TikTok Shop*

### C. Online Customer Review

Maslowska et al. (2019) describe online customer reviews as a form of customer engagement behavior, presenting a framework to understand how different types of reviews influence purchasing behavior. Online reviews have become a pivotal factor in shaping consumer purchasing decisions and play a central role in marketing communications (Chen & Xie, 2004). Acting as an essential source of information, these reviews help potential buyers make informed decisions by identifying products that best suit their needs (Chen & Xie, 2004; Katole, 2022). Gesitera (2020) emphasizes that online customer reviews are more effective in attracting consumer interest in online shopping than traditional social media promotions. Reviews from other customers strongly influence shopping decisions and can significantly drive purchase intent. Zhu and Zhang (2010) further highlight that online reviews have a greater impact on the sales of lesser-known brands and among consumers with extensive online shopping experience. Beyond influencing purchasing decisions, online customer reviews also play a vital role in fostering consumer loyalty. Research by Park et al. (2007) indicates that the quality and quantity of reviews positively affect purchase intentions. Similarly, Lisnawati et al. (2021) found that online reviews enhance brand image and strengthen consumer loyalty. These findings underscore the strategic importance of leveraging online reviews to build trust, engagement, and lasting brand relationships.

*H3. Online customer reviews have a positive effect on the loyalty intention of local fashion brands on TikTok Shop.*

The conceptual framework of the study is illustrated in Figure 1 below:



**Figure 1 Conceptual Framework**

### III. RESEARCH METHODS

This study adopted a quantitative design with a cross-sectional survey approach to collect data, allowing for statistical measurement of the relationships between variables. According to Dilman et al. (2014), online surveys enable researchers to reach a diverse population, enhancing the representativeness of the data. Data collection took place in October 2024, with questionnaires distributed online to TikTok Shop users through social media platforms and with assistance from fellow researchers. A 5-point Likert scale (1 = strongly disagree to 5 = strongly agree) was used to measure respondents' data. The target population comprised active TikTok Shop users who had purchased fashion products from local brands through the platform within the past six months. The survey was conducted using Google Forms, and data analysis was performed using SPSS 25 software. The findings were compared with existing literature to identify the research contributions, particularly in the context of TikTok Shop and local fashion brands. Theoretical and practical implications were discussed, with a focus on strategies that local fashion brands can implement to increase customer loyalty by optimizing content marketing, enhancing the customer experience, and managing online customer reviews effectively on the TikTok Shop platform.

Nonprobability sampling was employed, with a purposive sampling method to select respondents. The sample size was determined based on Hair et al. (2017), who recommended a sample size for populations of uncertain size. The data collection targeted TikTok Shop users aged 18 to 50 years and above. Respondents were provided with brief information about the questionnaire's content and instructions on how to complete it. In total, 233 questionnaires were distributed, and 182 were included for further analysis after outlier removal and elimination of incomplete data. The sample consisted of 153 female respondents (65.7%) and 80 male respondents (34.3). In terms of age, 190 respondents (81.5%) were between 18-24 years old;

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28 (12%) were between 25-34 years old; 9 (3.9%) were between 35-44 years old; and six respondents (2.6%) were between 45-54 years old. Respondents aged 55 years and above did not complete the questionnaire. In terms of respondent area of origin, 79.8% of respondents came from Bali and Nusa Tenggara islands, 9.9% came from Java Island, 2.6% came from Sulawesi Island, 3.9% came from Sumatra Island, 1.7% came from Kalimantan Island, 1.7% came from Maluku Island, and 0.9% came from Papua Island. As for employment, 9.4% were not employed at the time of data collection, 60.9% of respondents were students or college students, 6.4% worked freelance, 18.5% were employed full-time, and 4.7% did not specify. As for being on TikTok, 141 (60.5%) respondents had been on TikTok for one to three years, 75 (32.3%) respondents for four to six years, and 17 (7.2%) respondents for more than seven years. As for the intensity, 51 (21.9%) respondents used TikTok for approximately one hour per day, 71 (30.5%) respondents used TikTok in the range of one to two hours per day, and 111 (47.6%) users used TikTok for more than two hours every day.

### IV. RESULTS AND DISCUSSION

Validity refers to the extent to which a measurement accurately reflects the variable it aims to study (Cooper & Schindler, in Zulganeff, 2006). The validity results are shown in Table 1, where all item-total correlation coefficients exceed the r-product moment value of 0.146 at a significance level of 5%. As a result, the scale is deemed both reliable and valid. All questions are considered valid since the significance values are <0.05. Customer experience and online customer reviews are two critical variables that significantly influence loyalty intention. A positive shopping experience and trust in customer reviews play key roles in fostering loyalty. This aligns with customer experience theory, which emphasizes convenience and security as central factors in creating a positive experience (Lemon & Verhoef, 2016). Similarly, Chevalier and Mayzlin (2006) state that consumers are more likely to be influenced by reviews deemed credible and relevant. As shown in Table 3, content marketing, customer experience, and online customer reviews all have a significant effect on loyalty intention, confirming that hypotheses H1, H2, and H3 are supported.

**Table 1. Summary of item-total correlation**

	Item	correlation
<b>Content marketing</b>		
Local fashion brand content on TikTok Shop provides useful information	CM1	.234
The content of local fashion brands on TikTok Shop helps me make better purchasing decisions	CM2	.544
The content of local fashion brands on TikTok Shop attracts my attention	CM3	.440
I enjoy viewing local fashion brand content on TikTok Shop	CM4	.581
I feel the content of local fashion brands on TikTok Shop is trustworthy	CM5	.605
<b>Customer experience</b>		
The interface on TikTok Shop is easy to understand	CE1	.601
The purchase process on TikTok Shop is simple and efficient	CE2	.657
I feel like the shopping experience at TikTok Shop is tailored to my preferences	CE3	.592
TikTok Shop provides product recommendations that are relevant to my interests	CE4	.585
I feel safe when transacting at TikTok Shop	CE5	.659
<b>Online Customer Review</b>		
Customer reviews on TikTok Shop help me make better purchase decisions	OCR1	.470
Reviews with product photos or videos strongly influence my purchase decision	OCR2	.458
I trust the honesty of customer reviews on TikTok Shop	OCR3	.573
I trust reviews from verified buyers on TikTok Shop more	OCR4	.606
I consider the number of positive reviews before buying local fashion products on TikTok Shop	OCR5	.594
<b>Loyalty intention</b>		

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I intend to continue buying products from my favorite local fashion brand on TikTok Shop	LI1	.670
I will recommend local fashion brands that I buy on TikTok Shop to others	LI2	.623
I will share positive experiences when shopping for local fashion brands on TikTok Shop	LI3	.527
I am willing to pay a higher price for my favorite local fashion products on TikTok Shop	LI4	.532
I will remain loyal to my favorite local fashion brand at TikTok Shop despite cheaper offers from competitors	LI5	.469

The reliability test is conducted following the validity test. To assess reliability, the Cronbach's alpha value is used as the criterion. A valid and reliable questionnaire is crucial to minimize measurement errors in the research variables (Bhattacharyya et al., 2017). The results of the data processing are shown in Table 2. The table indicates that Cronbach's alpha value above 0.7 signifies good reliability for all variables. Customer experience has the highest average among the variables analyzed. With a Cronbach's alpha value of 0.818, the measurement instrument for this variable is highly reliable and consistent. A positive customer experience tends to enhance loyalty intention, making this variable one of the key factors contributing to loyalty intention. Content marketing, with a Cronbach's alpha value of 0.694, is close to the minimum threshold, suggesting that some questions may not fully align in terms of consistency.

**Table 2. Descriptive Statistics and Reliability Test Results**

		Std. deviation	Cronbach's Alpha	Variance
Mean				
Content Marketing	20.29	2.227	.694	4.959
Customer Experience	20.82	2.245	.818	5.041
Online Customer Review	21.53	2.153	.746	4.637
Loyalty Intention	19.02	2.476	.717	6.132

**Table 3. Regression analysis of the effect of content marketing, customer experience, dan online customer review on loyalty intention**

Variable	$\beta$	t-value	Sig	Conclusion
Content Marketing	0.301	3.553	0.000	H1 (Supported)
Customer Experience	0.291	3.393	0.001	H2 (Supported)
Online Customer Review	0.200	2.356	0.020	H3 (Supported)

F = 30.566, p = .000, R = 0.583, R<sup>2</sup> = 0.340, Std error of the estimate = 2.029

The  $\beta_1$  value is 0.301, indicating that for every one-unit increase in content marketing, the loyalty intention increases by 0.301. The  $\beta_2$  value is 0.291, suggesting that for every one-unit increase in customer experience, loyalty intention rises by 0.291. The  $\beta_3$  value is 0.200, showing that a one-unit increase in online customer reviews leads to a 0.200 increase in loyalty intention. With a significance value of <0.05 and a calculated f-value of 30.566 (greater than 2.66), it can be concluded that all independent variables in this study have a positive and significant effect on the dependent variable.

The R<sup>2</sup> value of 0.329 indicates that 32.9% of the variation in loyalty intention is explained by content marketing, customer experience, and online customer reviews, with the remaining 67.1% influenced by other factors outside the regression model. The analysis confirms that the influence of content marketing, customer experience, and online customer reviews on loyalty intention is significant. Residual normality further supports the validity of the results, indicating that the findings are reliable for understanding the relationship between the variables. These results are not only valuable for academic insight but also serve as a guide for strategic decision-making for local fashion brands on TikTok Shop.

Regression analysis highlights that content marketing significantly contributes to loyalty intention with a positive coefficient. This suggests that creating relevant and engaging content enhances customer engagement and purchase intention. On TikTok, visuals and creativity play a crucial role in driving sales. A well-crafted content marketing strategy can capture the audience's attention, fostering brand loyalty. Brands should focus on producing content that is not only informative but also entertaining, creating an emotional connection with customers.

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Additionally, a positive customer experience is shown to significantly influence loyalty intentions. The results indicate that positive interactions between customers and brands—such as responsive customer service and a smooth purchasing process—can enhance customer satisfaction. In today's digital era, where customers have numerous options, providing an exceptional experience is vital to retaining loyalty. A positive experience strengthens the relationship between customers and brands (Jain et al., 2017). Therefore, companies must continuously refine every touchpoint with customers to ensure the experience remains consistently positive.

Online customer reviews also have a significant impact, though slightly less than content marketing and customer experience. This suggests that customer feedback, both positive and negative, plays a critical role in influencing the purchasing decisions of potential online shoppers. With TikTok's vast user base, positive reviews can attract more customers, while negative reviews can harm the brand's reputation. Consequently, companies should take a proactive approach to managing reviews—encouraging positive ones and responding constructively to negative feedback.

This research holds valuable implications for marketers of local fashion brands, particularly those operating on TikTok Shop. Given the significance of content marketing and customer experience, brands should prioritize creative and innovative strategies, ensuring all customer interactions are positive. Moreover, effectively managing online reviews is an essential component of building and maintaining customer loyalty. Ultimately, this study provides key insights into the factors influencing loyalty intentions toward local fashion brands on TikTok Shop. By leveraging these findings, companies can foster stronger customer loyalty and enhance their competitive position in the market.

### **IV. CONCLUSION**

Based on the results of the data analysis, it can be concluded that content marketing, customer experience, and online customer review variables significantly influence business performance. This confirms that an effective marketing strategy, which includes engaging content, a satisfying customer experience, and proactive management of online customer reviews, can positively impact business outcomes. Therefore, companies need to prioritize these three areas to enhance their competitiveness and performance in the market.

Companies should invest in developing marketing content that resonates with their target audience, ensuring it is both relevant and engaging. Furthermore, improving customer experience at every touchpoint—whether in person or through digital platforms—is essential for fostering loyalty and satisfaction. It is also recommended that companies actively manage customer reviews and feedback, as this can build consumer trust and strengthen brand loyalty. Investing in staff training and technology to facilitate better customer interactions will further support these efforts.

Overall, this research offers valuable insights for marketing and business management practitioners. By understanding and applying these findings, companies can develop more effective strategies to address the challenges of an ever-evolving market. Prioritizing content development, enhancing customer experience, and managing online reviews should be central to achieving success in a competitive business environment.

### **V. MANAGERIAL IMPLICATIONS**

Based on the results from the study, it is recommended that the company implement a stronger content marketing strategy and place a high priority on customer experience. Additionally, effectively managing online reviews is crucial, as they can significantly influence the perceptions of potential customers. Companies should focus on developing content that is engaging, informative, and relevant to their target audience. Quality content can drive customer engagement and interest, which can ultimately foster loyalty. It is also essential to manage the frequency and consistency of content creation to keep the brand on the customer's radar and build stronger relationships.

Improving the quality of customer service is also critical, particularly through timely responses to inquiries and effective handling of complaints. A positive customer experience can encourage loyalty and positive word-of-mouth. Encouraging customers to leave reviews about products is another key strategy. Positive reviews not only enhance brand reputation but also influence purchasing decisions. Responding to both positive and negative reviews demonstrates that the brand values customer feedback, which can improve brand image and strengthen customer relationships. Regular customer satisfaction surveys can also help identify areas for improvement and guide decision-making.

Given the popularity of TikTok as a social media platform, collaborating with relevant influencers can expand the reach and impact of the company's marketing efforts. In addition, establishing a loyalty program that rewards repeat customers with incentives such as special discounts can improve customer retention. By implementing these strategies, the company can optimize its approach on the TikTok Shop platform and increase loyalty intentions towards local fashion brands. A focus on enhancing

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customer experience and effectively managing customer-generated content and reviews will help create long-term relationships and drive business growth.

### VI. LIMITATION AND FUTURE RESEARCH

The results of this study provide valuable insights into the factors that influence customer loyalty. However, it is important to recognize that other variables may also play a role in shaping loyalty intention. Future research is recommended to explore additional variables that could further enhance the understanding of customer loyalty, enabling companies to develop more effective strategies. Furthermore, analyzing different sectors will provide a broader perspective on consumer behavior and allow for cross-industry comparisons.

This research focuses specifically on local fashion brands on the TikTok Shop platform, and the findings may not be fully applicable to other industries or e-commerce platforms. Additionally, the data collected in this study is subjective, relying on the perceptions of the respondents, which could affect the accuracy and reliability of the results. Future studies could incorporate additional variables that may influence loyalty intention, providing a more comprehensive understanding of the factors that drive customer loyalty. Expanding the research to other industries or product categories will allow for broader insights and comparisons. Longitudinal studies could also be conducted to analyze how loyalty intention evolves, especially in the context of changing digital trends and shifts in consumer behavior. By addressing the limitations of this study and considering the recommendations for future research, it is hoped that further investigations will contribute to a deeper understanding of the factors that influence customer loyalty in the digital age.

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## The Effect of Body Mass Index on Agility: A Perspective on Youth Volleyball Athletes Amateur



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**ABSTRACT:** This research aims to analyze the relationship between Body Mass Index (BMI) with agility in young volleyball athletes. The problem raised in this study is the lack of understanding of roles BMI as a predictor of agility, although agility is an important component of volleyball performance. The study involved 14 male participants who took part in extracurricular volleyball activities. Measurement BMI this was done using a weight scale and a stature meter, while agility was measured with the Hexagonal Agility Test. Data were analyzed using the Pearson Product Moment correlation test. Results indicate a significant positive correlation between BMI with agility, with a correlation coefficient of 0.631 and a significance value of 0.016 ( $p < 0.05$ ). In conclusion, improvement BMI caused by increased muscle mass is associated with increased agility in young volleyball athletes. Therefore, a comprehensive evaluation of body composition in athletes' fitness management is needed to optimize their physical performance.

**KEYWORDS:** Body Mass Index, Agility, Volleyball

### I. INTRODUCTION

The body mass index provides a general picture of a person's body composition which can be obtained from dividing body weight and height squared in meters which functions to assess the nutritional status of the population (Savita, Shantala, Parwati, & Shivaprasad, 2023), including volleyball players. Factors regarding weight and height need to be considered in the sport of volleyball, because having an ideal body can help players to bring out their best abilities through excellent physical condition (Koźlenia, Popowczak, Horička, Šimonek, & Domaradzki, 2024). If a volleyball player does not have an ideal body, it can reduce his performance in the match. According Miguel-Ortega, Calleja-González, & Mielgo-Ayuso, (2023), apart from the jumping, strength and explosive aspects, the anthropometric characteristics of the volleyball player's body also play a role in influencing performance and helping determine the ideal body shape. The assessment of an athlete's body mass index can be used to evaluate fitness and physical condition, verify the effectiveness of the training program, as well as form a specific profile that matches the demands of the sport. Besides that Pawlik & Mroczek, (2023) argue that results in volleyball games are determined by the optimal combination of motor factors and technical-tactical abilities. Elite volleyball players are generally characterized by significant height, high level of agility, and superior muscle strength, especially in terms of agility. In several sports such as volleyball, ideal body posture and good physical condition will be able to support achievement.

One of the anthropometric components that is an important indicator for an athlete is the Body Mass Index (BMI), which is a parameter used to assess body proportions by comparing body weight with height ( $m^2$ ). The World Health Organization (WHO) has established international classifications for BMI, namely underweight ( $< 18.5 \text{ kg/m}^2$ ), normal ( $18.5 \leq \text{BMI} < 25 \text{ kg/m}^2$ ), overweight ( $25 \leq \text{BMI} < 30 \text{ kg/m}^2$ ), and obesity ( $\geq 30 \text{ kg/m}^2$ ) (Dharmajayanti, Negara, & Artini, 2023). Body mass index is used as a body composition parameter that is easy to measure and apply (Abineno & Malinti, 2022). There are several studies that have found that the body mass index correlates with various aspects of physical performance such as agility. There is data showing that

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64.9% of individuals have an ideal body mass index (BMI), while 35.1% of individuals have a non-ideal body mass index (Pratama & Zulfahmidah, 2021). However, other research revealed that the level of negative body image was still quite high, namely 57.8%, while the remaining 42.2% had a positive body image, which of course affected the body mass index (Wati, Lidiawati, & Bintoro, 2019). Several factors that influence agility include age, gender, weight, and fatigue level (Popowczak et al., 2020; Evanow et al., 2021; Azra et al., 2024).

Agility in the game of volleyball is very important because it allows players to move quickly and efficiently throughout the field, anticipate and react to the movement of the ball and opponents, place themselves in optimal positions to receive, pass, or attack, maintain a good position in receiving serves or blocking, attack effectively with fast movements and variations of attacks, transition efficiently between defensive and attacking positions, use energy optimally, prevent injuries with good body control, make quick decisions, maintain hand-eye coordination, adapt to tactical changes, maintain performance in long rallies, and support position specializations such as libero, setter, and forward, all of which contribute to the player's confidence and overall performance (Cherouveim et al., 2020; Chuang, Hung, Chang, Wang, & Lin, 2022; Gulati, Jain, Lehri, & Kumar, 2021; Hale, Kollock, Pace, & Sanders, 2019). Emphasized by Dharmajayanti et al., (2023) that agility is one of the important biomotor components to train in athletes. Agility is defined as the ability of muscles to contract to produce fast, dexterous movements, or in other words, the individual's ability to change the direction of movement throughout the body quickly while keep balance. Some factors that influence agility include balance, strength, and speed.

This research focuses on a lack of in-depth understanding of the role of the body mass index as a predictor of agility in young volleyball players. Although it is generally believed that a lower BMI correlates with better agility, empirical studies that specifically confirm and quantify this association in the young volleyball player population are limited. Most existing research focuses more on the relationship between BMI and other components of physical fitness, such as speed (Popowczak et al., 2022), strength (Kushkestani et al., 2021) and durability (Wahyuti et al., 2022), without highlighting agility specifically. Given the importance of agility in the game of volleyball, an understanding of the extent to which BMI serves as a predictor of agility in young athletes is indispensable.

This research has important significance because it has the potential to provide new insights into optimizing the performance of young volleyball athletes. The findings of this study will contribute to the still limited literature on the effect of BMI on agility, especially in young players who are undergoing rapid physical development. The results are expected to provide insights for trainers and medical teams in designing appropriate training programs, as well as highlighting the importance of healthy body composition management to support optimal performance. The research also contributes to filling knowledge gaps related to factors influencing agility, through BMI measurements and standard agility tests that will be statistically analyzed to evaluate the significant relationship between the two.

## II. METODEDES

### A. Participants

The sample selection in the study used the total sampling method, totaling fourteen men who took part in volleyball extracurriculars. Average age ( $M \pm SD = 17.14 \pm 1.748$ ), body weight ( $M \pm SD = 55.29 \pm 7.710$ ), and subject height ( $M \pm SD = 165.00 \pm 4.095$ ). The subjects have been briefed on the potential risks and benefits associated with the study, and have given their consent to participate.

### B. Instruments and Procedures

In the research carried out there were two measurements taken, namely, body mass index measurements and agility. The body mass index is measured using a weight scale and a stature meter. The score used by the body mass index consists of underweight, normal, overweight, obese and extremely obese scales. Meanwhile, agility measurements use a hexagonal test which is designed to measure a person's agility. The instrument test used is a simple test in its use and shows significant validity and reliability of the test, so this test is a good choice for coaches and sports scientists in determining a person's body mass index and agility. Body mass index measurements were carried out 1 repetition and agility was carried out 3 times to determine the best score for each test with a recovery time of 10 seconds between each agility repetition.

**Table 1. BMI Criteria**

Criteria	Value
Underweight	$18.5 \leq$
Normal	18.6 - 25.0
Overweight	25.1 – 28.0

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Obese	28.1 ≥ 31.9
Extremely Obese	≥32.0

**Table 2. Agility Norms**

Criteria	Value	
	Male	Female
Excellent	<11.2 secs	<12.2 secs
Above Average	11.2 – 13.3 secs	12.2 – 15.3 secs
Average	13.4 – 15.5 secs	15.4 – 18.5 secs
Below Average	15.6 – 17.8 secs	18.6 – 21.8 secs
Poor	>17.8 secs	>21.8 secs

### C. Data Analysis

Data are presented in the form of average values and standard deviation. The normality assumption was tested first using the Shapiro-Wilk test before applying the parametric test. Relationship between body mass index and agility was analyzed using Pearson Product Moment Correlation. All analysis was carried out using SPSS software for Windows version 26. The value of statistical significance was set at  $p < 0.05$ .

### III. RESULT

Data from the results of the descriptive analysis carried out on male students taking part in volleyball extracurriculars can be found in table 3. In table 3, data were obtained regarding the number of samples consisting of 14 subjects with an average age of 17.4 years and a standard deviation of 1.748, which showed that the age variation between subjects was quite small. Furthermore, the average height of the subjects was 160 cm with a standard deviation of 4.095 indicating that there was little variation in the height of the subjects. Next the mean body weight of the subjects was 55.29 kg with a standard deviation of 7.710 indicating a greater variation in body weight between subjects. Then the average body mass index was 20.21 with a standard deviation of 2.694, this value shows that there is a fairly moderate difference in BMI between subjects. And the mean subject agility score was 7.0593 with a standard deviation of 1.05756, indicating that there was little variation in the level of agility the subject had. The entire data can be seen in the following table.

**Table 3. Results of statistical descriptive of mean values and standard deviations**

Descriptive Statistics			
	N	Mean	Std. Deviation
Age	14	5.14pm	1,748
Height	14	165.00	4,095
Weight	14	55.29	7,710
BMI	14	8.21 PM	2,694
Agility	14	7.0593	1.05756
Valid N (listwise)	14		

The normality test results shown in table 4 according to *shapiro-wilk* with a significance value of .948 ( $p > 0.05$ ), it can be concluded that there is a residual value with a normal distribution. Next, correlation analysis was carried out *Pearson Products Moments* to see the relationship between BMI and agility in extracurricular students of volleyball players. The following is normality test data.

**Table 4. Normality test analysis results**

	Shapiro-Wilk Statistics	df	Sig.
Unstandardized Residual	.976	14	.948

After calculating the prerequisite test, the correlation test between independent and dependent variables is then carried out. Based on table 5, the Pearson Product Moment correlation value in the body mass index is .631 with a significance value of .016 ( $p < 0.05$ ), so it can be concluded that the body mass index and agility have a large relationship according to considering the

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correlation as infimum (0.00-0.20), low (0.20-0.40), medium (0.40-0.60), large (0.60-0.80), and very large (0.80-1.00). The following is the correlation test data between variables.

**Table 5. Correlation test results**

Correlations		Agility	BMI
Agility	Pearson Correlation	1	.631*
	Sig. (2-tailed)		.016
	N	14	14
BMI	Pearson Correlation	.631*	1
	Sig. (2-tailed)	.016	
	N	14	14

\*. Correlation is significant at the 0.05 level (2-tailed).

### IV. DISCUSSION

Based on the results of correlation tests that have been carried out, it was found that the body mass index (BMI) has a significant positive relationship with agility, with a correlation coefficient of 0.631 and a significance value of 0.016 ( $p < 0.05$ ). This suggests that the increase in BMI is directly proportional to the increase in agility. The correlation indicated a moderate relationship between the two variables, but with a fairly high level of significance in the context of this study. The relationship between body mass index (BMI) and agility is an important topic in sports science, especially because these two variables are often associated with physical performance and health. BMI is a composite indicator that calculates the weight-to-height ratio and is often used to assess a person's body composition, whether they are classified as normal, underweight, overweight, or obese (Hernandez-Martinez et al., 2024; Pawlik & Mroczek, 2023). Meanwhile, agility refers to the ability to change direction or body position quickly and efficiently, which is one of the key components in various sports (Paška, Horička, Šimonek, Czakova, & Poláčková, 2023).

The positive correlation results between BMI and agility in this study may seem contradictory to general findings, which often suggest that high BMI is usually associated with being overweight, associated with reduced physical performance, including agility (Fiori et al., 2020; Hermassi, van den Tillaar, Bragazzi, & Schwesig, 2021; Mora-Gonzalez et al., 2019). However, it should be understood that BMI does not differentiate between muscle mass and fat mass. In the athlete population, a high BMI often reflects large muscle mass rather than excess fat (Abramowitz et al., 2018). Athletes with significant muscle mass may have a high BMI, but that muscle mass can support good physical performance, including agility. Studies show that greater muscle mass, if trained appropriately, can support the fast, explosive movements required in a variety of sports, including team sports such as volleyball (Aghajani, Hojjati Zidashti, & Elmieh, 2014; Tanghe & Martin, 2020). Research by Sonoda et al., (2018) emphasizes that agility is greatly influenced by the strength of the main muscles and the body's ability to coordinate movements efficiently. Therefore, individuals with a higher BMI due to significant muscle mass tend to have better agility performance than those with a lower BMI but with a greater proportion of fat mass.

The results of the studies that have been carried out show a positive relationship between BMI and agility, which results contradict the findings of many previous studies, which generally report a negative relationship between these two variables. For example, research Ruiz-Ariza et al., (2020) reveals that increased BMI is usually associated with decreased agility, as greater body mass increases mechanical load during rapid movement or change of direction. However, the positive association found in this study may be due to special characteristics of the sample, such as age or high levels of physical activity in subjects, who tend to be more active or athletic, and thus have a greater distribution of body mass while still being able to maintain optimal agility (Usher, 2019).

In addition, recent research in the field of exercise has also increasingly highlighted the importance of more specific body composition, such as the comparison between muscle mass and body fat, which can affect agility in different ways compared to BMI as a whole. Azra et al., (2024) emphasizes that greater muscle mass, especially in parts of the body actively used in sports, can contribute positively to agility despite higher BMI values.

The present invention has important relevance for trainers and sports nutritionists in managing the body composition of athletes. Although BMI is often used as a measuring tool quick to assess body proportions, in the context of athletes, a high BMI does not necessarily reflect a less than ideal body composition. Athletes who undergo intensive strength training tend to have greater muscle mass, which can actually contribute positively to agility and overall sports performance (Pauli et al., 2023).

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Therefore, it is important for coaches not only to focus on the ideal BMI number, but also to consider the athlete's body composition more thoroughly. These results also highlight the importance of a multidimensional approach in assessing athlete fitness. Relying on BMI alone as an indicator of agility or physical fitness can be too narrow. More detailed body composition measurements, such as densitometry or bioelectric impedance analysis, can provide a more comprehensive picture of muscle and fat proportions and their impact on physical performance (Campa et al., 2022; Kasper et al., 2021).

Mala et al., (2020) explains that young athletes tend to be in a stage of physical development where their bodies naturally build muscle mass so that having a higher BMI means having healthy muscles that can help support their physical performance. Yapici et al., (2022) emphasizes that muscle strength can increase with age, the increase in muscle mass that occurs is highest during the growth and development period in teenagers. Therefore, at a young age volleyball athletes have a relationship between BMI and agility which is more influenced by positive components such as muscle mass. Furthermore, the structured exercise carried out can also increase muscle strength, coordination and agility, thus, athletes who have a higher BMI because it is caused by large muscle mass can be trapped with increased agility. Emphasized by Chang, Sun, Lin, & Tsai, (2022) that regular and structured exercise can increase muscle mass, muscle strength and functional performance by approximately 30 minutes. Then greater muscle mass can provide stability when moving quickly or turning, this can have an influence on increasing rapid changes in direction (França et al., 2022).

Today's scientific understanding increasingly focuses on the importance of a more in-depth evaluation of body composition rather than using BMI as the only indicator. Research by Alzoubi & Nashwan, (2022) showed that the relationship between muscle mass and agility performance was stronger compared to overall BMI. Thus, although BMI is still relevant as an indicator of general health, more and more research is now focusing on lean body mass (lean body mass) and fat mass (fat mass) and their relation to physical performance (Pomeroy et al., 2018; ten Haaf et al., 2018). The positive correlation between BMI and agility in this study supports the view that higher BMI especially in athletes with significant muscle mass, can contribute positively to agility performance. However, it is important to carry out a more in-depth evaluation of body composition, because BMI alone does not provide an accurate picture regarding the influence of body composition on physical performance. Trainers, fitness experts and nutritionists need to take this aspect into account in designing exercise and weight management programs for athletes.

## V. CONCLUSIONS

Based on the research results, a positive and significant correlation was found between body mass index (BMI) and agility, with a correlation coefficient of 0.631 and a significance value of 0.016. This suggests that increased BMI in study subjects is related to increased agility, although this contradicts some previous studies that generally reported a negative association between the two variables. However, these findings can be explained by the specific characteristics of the study subjects, such as high levels of physical activity and greater distribution of muscle mass.

Although BMI is often used as a general indicator of body composition, this study highlights the importance of a more in-depth evaluation of body composition, especially in the athlete population. In athletes, a higher BMI often reflects greater muscle mass, which can support optimal physical performance, including agility. Thus, body composition characterized by a significant proportion of muscle mass can contribute positively to agility, despite high BMI values.

In conclusion, although BMI is a commonly used measuring tool, more detailed body composition, such as the proportion between muscle mass and fat mass, needs to be taken into account in the evaluation of physical performance. Therefore, trainers and sports nutritionists are advised not only to rely on BMI, but also to use more accurate measurement methods, such as bioelectric impedance analysis or densitometry, in order to manage athletes' fitness and performance more comprehensively.

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## Study of the Level of Knowledge of Elderly Posyandu Cadres “Bougenvile” On Degenerative Diseases in the Iroyudan Bantul Community



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**ABSTRACT:** The definition of degenerative disease is generally said that this disease is a process of decline in the function of organs that generally occurs in old age. Degenerative disease is one of the diseases often suffered by the elderly. Usually included in the elderly category between 45 years and 70 years. The elderly are more susceptible to degenerative diseases such as diabetes, hypertension, and end up with complications. It tends to be more likely that the elderly are affected by degenerative diseases because they don't really know how to handle them and cure them.

This study aims to determine the level of knowledge of cadres and members of the elderly posyandu “bougenvile”. This posyandu consists of posyandu cadres and posyandu members who have an age range between 45 years and 70 years and above.

There are 144 members of the elderly posyandu “bougenvile”. This study uses a purpose sampling technique by taking several samples to be studied. This research is descriptive type by distributing pretest and post test questionnaires. From the results of this study explain that knowledge has increased significantly to the level of knowledge of elderly cadres and elderly posyandu “bougenvile” experiencing changes in knowledge improvement from the pretest “less” from 30% to 20%, the category “Enough” from 23% to 27%, the category “Good” from 37% to 40%, and the category “Excellent” from 7% to 10%. With this, the average increase in knowledge increased by 3% in each category. Hence it can be concluded that the delivery of degenerative disease material can increase the level of knowledge of elderly cadres and elderly posyandu “bougenvile” in iroyudan, Bantul, Yogyakarta.

**KEYWORDS:** Degenerative diseases, Elderly, Posyandu Bougenvile

### I. INTRODUCTION

Degenerative diseases are non-communicable diseases. This disease is caused by a natural decline in the function of cells and organs due to the aging process (Dewi et al., 2021). In addition, degenerative diseases are also caused by lifestyles such as lack of physical activity and unhealthy diets (Hanum & Ardiansyah, 2018). Until finally this disease can affect a person's quality and life activities, and even some cases cause degenerative disease patients to have to undergo treatment, both inpatient and outpatient (Hasby et al., 2019). Generally, degenerative diseases are experienced by the elderly, but recently these cases have occurred at an early age. Some examples of degenerative diseases include heart disease, stroke, hypertension, diabetes mellitus. It is not uncommon to find degenerative diseases that have been complicated by other diseases, causing an increase in morbidity and mortality cases (Mighra & Djaali, 2020). Although degenerative diseases cannot be cured, they can be controlled by managing lifestyle such as diet, exercise, fruit and vegetable consumption and medication (Hanum & Ardiansyah, 2018).

Patients with degenerative diseases generally do not know the symptoms that arise in degenerative diseases, because patients do not feel pain. But degenerative diseases can be said to be diseases that will be felt in the long term. In general, natural sufferers ignore the disease. According to Dr. Gerard Reaven from Stanford University in 1988 called it syndrome X. This metabolic syndrome does not appear suddenly but through a long and slow process and is closely related to a person's lifestyle. It is the end result of an unhealthy diet with high sugar and fat content in food. Metabolic syndrome can be defined as a condition where a person experiences high blood pressure, obesity, high blood sugar levels and abnormal blood fat levels. Detection of metabolic syndrome

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needs to be done in two ways, namely physical examination and laboratory examination. Physical examination includes measurement of waist circumference and blood pressure. While laboratory examinations include Blood Glucose, HDL Cholesterol, Triglycerides, Adiponectin. A collection of symptoms in metabolic syndrome (according to IDF/International Diabetes Federation, 2005). Degenerative diseases that are often experienced by the elderly are diabetes militus, hypertension, heart disease, cancer, and stroke. These diseases are classified as degenerative diseases that are often experienced by the elderly. But the general public has not been able to overcome and identify degenerative diseases experienced.

The results of observations in iroyudan village, Bantul, Yogyakarta, there are 144 elderly people who are active in the elderly posyandu. Of these there are still pre-elderly and elderly. The characteristics of the elderly who prefer to play and focus more on musical activities. Because in this village there is an elderly angklung group that often performs at certain events. In addition, in the village there is an elderly posyandu that is active and often carries out health activities for the elderly. The elderly posyandu called bougenvile has several health cadres who pay attention to the elderly. The cadre is the target to provide more elderly health knowledge, especially degenerative diseases experienced by the elderly. Therefore, researchers will try to find out how well the cadres of the bougenvile elderly posyandu understand degenerative diseases in iroyudan village, bantul, Yogyakarta.

Based on the problems described above, the researchers are interested in conducting further study under the title “Study Of The Level Of Knowledge Of Elderly Posyandu Cadres “Bougenvile” On Degenerative Diseases In The Iroyudan Bantul Community, Indonesia”.

### II. METHODS

This type of research is descriptive by focusing on filling out questionnaires by respondents then analyzed by the team then concluded. This research has 2 steps, namely the first step of making a questionnaire as well as validating the questionnaire by experts and disseminating the valid questionnaire. Furthermore, the results of filling out the questionnaire can be seen how much the level of understanding of the elderly's knowledge of degenerative diseases suffered and how to overcome these diseases so as not to make other diseases arise. The respondents who will fill in 30 elderly people in the village of Iroyudan, Bantul, Yogyakarta.

### III. RESULTS

The results of the implementation of activities at the posyandu “bougenvile” in the Iroyudan area, Bantul, Yogyakarta Special Region by the research team of the Faculty of Sport and Health Sciences. The research was conducted on Saturday, August 02, 2023 at the house of the village head of Iroyudan, Bantul, Yogyakarta. This research refers to the background of the community who are members of the bougenvile posyandu. This research is entitled Study of the Level of Knowledge of Elderly Posyandu Cadres “Bougenvile” Against Degenerative Diseases of the Iroyudan Community, Bantul. The effort of this activity is to determine the knowledge of degenerative diseases of members and cadres of bougenvile posyandu Iroyudan, Bantul, Yogyakarta.

The above activity shows the team's concern to find out the knowledge of the elderly of Iroyudan about degenerative diseases. Assisted by members of the research team by accompanying elderly cadres and elderly members of the “bougenvile” posyandu to fill out questionnaires related to degenerative diseases. The pretest questionnaire will be used as the main benchmark for the research team to find out how well elderly cadres and elderly people understand degenerative diseases. After evaluating the pretest questionnaire, the level of understanding of elderly and elderly cadres will be generated. The following are the results of the pretest questionnaire for elderly and elderly cadres.

	Kategori	Frekuensi	Presentase
	Very Poor	1	3%
	Poor	9	30%
	Fair	7	23%
	Good	11	37%
	Excellent	2	7%
	Total	30	100%

Figure 1. Table of pretest results

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Then it is known that the initial level of knowledge related to degenerative diseases is still relatively good. Therefore, trying to maximise knowledge by providing material related to degenerative diseases and health in the elderly. It is hoped that the addition of this material can increase the knowledge of elderly cadres and elderly posyandu ‘bougenvile’ in the iroyudan area, Bantul, Yogyakarta. The material to be delivered by speakers Sabda Hussein and Rizky Mulyawan which contains degenerative diseases as well as ways of prevention and treatment, is added in terms of health as well. The presentation of the material lasted about 2 hours and was combined with self-massage practices for the prevention of degenerative diseases. The delivery of material is combined with practice so that cadres and the elderly can memorise independent massage movements with practice, if not combined with practice it will not be optimal delivery of material that can be absorbed by cadres and the elderly.

Kategori	Frekuensi	Presentase
Very Poor	1	3%
Poor	6	20%
Fair	8	27%
Good	12	40%
Excellent	3	10%
Total	30	100%

Figure 2. Table of posttest results

After the posttest was held, the results showed that the level of knowledge of elderly cadres and the elderly was recorded in the ‘Very Poor’ category 3%, the ‘Poor’ category 20%, the ‘Fair’ category 27%, the ‘Good’ category 40%, and the ‘Excellent’ category 10%.

#### IV. DISCUSSION

The results of observations in iroyudan village, Bantul, Yogyakarta, there are 144 elderly people who are active in the elderly posyandu. But out of 144 elderly people the research team only provided research with purpose sampling to streamline limited time by distributing questionnaires to 30 elderly people. Of these there are still pre-elderly and elderly. The characteristics of the elderly who prefer to play and focus more on musical activities. Because in this village there is an elderly angklung group that often performs at certain events.

In addition, in the village there is an elderly posyandu that is active and often carries out health activities for the elderly. The elderly posyandu called bougenvile has several health cadres who pay attention to the elderly. The cadre is the target to provide more elderly health knowledge, especially degenerative diseases experienced by the elderly. Therefore, researchers will try to find out how knowledgeable the cadres of the bougenvile elderly posyandu are about degenerative diseases in iroyudan village, bantul, Yogyakarta.

After the presentation of material related to degenerative diseases to elderly cadres and elderly posyandu ‘bougenvile’ there was an increase in the level of knowledge of elderly cadres and elderly posyandu ‘bougenvile’ experienced a change in knowledge increase from pretest ‘less’ from 30% to 20%, category ‘Enough’ from 23% to 27%, category ‘Good’ from 37% to 40%, and category ‘Excellent’ from 7% to 10%. With this, the average increase in knowledge increased to 3% in each category. Hence it can be concluded that the delivery of degenerative disease material can increase the level of knowledge of elderly cadres and elderly posyandu ‘bougenvile’ in iroyudan, Bantul, Yogyakarta.

#### V. CONCLUSION

The conclusion of this activity shows that by delivering materials related to degenerative diseases and health, it has succeeded in increasing knowledge of the community in Iroyudan, Bantul, Yogyakarta. Following the delivery of material helps improve degenerative and health knowledge for the welfare of the community.



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Ultimately, the success of this programme shows that the delivery of materials related to degenerative diseases and health can be used to maintain the health of the elderly, preventing the occurrence of diseases that result in death. Diseases are often experienced by the elderly who are sometimes late in prevention. Because only by preventing it can reduce other diseases that will arise. Usually experienced by the elderly are hypertension, diabetes, and many others.

That is why this research was conducted to support the government's programme to care for the elderly who tend to be a large population but do not know how to maintain health. By always checking health can extend the life of an elderly person and do activities to the fullest. There is an increase in the level of knowledge of elderly cadres and elderly posyandu ‘bougenville’ iroyudan, Bantul, Yogyakarta.

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## Digital Marketing Strategies to Enhance Visibility and Sales of MSMEs: A Case Study at KWT Kuncup Mekar



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**ABSTRACT:** In the ever-evolving digital era, Micro, Small, and Medium Enterprises (MSMEs) must adopt digital marketing strategies to remain competitive in an increasingly competitive market. Although digital marketing has proven effective in expanding reach and boosting sales, many MSMEs still face challenges in effectively implementing it. This research aims to analyse how digital marketing strategies can enhance the visibility and sales of MSMEs, particularly by examining a Case Study at KWT Kuncup Mekar. Through a qualitative approach, this study explores the experiences and perspectives of MSMEs regarding digital marketing by employing in-depth interviews, observations, and document analysis as data collection techniques.

The study found that the effective implementation of digital marketing strategies can significantly improve the visibility and sales of MSMEs. MSMEs utilizing various digital platforms, such as social media and e-commerce, experienced a notable increase in visibility and interaction with the market. However, the success of these strategies depends on the quality of content, understanding of market trends, and the ability to regularly evaluate campaign performance. Additionally, collaboration with external parties and partnerships can also broaden access to marketing resources.

In conclusion, this research concludes that digital marketing strategies play a vital role in enhancing the visibility and sales of MSMEs. MSMEs need to continually develop and update their strategies in line with market changes and consumer trends. Collaboration with external parties can also be an effective strategy to expand marketing reach. The researcher expresses gratitude to all parties involved in this study, including MSMEs at KWT Kuncup Mekar, respondents, supervisors, and research partners, for their contributions and support.

**KEYWORDS:** *Digital Marketing, Enhancing Visibility, Sales, MSMEs*

### I. INTRODUCTION

In the rapidly evolving digital era, Micro, Small, and Medium Enterprises (MSMEs) need to update their marketing strategies to remain competitive in an increasingly challenging market. MSMEs require business development through technology to compete effectively with similar businesses (Harahap et al., 2022). Digital marketing has become a key factor in expanding market reach and increasing sales. However, many MSMEs still face challenges in implementing it effectively. Digital marketing involves leveraging technology in marketing activities, such as using e-commerce for online sales transactions and utilizing social media as a promotional platform (Sholikhatin et al., 2022).

The need for digital marketing arises from rapid technological and connectivity advancements and the shift in consumer transaction behavior toward massive digitalization. This compels businesses of all sizes to adopt digital marketing approaches to grow their enterprises and broaden the distribution of their products and services.

The current situation indicates that MSMEs, including our partner, KWT Kuncup Mekar, face various challenges in marketing their products. Despite having high-quality products and significant market potential, their visibility remains limited. Stagnant sales and a lack of growth indicate that the marketing strategies are not optimal.

KWT Kuncup Mekar, as our partner, encounters several challenges in efforts to boost sales of its organic agricultural processed products. These challenges include a lack of strong presence on digital platforms such as social media or websites. Members of KWT Kuncup Mekar also face limitations in knowledge and skills regarding digital marketing management. The promotional methods used so far have not effectively reached potential target markets.

## Digital Marketing Strategies to Enhance Visibility and Sales of MSMEs: A Case Study at KWT Kuncup Mekar

This study is conducted based on several key reasons highlighting the importance of digital marketing strategies for KWT Kuncup Mekar in Buleleng:

1. **Increasing Sales of Processed Products**  
KWT Kuncup Mekar produces various processed products such as snap peas, cassava chips, and other cassava-based products. Sales of these products need to be improved to reach broader markets and increase the group's income.
2. **Utilizing Digital Technology**  
In the digital era, information and communication technology have become crucial in various business aspects. Digital marketing offers a more effective and efficient way to reach consumers compared to traditional marketing methods.
3. **Empowering KWT Members and Local Farmers**  
Increased sales will lead to higher demand for raw materials from local farmers. This helps improve farmers' incomes and empowers women members of KWT who are involved in production and marketing processes.
4. **Enhancing the Visibility of Local Products**  
Digital marketing enables local processed products from Buleleng to gain broader attention, not only in local markets but also at national and international levels. This introduces the richness of Indonesian agricultural products to a larger audience.
5. **Efficiency and Effectiveness**  
Digital marketing offers various tools and platforms that can analyze and measure campaign effectiveness in real time. This allows KWT Kuncup Mekar to quickly and accurately adjust their strategies.
6. **Market Competition**  
To face increasingly tight competition, MSMEs like KWT Kuncup Mekar need to adopt innovative strategies and adapt to technological developments. Digital marketing is one way to remain competitive and relevant in the market.

Based on these considerations, this study aims to analyze how digital marketing strategies can effectively enhance the visibility and sales of KWT Kuncup Mekar's products, as well as the positive impacts on KWT members and local farmers in Buleleng

## II. THEORITICAL REVIEW

### Digital Marketing

Digital marketing is a strategy that utilizes digital media and online platforms to promote products, services, or company brands (Aridi & Agustina, 2020). In the continuously evolving digital era, digital marketing has become an essential component of marketing efforts for businesses of all sizes. This approach leverages digital technology and the internet to reach target audiences effectively and efficiently.

One of the primary advantages of digital marketing is its ability to reach a broader audience at a lower cost compared to traditional marketing methods (Eka Santi, 2020). Through digital marketing, businesses can interact with potential customers across various online platforms such as websites, social media, email, search engines, and mobile applications (Mulyantomo et al., 2021). This enables tailored messaging to target audiences and allows for better monitoring and measurement of campaign effectiveness.

### Visibility

Enhancing visibility involves strategies to help businesses, particularly MSMEs, expand their reach and improve market presence. According to Kotler (2016), increasing visibility is a marketing strategy aimed at making products or brands more recognizable to a broader audience. This involves utilizing various marketing tools and techniques to attract attention and build brand awareness in the target market.

Kaplan and Haenlein (2010) describe visibility enhancement as the process of leveraging social media to expand reach and build engagement with consumers. Social media allows businesses to communicate directly with customers and foster loyal communities.

High visibility is the result of a strong and consistent branding strategy. Effective branding ensures that products or services are easily recognized and remembered by consumers, increasing the likelihood of being chosen over competitors.

In summary, increasing visibility requires a structured strategy that includes leveraging digital technology, implementing strong branding, and employing effective communication to make a business more recognizable and memorable to a broader audience.

### Sales

## Digital Marketing Strategies to Enhance Visibility and Sales of MSMEs: A Case Study at KWT Kuncup Mekar

Sales refer to the process in which goods or services are exchanged for value, typically in monetary terms. According to Philip Kotler (2016), sales are the process through which consumer needs and wants are met by exchanging products or services for specific value.

Sales play a crucial role in marketing, focusing on how businesses can satisfy customers and achieve their business goals. Based on definitions and studies from various experts, sales can be viewed as a complex process involving multiple elements, from identifying customer needs to achieving customer satisfaction and long-term loyalty. It is not just about transactions but also about building sustainable relationships with customers.

### MSMEs

Micro, Small, and Medium Enterprises (MSMEs) play a significant role in the economies of many countries, particularly in job creation and contributing to GDP. Schaper and Volery (2004) define MSMEs as businesses characterized by small size in terms of revenue, number of employees, and capital. They emphasize that MSMEs often have simple organizational structures and high flexibility in adapting to market changes.

MSMEs are vital for fostering innovation and creating jobs, especially in local economies. These businesses are typically independently owned and operated, often serving local markets. MSMEs also play a crucial role in economic diversification.

The development of MSMEs as a priority in development policies is a right that must be fulfilled. Although inclusive and competitive economic development is often declared a shared goal for Indonesia, policies specifically focused on MSME development remain limited compared to other development priorities. To achieve development objectives more effectively and efficiently, it is essential to ensure that development policies and their implementation consider the needs of MSMEs to foster growth, rather than imposing conditions that are difficult for MSMEs to follow (Darwin, 2017).

In conclusion, MSMEs are small- to medium-scale businesses that play a vital role in the economy through job creation, innovation, and contributions to GDP. The definition and role of MSMEs can vary depending on the local context and the economic policies of each country.

### III. RESEARCH METHOD

The research method applied in this study involves a qualitative research design aimed at gaining an in-depth understanding of MSMEs' experiences and perspectives regarding digital marketing. The steps include careful sampling to ensure good representation of the MSMEs that serve as the subjects of the case study.

The data collection techniques used include in-depth interviews, observation, and document analysis to gain a holistic insight into the digital marketing strategies implemented by MSMEs. Additionally, qualitative data analysis is employed to identify patterns and key themes emerging from the collected data.

### IV. RESULT AND DISCUSSION

The results and discussion of the study titled "*Digital Marketing Strategies to Enhance Visibility and Sales of MSMEs: A Case Study of KWT Kuncup Mekar*" can be summarized as follows: This study reveals that implementing digital marketing strategies has a significantly positive impact on the visibility and sales of Micro, Small, and Medium Enterprises (MSMEs), as documented in the case study of KWT Kuncup Mekar. The findings show that MSMEs adopting digital marketing strategies—such as leveraging social media, SEO, and relevant online content—experience notable improvements in their visibility in both local and online markets.

The discussion highlights that digital marketing strategies enable MSMEs to be more easily discovered by potential customers and to interact directly with their market. Such interactions not only enhance brand awareness but also strengthen relationships with existing customers while expanding the base of new ones. By utilizing the diverse digital platforms available, MSMEs can optimize their resources to reach a wider target market and significantly boost sales.

The study also emphasizes the importance of MSMEs actively understanding trends and changes in consumer behavior and adapting their marketing strategies accordingly. By taking a responsive and flexible approach to market dynamics, MSMEs can strengthen their position in increasingly competitive business environments. Thus, the study contributes to understanding the critical role of digital marketing strategies in enhancing MSME visibility and sales while providing practical insights for MSMEs to develop effective marketing strategies in the digital era.

The success of MSMEs' digital marketing strategies depends not only on their online presence but also on the quality of the content they deliver and the interactions they foster with their audience. Relevant, informative, and engaging content has a significant potential to attract consumer attention and build strong relationships. Therefore, MSMEs must focus not just on the frequency of their postings but also on the quality of the content they share to ensure a positive impression on customers.

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It is essential to recognize that digital marketing strategies are not static; they require continuous evaluation and adjustments in response to market trends and consumer feedback. MSMEs need to actively monitor their digital campaign performance, analyze the data obtained, and identify areas for improvement. This may include optimizing search strategies, enhancing social interactions, or even exploring new emerging platforms.

Considering specific aspects of digital marketing strategies tailored for MSMEs, such as the need to operate within limited budgets while maximizing resource efficiency, MSMEs can utilize low-cost but effective digital marketing tools and techniques, such as organic social media usage, content marketing, or collaborations with local influencers. With smart and focused approaches, MSMEs can achieve significant results despite budget constraints.

Overall, the study demonstrates that digital marketing strategies are key elements in strengthening the visibility and sales of MSMEs. By understanding and implementing appropriate digital marketing strategies, MSMEs can take concrete steps to enhance their competitiveness in this increasingly digital market. However, success does not come automatically; it requires commitment and hard work in developing and executing effective and responsive digital marketing strategies.

The success of MSMEs' digital marketing strategies is also influenced by their ability to regularly measure and evaluate campaign performance. MSMEs must identify relevant key metrics, such as conversion rates, user engagement levels, or ROI (Return on Investment), and use this data to make better decisions in allocating marketing resources. By understanding what works and what doesn't, MSMEs can continuously refine their digital marketing strategies over time.

Additionally, collaboration and partnerships with external parties, such as digital marketing agencies or industry stakeholders, can also be effective strategies for MSMEs to enhance their visibility and sales. By leveraging the expertise and additional resources of external partners, MSMEs can expand their reach and access resources they may not possess internally. This also helps reduce internal workload, allowing MSMEs to focus on their core business activities.

The success of MSMEs' digital marketing strategies is not only measured by direct revenue but also by their long-term impact on business growth and sustainability. Besides increasing sales, effective digital marketing strategies can help build a strong brand, enhance customer loyalty, and expand the MSME market share in the long term. Therefore, investing in digital marketing strategies is not merely a cost but an investment in the future of MSME businesses.

The study reaffirms that digital marketing strategies are crucial in improving MSME visibility and sales. With a targeted approach, continuous evaluation, and the right collaborations, MSMEs can optimize their digital marketing potential and achieve sustainable success in this digital era.

The Role of Information Technology, Information technology (IT) involves creating, storing, transforming, and utilizing information in all its forms. Through the use of IT, MSMEs can enter global markets. Companies like Amazon, Yahoo, and eBay, which started as small businesses, grew into giants in a short time because they utilized IT to develop their businesses. For small businesses, IT use in operations, often referred to as e-commerce, provides flexibility in production, faster delivery for software products, quick and cost-efficient tendering, and paperless transactions.

The internet allows MSMEs to market their products to global markets, opening up vast export opportunities. Transaction costs, including communication expenses, can also be reduced through better IT systems. The positive aspects of leveraging internet networks for business development include:

1. Enhancing product promotion through direct, rich, and interactive customer engagement.
2. Creating distribution channels for existing products.
3. Reducing the cost of information delivery to customers compared to conventional means.
4. Drastically shortening information exchange times, taking minutes or seconds.

The establishment of IT-Based MSME Development Centers at the district or sub-district level is essential because most MSMEs are located in rural areas without internet access or websites. These centers would enable MSMEs to expand their markets both domestically and internationally efficiently. Improved prosperity for MSME communities and their workforce would positively impact national development success.

Although Indonesian MSME products often match or exceed the quality of foreign goods, they lag in technology for production, packaging, and marketing. For competitiveness, MSMEs must adapt to modern advancements. By leveraging IT, MSME performance can become more efficient and effective, providing a significant return on investment. With IT, MSMEs can compete not only domestically but also internationally, excelling in quality, packaging, speed, and marketing.

## V. CONCLUSION

This research has provided a deeper understanding of the role of digital marketing strategies in enhancing the visibility and sales of Micro, Small, and Medium Enterprises (MSMEs). By examining the case study of KWT Kuncup Mekar, the researcher

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successfully identified how the implementation of digital marketing strategies significantly impacts the performance of MSMEs in an increasingly digital market.

From the findings, it can be concluded that digital marketing strategies play an essential role in strengthening MSMEs' position in the competitive market. Through the application of appropriate strategies, MSMEs can increase their visibility, expand their market reach, and significantly boost their sales. However, success does not come automatically; commitment, continuous evaluation, and adaptation to market changes are necessary to ensure the sustainability of these digital marketing strategies.

Based on these findings, the researcher offers several recommendations for MSMEs and related stakeholders. First, MSMEs are encouraged to actively understand market trends and consumer responses while continuously developing and enhancing their digital marketing strategies. Second, MSMEs should focus on the quality of the content they deliver and continuously monitor the performance of their campaigns, using the data collected to make better decisions. Finally, the researcher suggests collaboration and partnerships with external parties to expand their reach and access additional resources in digital marketing.

The researcher wishes to extend profound gratitude to all parties involved in this study. Special thanks go to the MSMEs at KWT Kuncup Mekar for their willingness to participate as the case study subjects and share their experiences. Gratitude is also extended to the respondents who participated in interviews and provided valuable data for this research. Lastly, the researcher would like to thank the supervising lecturers and research colleagues for their guidance and support throughout the research process. All contributions and support have been invaluable to the success of this study.

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## Teacher Performance and Implementation of The Independent Curriculum in Improving the Quality of Education (Descriptive-Analytical Study at MAN Banyumas, Central Java Province)



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**ABSTRACT:** Performance is an expression of a person's competence based on understanding, attitude and skills, motivation in achieving work. A teacher's performance can basically increase and decrease depending on the teacher performance management process in the institution. While the independent curriculum is a curriculum with intracurricular learning with diverse content so that students can be more optimal and have enough time to explore concepts and strengthen competence. Therefore, it is necessary to study teacher performance and the implementation of the independent curriculum in improving the quality of education, one of which is at MAN Banyumas, Central Java Province. This research is a qualitative research that is descriptive and observation, interview and documentation as data collection techniques. The subjects of the research are the Head of MAN Banyumas, Deputy Head of Curriculum, teachers, Committee and students. The results of this study indicate: (1) Improvement of teaching and learning activities in the classroom by using technology media and the implementation of supervision is carried out optimally. (2) Increased knowledge (3) MGMP (4). Increased ability (5) Increased skills (6) Increased self-attitude (7) Teacher certification. The model for improving teacher performance through The Spiritual Motivation in The Learning Organization, based on the assumption of factual conditions at MAN Banyumas, so the model that the researcher put forward contains hypothetical thoughts about teacher performance through learning organizations is expected to be more effective, efficient and productive. The steps taken so that teacher performance and the implementation of the independent curriculum in improving the quality of education are effective and efficient and productive as follows: First, setting teacher performance standards, second, conducting screening , third, determining strategic issues and making plans. Fourth, implementing coaching through a learning organization with six disciplines (The Sixh Discipline). Fifth, evaluating the results of coaching in improving teacher performance. The learning process through single loop or double loop and having an impact on accelerating change in the organization is called the cybernetic quantum learning cycle. A cycle of correction and identification of learning systems both individually and in groups as feedback to make continuous improvements. The role of the visionary head of MAN Banyumas and a conducive organizational culture, qualified human resources and a good learning culture greatly determine teacher performance and the implementation of the independent curriculum in improving the quality of education through The Spiritual Motivation in The Learning Organization. In addition, teachers also master and are able to optimally implement four competencies at MAN Banyumas, namely pedagogical competency, professional competency, personality competency and social competency.

**KEYWORDS:** Performance, Teachers, Independent Curriculum, Education Quality.

### I. INTRODUCTION

Education is defined as the process of developing abilities or human potential in living life, both as individuals, citizens, and as part of society world. The development of this potential occurs in the environment, both in family, the world of work, educational institutions, and society. Education also interpreted as a field/sector service Which important in determine success aspect development nation in a country. Education Also called as investative-productive become determinant for nation. In

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developed countries, education is not only a consumptive aspect also considered as a "human investment" and becoming a "leading sector" which prioritized.

For increasing quality education must optimize management. Because "proceed the retreat an institution education, quality and whether or not A institution education, depends on management in in the institution". Institution education Which Can it is said bonafide Lots apply "Open Management". Various possibility Which done because of institution education now must be able to encompass various activities that are increasingly demanded by "consumer education" For capable increase output education Which naturally satisfying customers/consumers. Already it is a common issue that prosperity something related to a nation with quality or quality learning institution education Which concerned. Ascension quality learning past standardization as well as professionalization which moment this lots of demand understanding and knowledge to regulation change Which There is in context education. The existence of regulation education Which centralized become decentralization confirm that taking regulation shifts from the center to regional government, namely local government city/district. Therefore, teacher performance and implementation independent curriculum must be optimized so that the goal is achieved education is achieved.

The problems faced by the Indonesian nation, especially education, are related to the quality of education at various levels of education, but various Efforts are being made to improve the quality standards of Indonesian education. Therefore, in order to improve the quality standards of educational services in Indonesia need implementation curriculum Which optimal, means infrastructure and others. The statement above is in line with results study from Image Goddess, et al. Which explain in results his research that performance Teacher in JUNIOR HIGH SCHOOL Country 3 Sidoarjo in implementing the independent curriculum based on P5 Having results which is good with an average value of 55.17 which is in the interval value with good category. So Researchers are interested in raising the research theme entitled "Teacher Performance and Implementation of the Independent Curriculum in Improving Quality Education in Madrasah Aliyah Banyumas." So that the output expected can satisfying customer education which in accordance with need also hope public.

### **II. RESEARCH METHODS**

This research at MAN Banyumas, Central Java Province, uses a qualitative method that is more based on phenomenological philosophy that emphasizes the appreciation (*verstehen*) of human behavior (Cook and Reichard, 1982:10). Data collection techniques use observation, interview, and documentation methods and triangulation as a data validity test technique where researchers try to obtain data credibility by combining observation, documentation, and interview techniques for collecting the same data. Djarn'an Satori and Aan Komariah (2009:22) state that: qualitative research is research that emphasizes quality or the most important thing about the nature of a good/service. Meanwhile, according to Sugiyono (2013), qualitative research methods will be suitable for researching research problems that are not yet clear, still dim, or perhaps still dark. This kind of condition is suitable for research using qualitative methods, because qualitative researchers will go directly to the object, explore with the grand tour question, so that the problem can be found clearly. To strengthen and complete the collection of research data, researchers also use a tape recorder as an aid in data collection and recording non-verbal information.

### **III. LITERATURE REVIEW**

#### **DEFINITION OF PERFORMANCE TEACHER**

Performance can interpret as activity Which has done someone in the form of the tasks he receives. Big Language Dictionary Indonesia (KBBI) the concept of performance can also be defined as an effort that is achieved somebody. Webster's third new international dictionary mentions all activity or process settlement something implementation activity, ability for achieve, ability in achievement results Which set. (Gave and Websters, 1996)

According to Irma Fahmi Performance is results from a process organization, where organization That nature oriented on profit (*profit oriented*) and *non* -profit oriented in one period. Indra Bastian state performance as a description about level achievement from implementation an activities/programs that are oriented towards goals, missions and visions organization in formulate draft strategic organization (*strategic planning*). Whereas Nanang Fattah states that performance Work (*Performance*) is an expression of a person's competence. based on on understanding, attitude and also skills, also motivation in work achievement. So, teacher performance is the teacher's ability to carry out work or task Which owned by him in finish a work. With thus position Teacher as profession demand skill and skills special in the field education.

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### a. PROCESS EVALUATION PERFORMANCE TEACHER

Evaluation performance consists of from three step, namely define work, start Work And give bait come back. Because position a Teacher on a Madrasah such that the urgency, especially its impact on the learning process, and it is not surprising either if all aspect Good That government, guardian students, and *stakeholders* other very support to quality education in Madrasah very depends on ability his teacher.

According to Schuler in Jackson (in Susan 1997: 11) There are 3 criteria evaluation performance as follows: 1) Performance is based on nature, namely centered on nature or characteristics. personal Teacher, ability communicate, loyalty, skills lead, And reliability. Characteristic performance Which centralizes self to individual is not what the individual gets or doesn't get the in the field his job. 2) Criteria based on on behavior/attitude, namely oriented on how the field of work is carried out. This type of nature is also very important in his field and needs connection between individual somebody. 3) The criteria are based on the results, where these criteria are oriented towards something Which achieved.

### b. OBJECTIVE EVALUATION PERFORMANCE TEACHER

Evaluation performance used in achievement success a programs/activity, where the program is in accordance with the targets and objectives. has been established in order to realize both the vision and mission of Madrasah. The dimensions of the performance assessment concept include performance indicators. Pasolong to put forward objective evaluation performance as follows: 1) Base giving compensation employee Which comparable with performance Which done. 2) Base giving promotion for employee or employee Which own achievements/work that Good. 3) Base giving demotion to employee or employee. Which not enough own work performance Which Good: 1) Made into base termination employee or employee Which No capable Again perform well. 2) It is used as a basis for providing training to employees or staff so that capable increase its performance as base reception employee new in accordance with opportunity Work Which available. 3) Made into base for know succeed or whether or not a organization walk

Whereas according to opinion Tohari (2002:249) evaluation performance aiming for: (1) Program Repair, (2) Promotion, (3) Compensation, (4) *Replacement*, (5) Training and development, (6) Job design, (7) Remove jealousy social, (8) Competition (grow) competition Healthy between teacher). Assessment performance of the teacher who done according to researcher based on on five dimensions, namely ability, initiative, punctuality, quality work results, and communication.

### c. DIMENSIONS PERFORMANCE TEACHER

Performance Teacher can seen from performance Teacher Good Which tangible service nature quantitative Also qualitative in period time Which determined, according to opinion Mitchell T. R And Larson (1987: 343) dimensions performance employee measured by : (a) ability (*capability*), (b) initiative initiative , (c) punctuality , (d) quality of work results (*quality of work*), and (e) communication (*communication*). The five dimensions The employee's performance can be used as a guideline in assessing the level of performance of an employee in a organization.

### d. BENEFIT MEASUREMENT PERFORMANCE TEACHER

A teacher can be said to be professional if a teacher has a high *level of abstract* ability and high work motivation (*high level of commitment*). Teacher Which not enough give attention to student usually tend to have low commitment, as well as time as well as power Which deployed for the sake of improvement quality learning even little. On the other hand, if the teacher pays a lot of attention to the students, and the time spent is very large, then usually teachers tend to have high commitment. Factors which can influence performance professional teacher includes knowledge, skills, skills, attitude and behavior employee.

According to Dharma (1998:9-11) state existence 4 factor Which affecting employee performance, namely: 1) Employees, which relate to ability and willingness to carry out work; 2) Work, which concerning matter work, source Power, And description work; 3) Mechanism Work, Which covers system/procedure control And delegation as well as organizational structure; 4) Work environment, which includes location factors as well as working conditions, communication, and organizational climate. Meanwhile, according to Gibson Ivancevich, Donnelly (1990:51-53) describes in detail three group of indicators that influence individual performance and potential in organize, that is: *Factor individual*, Which includes; ability as well as skills, family background, experience, social level), and demographics such as age, gender and origin; 2) *Organizational factors*, Which includes: source Power, leadership, structure, rewards, design work, And 3) *Factor psychological*, Which includes: mental/intellectual, perception, attitude, personality, learning, and motivation.

Performance is part of self-esteem, if a person's self-esteem is high low, so performance somebody Also low. Performance Can known on base assessment process. A task that someone does seriously then can be interpreted as the entire function and task of the organization. Thus, performance does not only explain one part of a organization but rather in a way overall.

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## Definition of Implementation

Implementation is an action taken after a policy has been made. In terms of language, implementation means execution and application. In general, implementation is an action or execution of a plan that has been prepared carefully, precisely and in detail. So, implementation is carried out if there is already good and mature planning, or a plan that has been prepared long before, so that there is certainty and clarity about the plan.

Implementation is the provision of means to carry out something that has an impact or consequence on something. It is an activity that is planned and carried out seriously and refers to certain norms to achieve the objectives of the activity. From this understanding, it can be concluded that implementation is an action from a plan that has been prepared carefully. Implementation focuses on the real implementation of a plan to achieve organizational goals.

### 1. CURRICULUM

Curriculum as device lesson Which containing design learning at both elementary and secondary levels undertaken by the unit education. According to Hamalik, Curriculum is tool education indevelopment source Power man going to man Which quality (Hamalik, 2014:24). Curriculum Independent is curriculum with intracurricular learning with diverse content so that students can be more optimal and have enough time to delve deeper draft and strengthen competence. Curriculum Independent First launched in the year 2022 and is optional.

Consequence from existence development public and progress technology, draft curriculum ideally capable break through dimensions time and place, in meaning curriculum take process Study Which experienced Not only limited Which Once done learning time Now but must be oriented towards the material to be taught, as well as the learning proccesson experienced time past and time will face. Material teach can taken starting from the National Curriculum or even the international one Which customized with condition local Which poured out in curriculumlocal content. Internal or external curriculum assistance is one of the efforts to empower the process of improving the quality of a curriculum on unit education with customized on power, potential, as well as resources available in the educational units. This can the formation of a network team as a management collaboration between the pillarspillar education between government area with government center use as means development curriculum based on characteristics, needs and development area That Alone, Teamwork between related parties is a form of seriousness and solidarity of a organization Which in matter This non-structural Which inside it consists of university or college tall, element service education start from subdistrict until service education provincial level.

There are foundations law:

- a. Regulation of the Minister of National Education of the Republic of Indonesia Number 24 of 2006 concerning Implementation Standard Contents.
- b. Regulation Minister of National Education Republic of Indonesia Number 22 year 2006 about Standard Content.
- c. Regulation Minister of National Education Republic of Indonesia number 23 year 2006 about Standard CompetenceGraduate of Regulation Government Republic of Indonesia Number 19 Year 2005 about Standard Nationaleducation
- d. Constitution Republic of Indonesia Number 32 Year 2004 about Government Area
- e. Republic of Indonesia Law Number 20 of 2003 concerning the Education SystemNational

### 2. QUALITY EDUCATION

The absoluteness of quality is having a level above that of standard which there is and have idealist Which strong, as description general quality is a media which has confirmed previously in accordance with standard And ability self on unit educational unit as reject measuring the ability to be a ladder to something better (Sallis, 2003), which then it becomes an achievement because it exceeds existing standards, so that achievement harmony with need. So, compatibility with needs a unit education is part from quality that alone.

Draft quality is part from characteristics and description Which encompassing all over goods and service as fulfillment implied. Whereas which includes the educational context are process, input, output, and quality education (Ministry of National Education, 2001). Determination A quality Also can be determinedby the good or bad process of all activities carried out through service to consumers, in this case how the concept and strategy serving customers in the form of students or the general public is carried out community academics or as a stakeholder. <sup>7</sup>

The availability of something as preparation for the event to take place process is a concept of educational input. Which is the power as Inputs include: human resources (HR), both teachers, Madrasah heads, student and others. Source power which other in the form of means completeness, materials, finances, and so on as support). There are also input device soft like

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structure organigram, regulation legislation invitations, plans and programs, job descriptions. Other inputs include vision, mission, and objective and targets target Which want to achieved institution education. Input readiness is needed so that the education process can be realized well, the level of input readiness is the measure itself low quality of input. The higher the input readiness, the higher the quality the input.

Output can be produced through the process being carried out; this is the process can be influenced by how the initial management of the input is carried out alone. Which where process which meant is process determination and confirmation as well as from decision which taken by stakeholders that is how is the program management process, institutional management process, process Study teaching (PBM), monitoring and management process evaluation, with notes PBM have level readiness highest compared to process-process other. Process can it is said quality more tall If coordination and adjustment as well as institutional input, namely Madrasah residents, management curriculum, means completeness supporters, financial and other done in a way in harmony use support all program, condition harmonious in all aspects, this is necessary to create a situation Study with draft pleasant (*enjoyable learning*), push students' motivation and interest in learning and being able to change their abilities accordingly talent student implemented. Say empowering means that student Not only just control various knowledge from Teacher, but knowledge That become load conscience student, understood, implemented in life daily Which not lost important Again student can Study develop himself and his potential and make it a source strength self in living life independent.

The performance of human resources in educational institutions will have an impact on results or output of education. Performance is part of the achievement institutions that are acquired through a process or from characteristics and behavior institution education That Alone. Level quality Also become determinant quality of performance in educational institutions, both the level of effectiveness, the level of productivity, level efficiency, innovation, level moral his work. So Student achievement is a high quality institutional output if show in matter: 1) Academic achievement, in the form of mid-semester grades, final exam grades, competitions academic, work scientific, And etc. 2) Performance non-academic, like IMTAQ, honesty, mark courtesy, arts, sports, skills and others.

The quality of an institution education can be influenced by the many stages of the process chain One The same other like planning, implementation, Also control of the process so that it is hoped that educational institutions have quality with the following criteria: 1) Really know how to develop it yourself in society through the knowledge they have mastered and the skills they have owned; 2) The needs of today's work world require skills from its graduates; 3) Output Which own award And role model life Which to preserve culture its people; 4). Able to compete with positive; (5). Holding on firm on religious belief, piety, optimizing creativity and trust self. Teachers' achievements are seen as quality if able to create achievements academic and non-academic students from a level of education certain. Advantages scientific fields and academic with achievement objective student grades. Non-academic excellence through achievement from success various type skills Which achieved student in Madrasah.

### 3. MODEL AND STRATEGY IMPROVEMENT QUALITY EDUCATION

A series draft is a model, a variable and propositions that have a level of quality and are a unified whole which is able to explain a phenomenon. Model is a terminology that is often used in justification a theory.

#### a. TQM (Theory Total Quality Management)

Theory TQM inside it discusses quality education Which covering a number of abilities, which here There is three abilities academic, social, and moral. According to this theory, the quality of an educational unit emphasized on variable, that is culture institution, PBM And reality institution. As for culture institution namely values, ceremonies, habits, and behaviors that have long been formed and are passed down from one generation to the next, either consciously or unconsciously. unconsciously. This habit can influence the behavior of the element's institution, that is Teacher, student, staff administration Also guardian student. Culture Which effective for improving the quality of education will encourage citizens' attitudes to direction improvement A quality institution, on the contrary when culture institutions are not conducive, it will be an obstacle in efforts towards improving the quality of an institution. Culture institutions are influenced by two variables, namely variable from influence external Also reality institution that alone. Influence external in the form of policy education by government, development of mass media and so on. Reality in the form of factual conditions in the institution, physical conditions including buildings and facilities, and non-physical such as poor relationships between teachers harmonious and rule institution Which Can called rigid. Institution education Which owns rule Which accepted, implemented by all elements that have an impact on quality that are different from a school that has rules but is not accepted by various elements in educational institutions. influenced by factors external.



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### b. OBE

More emphasize on system organization Which formulate clear vision, mission and strategy in achieving maximum goals (Andrew Farmer, 2004). Theory *Organizing Business for Excellence* (OBE) to explain that formulation vision institution is step beginning for improving the quality of educational institutions. Designing a formulation for achieving quality is a big hope for educational units in the future future. Vision is a reference sketch of the future that is described more Details on A mission. Aspect Which contained good abstract or concrete leadership is needed, namely leadership that can develop institutional culture. A leader and the habituation that is embedded in educational institutions is the concept mission from an abstract point of view. A long-term goal is needed a strategy to achieve these goals so that the goals can be achieved realized effectively and efficiently. Three strategic educational plans, namely, oriented towards results (output), on the process, and scope comprehensive (*comprehensive*). With put forward strategy Result-oriented has a *top-down character*, this result refers to on the quantity and quality formulated in the competency standards graduates (SKL). As for other standards: curriculum standards, standards process, standard infrastructure, standard management, standard financing standard power educator and education But there is side weakness from strategy the that is existence gap between institution education Which has progressed and still underdeveloped.

Process-oriented strategy, movement that starts from lower for development will give convenience on education itself. Because the determination of this strategy is by the ability and initiative from institution, because institution have role in take initiative, so will bring up strength unit unit education in accordance with reality each institution. Progress strengthens self through existence cooperation in between institution will give birth to various creation and innovation from lower. However, in reality, strategy orientation in matter This Also own One shortcomings that become weaknesses in the direction and image of a good name educational units or educational institutions, so it will not be easy to go through quality improvement goals comprehensive.

Strategy Which is combination from two strategy called a strategy that covers the entire scope (comprehensive). In where orientation strategy This describe determination results in a way national, which is stated in national standards. This can be measured through Power competition through event competence various field Which held by private, government even world level. Competence is being able to carry out integrated tasks on knowledge, attitudes and skills as well as personal values produced from Once do Study Good through level unit low to high education by maximizing services and good management management so as to produce satisfaction for consumer education from impact innovation HR on institution education. (Robert A. Roe, 2001)

## IV. RESULTS AND DISCUSSION

The research results presented in this chapter were collected through data collection, with observation techniques, interviews and documentation studies conducted on research subjects. Data and information on teacher performance improvement management and the implementation of the independent curriculum in improving the quality of education at MAN Banyumas along with research findings are presented as follows: Based on the results of interviews with the head of the madrasah and the vice principal of curriculum at MAN 1 Banyumas, it was obtained that the number of classes consists of 41 classes. Class 10 consists of 14 classes, class 11 consists of 14 classes, class 12 consists of 13 classes. The total number of students consists of 1501 students. The number of teaching staff and education personnel consists of 102 people. While MAN 2 Banyumas the number of classes consists of 42 classes. Class 10 consists of 13 classes, class 11 consists of 15 classes, class 12 consists of 14 classes. The total number of students is 1722 students. The number of teaching staff and education personnel consists of 121 people.

The implementation of improving teacher performance at MAN 1 Banyumas and MAN 2 Banyumas with the following methods or techniques: 1). Involve teachers in training according to their respective fields. 2). Conduct comparative studies to other madrasahs/schools which can provide additional knowledge for teachers. 3). Involving teachers through MGMP forums both at the district and residency levels. 4). Participate in scientific discussions, seminars, workshops and symposiums for teachers to develop their professionalism. 5). Involve teachers in workshop activities. 6). The Head of Madrasah provides opportunities for teachers to continue their education to the Masters level according to their respective expertise.

Strategy Improvement Performance teacher at MAN Banyumas 1.

### 1. Improvement Knowledge

Knowledge like "heap goods need main in business" for teacher. A teacher must try hard - Really in intellectual development of their students. Especially if the teacher is able pay attention to the physical and emotional health of students.



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Therefore, teachers must be able to make plans philosophically. knowledge that must be developed to his students. Djam'an Satori and Aan Komariah (2009:2) state that knowledge (knowledge) is all something Which known Which the amount Lots And diverse. While scientific knowledge (Science) namely knowledge which follows rules based on science. Knowledge is not always hard to go through in a research process. Sometimes people respond to a problem always try utilising on base experience his personal Which has Then or Can Also look for from experience- experience new Which can help finish problem Which There is. It's just that individual/personal experiences without critical reasoning will lead to wrong conclusions. Another way to get knowledge is with method 'ask' to somebody Which have more experience and knowledge and have authority regarding a problem. Usually, people don't ask about the right when the wrong information is obtained or clarified but instead direct trust and follow him just. Matter That Of course No ensure obtained knowledge Which Correct. For get true knowledge, people use their reason by building it a deductive framework built from general things going to to things that more special.

So, knowledge can be interpreted as things that are obtained on the basis of experience and not only through the senses but can be the result of an experiment. Science can be defined as knowledge analysis results. The more knowledge a teacher has, the more Many teachers have insight into understanding science Which needed for student, Because role Teacher as the transmitter transfer knowledge, educator, director And Also mentor. With existence mastery knowledge knowledge, Teacher expected capable implementing both in schools/madrasas and in society, so that its output satisfying " customer education ".

### **2. Improvement Ability**

A Teacher Which professional must have level capability or competence which is a set of skills so that capable realize performance performance professionalism. According to Oemar Hamalik (2000:68) to put forward that: "Every task That demand ability certain. Every ability should also be based on cognitive, affective and performance as well as productive and exploratory. The abilities What is expected must be in line with and relevant to the work demands. has determined".

A professional teacher is required to have the ability to improve performance and also teachers not being left behind in the current era globalization in today's modern era. Teachers must be able to anticipate existence change That with often literacy to keep adding outlook knowledge. In development level professionalism Teachers must have extensive knowledge. As the saying goes, "if there is a will, there will be a way." There is road" so something must be supported by will and desire hard so that succeed.

So will is a consciousness that comes from within oneself. carry out his duties to improve his and his college's performance high. In addition, an educator is expected to have values and soul entrepreneurship, which means in soul a educator owns a creative, innovative soul, able to find solutions to problems that occur, create something new, and have the motivation and enthusiasm tall.

### **3. Improvement Skills T**

The teacher is an educator, so the present teacher is not only obliged to transfer material or transfer knowledge (transfer of knowledge) to student or student, but obliged teach aspect skills and mark (transfer of skills and transfer of value). Skills (skill) is element ability Which can studied. Skills teach that is combination knowledge (knowledge) and the abilities needed by educators in the teaching process. Task educator more specifically includes. Give facility learning for participant educate so that they capable get appropriate knowledge with his field b. Practice participants educate from aspect his intellectual c. Do development science in field knowledge knowledge, technology, culture and arts through research that produces results the analysis That informed audience crowded through journal scientific, seminars, exhibition activities, both print media and electronic media electronic. d.Guiding is a priority for teachers who have students so that participants students are able to reason critically and argue through analytical results with the hope that students can independently utilize and carry out development knowledge that has owned it. e. Methodology Good draft, or theory on field Which be supported is a useful tool that can provide new contributions in give methodology, draft and theory in accordance with condition the latest can be done and accepted in a way scientific. f. Teacher capable to realize science Which owned by him through devotion to public.

Thus, with these skills it is hoped that increase professionalism Teacher. Development professionalism Teacher in educational institutions related to the effectiveness of work based on principles that "the work done today is better than yesterday" Also tomorrow's work must be better than today's". The principles This always push a teacher become more creative, innovative, dynamic and critical and open in improving the quality of productivity Work Which tall.

### **4. Improvement Attitude Self**

Each person is born as one unity individual and grows and develops to become a person with character, where become a whole from before birth, then become baby Then interact with environment. As personal, He own right autonomy for can determine road his life, will but besides as personal Also every person need help person other, which is called social nature as a

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social and cultured creature living in the midst of the environment, both family and community environments environment public.

So, a person's attitude, behavior and habits can be formed from the atmosphere of the environment around him. Likewise, a child is able to start learning to know himself through environments closest, that is person old in House. So, from That, the times small called time imitation, which where child capable copy everything Which he saw. According to Sumaatmadja (2005:22), states that characteristics are a person's attitude/behavior is the result of bio-psycho-physical potential activities born Which seen in behavior as well as action Also results reaction psychological somebody when accept stimulus or stimulation from environment. Therefore, the environment means everything that There are things around us that can influence growth man itself.

Reacher Teacher own role, function as well as task Which strategic in national development, especially in the field of education, so teachers need to develop himself become power professional. For realize That all, teacher need armed with with qualification academic and abilities that are in accordance with the specified standards. In Constitution Teacher and Lecturer disclose that certification is part from improvement quality, quality as well as level welfare for teachers. Therefore, with the certification program it is hoped that teachers will become personal Which professional, competent as agent update Which can proven with own certification Teacher, If Professional teachers are entitled to receive rewards in the form of allowance profession of government.

### **Teacher performance monitoring and control techniques.**

The technique of monitoring and controlling teacher performance is carried out by the principal of the madrasah through observation, individual discussions, and group meetings through teacher meetings. The implementation of observations is usually carried out without prior notification, this makes teachers more careful in carrying out their duties. Teachers are expected to always try to show their best to be observed by the principal of the madrasah. There are several techniques used by the principal of the madrasah in carrying out supervision and control of the quality of teacher performance through discussions or brainstorming about problems or obstacles faced by teachers in carrying out their daily duties.

### **Implementation of the independent curriculum**

1. Planning the implementation of the independent curriculum. Curriculum implementation planning based on the results of interviews with the curriculum vice principal, namely teachers plan learning to be in accordance with the expected goals, learning plans are the main guidelines for organizing learning, including learning achievements, learning objectives, learning objective flows, and teaching modules. In addition, based on field observation data, that in planning the implementation of the independent curriculum, namely by involving teachers to take part in training or training at Madrasahs or at training centers. This is a series of processes to improve the skills and knowledge of an educator in order to achieve learning objectives in order to provide knowledge capital for implementing learning.
2. Implementation of the independent curriculum. The implementation of the independent curriculum at MAN Banyumas is a process or step taken to implement an activity; implementation includes every action taken to implement a program. The main goal is to realize effective planned results in order to achieve the goals that have been set.
3. Organizing curriculum implementation. The existence of organization in educational institutions has the aim that an educational process can be carried out smoothly, students are able to absorb knowledge well, and then so that they can apply their knowledge to meet the demands of life according to the competencies experienced. In educational institutions, an organization must be in accordance with good goals, because good things will bring success. While in the implementation of learning, educators also have organization. Organizing in implementation is discussing with the head of the madrasah, vice curriculum, homeroom teacher and teachers directly. Coordination between teachers in the implementation of the curriculum implementation is a process of communication and the quality of education delivered to students. This is an effort to ensure that the independent curriculum, teaching methods, and assessments are well integrated and learning objectives are achieved effectively.
4. Evaluation of the implementation of the independent curriculum. Based on the results of the researcher's interview, in the evaluation stage, the efforts made by teachers and madrasah principals in dealing with obstacles in implementing the independent curriculum were by participating in internal and external training workshops, MGMP, and teachers actively learning independently by using social media and others.

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5. Factors that influence the quality of education. There are several factors that influence the quality of education at MAN Banyumas, including: a) Leadership the Head of MAN Banyumas has and understands a clear work vision, is able and willing to work hard, has a high work drive, is diligent and steadfast in his work, provides optimal service, and has strong work discipline. b) Teacher Maximum teacher involvement, by increasing the four competencies (Pedagogical, Professional, Personality, Social) and increasing teacher professionalism in workshops, seminars, workshops, training, symposiums and so on, so that the results of these activities ... implemented at MAN Banyumas, Central Java Province. c) Participants Educate The approach taken is "children as the center" so that the competencies and abilities of students can be explored so that MAN Banyumas can inventory the strengths that exist in students. d) Curriculum The existence of a consistent, dynamic and integrated curriculum can facilitate the expected quality standards so that goals can be achieved effectively. maximum at MAN Banyumas e) Collaboration network MAN Banyumas has a wide network of cooperation that is not only limited to the madrasah environment and the community alone. but also with other organizations, such as schools both domestically and abroad, companies or government agencies so that the output of MAN Banyumas satisfies all education customers.

### CONCLUSIONS

From the explanation above, the following conclusions can be drawn: First, Implementation of improving teacher performance at MAN 1 Banyumas and MAN 2 Banyumas with the following methods or techniques: 1) Involve teachers in training according to their respective fields; 2) Conduct comparative studies to other madrasahs/schools which can provide additional knowledge for teachers; 3) Involving teachers through MGMP forums both at the district and residency levels; 4) Participate in scientific discussions, seminars, workshops and symposiums for teachers to develop their professionalism; 5) Involve teachers in workshops, training, seminars, symposiums and so on; 6) The Head of MAN Banyumas provides opportunities for teachers to continue their education to the Masters level according to their respective expertise. Second, strategy improvement performance teacher at MAN Banyumas are: 1) Improvement Knowledge; 2) Improvement Ability; 3) Improvement Skills. Task educator more more specifically includes: Give facility learning for participant educate so that they capable get appropriate knowledge with his field; Practice participant educate from aspect his intellectual; Do development science in field knowledge knowledge, technology, culture and arts through research that produces results the analysis That informed audience crowded through journal scientific, seminars, exhibition activities, both print media and electronic media electronic; Guiding is a priority for teachers who have students so that participants students are able to reason critically and argue through analytical results with the hope that students can independently utilize and carry out development knowledge that has owned it; Methodology Good draft, or theory on field which be supported is a useful tool that can provide new contributions in give methodology, draft And theory in accordance with condition the latest can be done and accepted in a way scientific; Teacher capable to realize science Which owned by him through devotion to public. The implementation of the independent curriculum at MAN Banyumas is carried out in four stages: planning, organizing, implementing and evaluating.

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## Effect of Triangle Solver Game on Secondary School Students' Achievement and Retention in Trigonometry in Ogoja Education Zone in Cross River State



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**ABSTRACT:** The study investigated the effect of triangle solver game on secondary school students' academic achievement and retention in trigonometry in Ogoja Education Zone. Four research questions guided the study, and four null hypotheses were tested at 0.05 level of significance. The design of the study was quasi-experimental design. The specific design was the pretest-posttest. Non-equivalent control group design. The study was carried out among secondary schools in Ogoja Education Zone of Cross River State. The population for the study consisted of 1,945 mathematics students in the Senior Secondary two (SSS 2) in the study area. The sample size 389 drawn from Ogoja Local Government Area. The instrument for data collection was Trigonometry Achievement Test (TAT). TAT was face validated by three experts in the Department of Curriculum and Instructional Technology in University of Cross River State. The reliability co-efficient of the instrument was determined to be 0.98 Using Kuder-Richardson formula ( $k - R$  20). The subjects were pretested before the treated and the posttest was administered after the treatment, while the achievement test was administered two weeks after the end of the treatments. The data collected were analyzed using mean and standard deviation and Analysis of Covariance (ANCOVA). The findings of the study showed that students who were instructed and taught using Trigonometry with triangle solver game achieved higher and retained more than those taught with conventional method. It was also discovered that no particular gender was favored more by the treatment. Based on the findings of the study. It was recommended that secondary school mathematics teachers should be given training on Triangle solver game so that they can use it while teaching. Also, workshops and seminars should be organize for serving teachers so as to acquaint them with the skill of triangle solver game.

### INTRODUCTION

Mathematics is defined as a science of numbers, quantities, shapes and spaces. (Chukwu, 2010). Mathematics could be defined as the science of dealing with quantity, forms, measurement and arrangement, in particular with methods of discovering by concepts and symbols the properties and inter-relationship of quantities and magnitude. (Ezekule and Ihezue, 2006).

Mathematics is a physical science that is practically and activity oriented which used abstract symbols, axioms and facts to deal with numbers, shapes and equally solve day to day problems. It is a diversification of different but related topics including number and numeration, basic operation, algebraic process, geometry and mensuration and everyday statistics.

Mathematics has generally been accepted as the foundation of science and technology and it is a very important subject in curriculum (Udousoro, 2011). Unodiaku (2012), opined mathematics is indispensable tool for achieving success in scientific and technological development of any nation. Mathematics is a key to positive and cognitive development, successful daily living, scientific development, lifelong learning etc. ideally, without mathematics, there is no technology and without technology there will not be all the factors of modern society (Ukeje, 1997 in Idigo, 2014).

It is evident therefore that the usefulness of mathematics in every facet of human life is so expedient that there is no school curriculum or national development planning without taking cognizance of development in school mathematics especially in secondary schools. Probably because of this vital support of the national scientific developments which mathematics endeared itself to, the Nigerian government made the study of the subject (Mathematics) compulsory at all levels of primary and secondary schools systems of education in Nigeria as contained in the National policy on education (Federal Republic of Nigeria, 2013).

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Despite the importance of Mathematics as a tool for societal and national developments, its study according to Unochaku (2011) in Nigerian secondary schools is bedeviled by incessant poor achievement among the students. In fact, the problems of teaching and learning of mathematics in secondary schools have continued to be tropical and worrisome to mathematics teachers, researchers, parents and examiners. The persistent low achievement in mathematics among secondary school students is a clear manifestation of this perceived problem (West African Examination Council), Chief Examiner's Report, 2009; Usman and Nwoye, 2010; Bot, 2011; Imoke & Anyagh, 2012; Idigo, 2010).

According to Akinoso (2011), the poor achievement in Mathematics has been associated with teachers' failure to use appropriate teaching strategies. Moreover, what students are taught and how well they comprehend is greatly influenced by the teaching methods used (Okwu and Karume, 2010 in Idigo, 2014; Usman and Nwoye, 2010).

Ogbu (2006), computer based mathematical game is one of the innovations that are in tune with the recent scientific and technological development. Game is a structured type of play, usually undertaken for entertainment or fun, and sometimes seen as an educational tool (Wikipedia). A game is an enjoyable and organized competitive activity involving physical effort and skill that is guided by rules.

A computer game is an interactive entertainment running on computers, game consoles or electronic devices, such as mobile phones and Personal Digital Assistants (PDAs). Computer game is a computer-based activity which leads participants to keep joyfully (Ozofor, 2001). In the last few years a tool for facilitating learning in different sectors of society. Some of the computer-based mathematical instructional games include Darts-pluto project, Harpoon, lemonade stand, mathematics blaster, Millies Math House, Triangle solver (Drill and practice game) cashier games, treasure hunt etc. (Mansureh, 2008).

However, as interesting as computerized mathematical games may sound, science educators still vary in their opinions as regards its use for teaching mathematics. A number of science educators believe that computer programs have tremendous potential for the enhancement of teaching and learning of science concepts. Others maintain that animations and computer software are used to facilitate the visualization of abstract concepts and processes at the micro-level of instruction. (Tsui & Treagust, 2007). Yet some researchers and some educators caution that the use of computer aided instruction can exacerbate problem/result to bad situation in teaching and learning. They reported that computer aided instruction can hinder deep reflection and understanding of complex science content (Marshall & Young, 2006, Waight & Abd-Khalick, 2007). All these gaps were bridged by this study. This work was based on a computer game (Drill and practice game) aided by Trigonometry tutorial).

Triangle solver-trigonometry game is designed to promote learners' techniques for solving trigonometry equations. Triangle solver is a Microsoft mathematics educational program designed for Microsoft windows that allow users to solve mathematics, science and technically related problems, as well as to educate the users. Triangle solver trigonometry game is primarily targeted at students as a learning tool. It is a computer aided instruction package, and it is user friendly.

### **Purpose of the study**

The purpose of the study was to investigate the effect of triangle solver game on secondary school students' academic achievement and retention in trigonometry in Ogoja Education Zone of Cross River State.

### **Research questions**

The following research questions guided the study:

1. What is the mean and standard deviation achievement scores of students in the experimental and control group?
2. What is the mean and standard deviation achievement scores of male and female students in experimental and control group?
3. What is the mean and standard deviation retention scores of male and female students in experimental and control group?

### **Hypotheses**

The following research hypotheses were tested at 0.05 level of significance.

Ho1: There is no significant difference between the mean and standard deviation achievement scores of students in experimental and control groups.

Ho2: There is no significant difference between the mean and standard deviation retention scores of students in experimental and control groups.

Ho3: There is no significant difference between the mean and standard deviation achievement scores of male and female students in experimental and control groups.



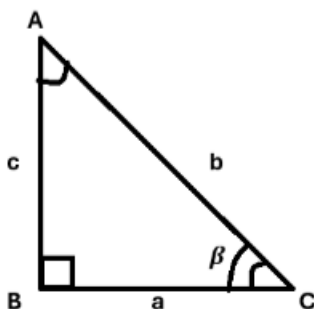
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Ho2: There is no significant difference between the mean and standard deviation retention scores of male and female students in experimental and control groups.

### METHODOLOGY

This study adopted a quasi-experimental design specifically pretest posttest non-equivalent control design was used. Nworgu (2015) defined quasi-experimental research design was one which random assignment of subjects to experiment and control groups is not possible. The choice of the designs according to Nworgu (2007) is because there was no randomization of research subject not groups. This was to avoid disorganization of the school arrangement. These intact classes were used for the study. However, the intact classes were randomly assigned to either experimental or control groups. According to Nworgu in Okoro (2015), an essential and indispensable feature of quasi-experimental design is the use of control group. He opined that a control group is one to which experimental treatment was not administered. A control group therefore usually provides the baseline against which to compare the effect of the experimental treatment on the experimental group. Expository method was used on the control group because it is traditional method used in all schools.

The teaching was for six (6) weeks. Each week had one contact period of 40 minutes duration. At the start of the experiment, all the students in the experimental groups were exposed to instructional technology. During subsequent meeting with the students, the teacher also used instructional technologies to teach them and each student was given a copy of the question stem and the teacher encourages the students to write down questions relating to what they have been previously taught. For example, the topic is Trigonometrical ratio. Thus, the use of instructional technology triangle solver game can be used to teach.



a = Adjacent side

b = Hypotenuse side

c = Opposite side

If the angle is at A then, the side of the triangle will be named as follows;

a = Opposite

b = Hypotenuse side

c = Adjacent side

Therefore, with reference to the above triangle the side a is the adjacent side with reference to angle c, the side b is the hypotenuse side with reference to angle c and the side c is the opposite side with reference to angle c.

Throughout, the lesson for the experimental group questions were posed by the teacher at appropriate times after sufficient content had been taught for the students to consider. After the students also tried to answer the questions by themselves. The students tried to solve some questions using instructional technology (triangle solver game) which were used in the class to teach them. The practice was repeatedly carried out weekly in the class using same instructional technology devices in mathematics is expected to help students' gain the sense of mastery in the learning. The students in the control group did not receive any instruction with instructional technology devices (triangle solver game). At the end of four weeks, all the students were tested on achievement test will be given two weeks after termination of the treatment. The materials of teaching the students were the questions. The experimental group students were told the use of instructional technology (triangle solver game) and asking questions in the way of managing and how to check their achievement and monitoring their learning will make their performance better in mathematics. The practice question was adopted from some questions in TONAD ESSENTIAL MATHEMATICS for Secondary School Two (SSS 2) and WAEC questions and modified by the researchers were distributed to all the students in the experimental group at the start of their lesson by using instructional technology device. The teacher led the students on how to solve the questions by using the instructional technology device (triangle solver) to solve specific content related questions using some of

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the questions several times throughout the lesson each week. The teacher lead the students to solve trigonometry questions using different sets of instructional technology and write out the solution and answer as it is suppose to be (well). At the starting of each weeks' lesson, students practice and discuss their answers with member of their small group. The instrument for data collection was Trigonometry Achievement Test (TAT). The TAT was adopted from the West African Examination Council (WAEC) past questions papers and the item covered the content (trigonometric ratio to be taught on the period of task to covered TAT was initially made up of 50 multiple choice questions with four options each (A, B, C and D). the instrument was divided into two sections, section "A" of the achievement test personal.....

Information from the students while section "B" was based on the questions on trigonometry. The TAT was administered as the pretest and the items were rearranged and then re-administered to the students as posttest after the treatment. The achievement test in trigonometry with a masking scheme, were given to three experts for face and content validation. Two of the experts were from mathematics education and one of the experts was in measurement and evaluation.

The reliability of the instrument (TAT) was established through a pilot study on 45 SS 2 students of Saint Thomas College, Ogoja. The researcher computed the internal consistency of the instrument TAT using Kuder-Richardson formula (20). The choice of using K-R (20) is influence by the fact that it is best used on multiple answer (Peters, 2016). The reliability coefficient obtained for TAT is 0.98.

### Experimental procedure

The treatment was carried out in the school's classroom at the normal mathematics period. The treatment and testing were done by their regular class teachers. The pretest was administered before the experimental treatment. The posttest was given immediately after the treatment. The researcher organized one week training programme for the teachers that trained the students at about one week before the starting of the actual teaching of the students. The teachers were involved in the study, that is in both experimental and control groups. Teachers were told to teach the same trigonometry ratio during the period.

### STATEMENT OF THE PROBLEM

The persistent poor achievement students in mathematics as revealed by both research evidence and WAEC chef examiners' report calls for great concern. This poor acheievemtn has bee traced partly to many factors including poor teahing methods. Presently, there are lots of cries to improve o the method of teaching mathematics in order to enhance this poor menaces.

It should be noted that educators and researchers have recommended the use of effective teaching method which is in tune with modern scientific and technological dispensation as a remedy to the poor marrance in secondary schools mathematics. Such recommended teaching methods include Constructivist Approach Teaching Strategy Peer Assisted Learning Strategies, Computer Aided Instruction, Computer Animation Instructional Strategy, Discovery Method, Computer game, simulation game, Delay formalization Approach etc. Computer game such as triangle solver, trigonometry game is in tune with the most recent scientific and technological developments. This game perfectly combines amusements, pleasure and challenges in facilitating mathematical thinking.

The questions are how did computer-based mathematics a game affect students academic achievement and retention in secondary school trigonometry? Which of the gender benefit more than the other in achievement and retention in compute-based game methods?

**Research question 1:** What are the mean and standard deviation trigonometry achievement scores of students in experimental and control groups in pretest and posttest?

**Table 1: Mean and standard deviation trigonometry achievement scores of experimental and control group in pretest and posttest**

Group	N	Pretest Mean ( )	SD	Posttest Mean ( )	SD
Experimental group	185	33.13	13.32	63.53	9.37
Control group	204	25.05	13.10	47.33	9.72

In Table 1, the pretest mean and standard deviation trigonometry achievement sores of the experimental group were 33.13 and 13.32 respectively and their posttest scores were 63.53 and 9.37 respectively. For the control group, the pretest mean and standard deviation trigonometry achievement scores were 25.05 and 13.10 respectively, while the post test were 47.33 and 9.72 for the mean and standard deviation achievement scores respectively.

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There was not much difference between the two groups in the pretest but there was appreciable differences in the posttest. The experimental groups scores of both groups in pretest, posttest did not differ significantly.

**Research question 2: What is the mean and standard deviation trigonometry scores of students' in experiment and control groups?**

**Table 2: Mean and standard deviation trigonometry retention scores of students in experimental and control groups**

Group	N	Retention Mean ( )	SD
Experimental group	185	61.85	9.10
Control group	204	46.90	11.81

The mean and standard deviation trigonometry scores of students in experimental group were 61.85 and 9.10 respectively, while those of the control group were 46.90 and 11.81 for the mean and standard deviation respectively. this result indicates that the experimental group retained more than the control group.

**Research question 3: What are the mean and standard deviation trigonometry achievement scores of male and female students in experimental and control groups in pretest and posttest?**

**Table 3: Mean and standard deviation trigonometry scores of male and female students in experimental and control groups pretest and posttest**

Group	N	Pretest Mean ( )	SD	Posttest Mean ( )	SD
Experimental male	92	34.63	12.72	62.45	9.43
Experimental female	99	25.64	14.18	48.83	10,04
Control male	93	31.70	13.95	64.55	9.21
Control female	105	26.02	12.04	46.05	9.57

Table 3 above shows that male students in the experimental group had a mean score 34.63 and 62.45 and standard deviation scores of 12.72 and 9.43 in pretest and posttest respectively while male in the control group had mean scores of 25.64 and 48.83 and standard deviation scores o 14.18 scores pf both groups ass more significant in the posttest with males in the experimental group far above those in the control group.

The female in experimental group had mean scores of 31.70 and 64.55 and standard deviation scores of 13.95 and 9.21 in the pretest and posttest respectively as against mean scores of 26.02 and 46.05 and standard deviation of 12.04 and 9.57 of control group showing that the experimental group achieved higher.

**Research question 4: What are the mean and standard deviation trigonometry retention scores of male and female students in experimental control groups?**

**Table 4: Mean and standard deviation trigonometry retention scores of male and female students in experimental and control groups**

Group	N	Retention Mean ( )	SD
Experimental male	92	65.30	7.25
Experimental female	93	65.91	7.33
Control male	99	47.96	9.94
Control female	105	48.07	9.04

The mean and standard deviation retention scores for male students in experimental group was 7.25 for standard deviation, while it was 65.91 and 7.33 for female in experimental group. Also, male in control group had a retention mean score of 47.96 and standard deviation while female in control group had 48.07 and 9.04. This result showed that the groups did not differ in their mean retention scores-based o their gender.

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### HYPOTHESIS 1

There is no significant difference between the mean trigonometry achievement scores of students in experimental and control groups.

### HYPOTHESIS 3

There is no significant difference between the mean trigonometry achievement scores of male and female student sin the experimental and control groups.

### HYPOTHESIS 5

There is no significant interaction between teaching method and gender on students' achievement scores in trigonometry.

### HYPOTHESES 1, 3, AND 5

There is no significant difference between the mean trigonometry achievement scores of student sin experimental and control groups.

**Table 8: ANCOVA results of the students' achievement scores**

Source	Sum of square	DF	Mean square	F	Sig.	Decision
Corrected model	17.996	3	5.999	1.684	0.011	
Intercept	72011.611	1	72011.611	2311.4	0.19	
Gender	6.065	1	6.065	.035	.853	NS
Method	9053.854	1	9053.854	51.518	.000	S
Gender method	217.286	1	217.286	1.236	.268	NS
Error	26468.1725	385	68.7485	3.161		
Total	516323.000	389	1327.3085			
Corrected total	11474.333	387				

Gender as main effect gave an f-value of .035 and this is significant at .853. Since .853 is greater than .05, this means that at.05, the f-value of .035 is not significant. Therefore hypothesis 2 is not rejected as stated, indicating that there is no significant difference between the achievement of male and female students. In addition, the sum of squares arising from gender (6.065) is highly insignificant in comparison with the sum of squares arising from error (26468.1725). this indicates that any observed difference is as a result of extraneous variable, hence the insignificant of the difference in the mean scores.

Method (Experimental and control) as main effect gave an f-value of 51.518 and this significant at .000. Since .000 is less than 0.5, this means that at .05 level, the f-value of 51.518 is Significant. Therefore, hypotheses 1 is rejected as stated, indicating that there is significant difference between the mean achievement scores of the experimental and control groups. Also, the sum of squares arising from method (9053.854) is highly significant in comparison with the sum of squares arising the error (26468.1725). this indicates that the observed difference in the achievements of the experimental and control groups is due to the treatment administered in the experiment.

The interaction effect (Gender/method) gave an f-value of 3.161 which is significantly at .258. Since .268 is greater than .05, this means that at .05 level, the f-value of 3.161 is not significant. Therefore, hypothesis 5 is not rejected as stated, indicating that there is no significant effect between method and gender on students' achievement in trigonometry in this study. The sum of squares arising from gender/method (217.286) is highly insignificant in comparison with the sum of squares arising from error (26468.1725) indicating that any observed difference may be due to extraneous variables.

### HYPOTHESIS 2

There is no significant difference between the mean trigonometry retention scores of students in the experimental and control groups.

### HYPOTHESIS 4

There is no significant difference between the mean trigonometry retention sores of male and female students in the experimental and control groups.

### HYPOTHESIS 6

There is no significant interaction between teaching method and gender on students' retention scores in trigonometry

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**Table 9: ANCOVA results of the students' retention scores**

Source	Sum of square	DF	Mean square	F	Sig.	Decision
Corrected model	2268.425	3	756.1417	.002	.967	
Intercept	61234.101	1	61234.101	4.211	.807	
Gender	8.324	1	8.324	.075	.785	NS
Method	7451.213	1	7451.213	67.128	.000	S
Gender method	142.908	1	142.908	3.291	.258	NS
Error	16717.47	385	43.422			
Total	494336.000	389	1270.7866			
Corrected total	8299.785	387				

In the table above, gender as main effect gave f-value of .075 which is significant at .0785 but insignificant at .05 since .785 is greater than .05. Hence, hypothesis 4 is not rejected as stated indicating that there is no significant difference between the mean retention scores of male and female students in the study. The sum of squares arising from gender (8.324) is highly significant in comparison showing the sum of squares arising from error (16717.47) showing that any observed difference is due to extraneous variable.

Method (experimental and control) as main effect gave an f-value of 67.128 which is significant at .000. Since .000 is less than .05, this means that the f-value of 67.128 is significant. Therefore hypothesis 2 is rejected as stated indicating that there is a significant difference between the mean retention scores of the experimental and control groups. The sum of squares arising from method (7451.213) is highly significant when compared with the sum of squares arising from error (16717.47) showing that the observed difference was due to the treatment administered.

The interaction effect between gender and method an f-value of 3.291 which is significant at .258. Since .258 is greater than .05, this means that at .05 level, the f-value of 3.291 is not significant. Therefore, hypothesis 6 is not rejected as stated indicating that there is no significant interaction effect between the male and female students' retention in trigonometry. The sum of squares arising from gender/method (142.908) is highly insignificant in comparison with (16717.47) arising from error, indicating that any observed difference in this regard is due to extraneous variable.

### Summary of Findings

The results presented above can be summarized thus;

The students' taught trigonometry with triangle solver game achieved higher than those taught with conventional method.

The students taught trigonometry with triangle solver game retained more than those taught with conventional method. Male and female students taught trigonometry with triangle solver game achieved in equal proportion.

Male and female students taught trigonometry with triangle solver game retained in equal proportion.

There was no significant interaction between teaching method and gender on the students achievement and retention in trigonometry.

### DISCUSSION OF THE FINDINGS

Discussion of the findings was made under the following sub-headings; students' academic achievement in trigonometry, students' academic retention in trigonometry and interaction between teaching method and gender on students academic achievement and retention in trigonometry.

Students' academic achievement in trigonometry results presented in table 4 showed that there was not much difference between the two groups in the retest. However, after treatment the experimental group achieved higher with an appreciable difference in the standard deviation.

Table 6 revealed that male and female students in both groups had close mean and standard deviation scores in pretest and posttest, apparently showing that they achieved equally. Tables further revealed that there was no significant interaction between teaching methods and gender on the student academic achievement in trigonometry.

With evident, these results implicated method of teaching as a major factor affecting students academic achievement in trigonometry. The finding supports the recommendations of the WAEC chief examiners' report (2020) for the use of effective

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teaching method which is in tune with modern scientific and technological dispensation as a remedy to students' poor academic achievement in Senior Secondary School Examination Mathematics. This was also in support of the findings of Randy and Trunelle (2008) who supported the usefulness of AI in teaching and learning.

Students' academic retention in trigonometry

Table 5 showed the students taught with computer game (triangle solver game) retained more than those taught with conventional method. The findings of this study is in line with the findings of Eze and Egbo (2007) whose reports revealed that students taught through computer-aided practice retained more than those taught with the traditional lecturer method.

Table 7 showed that male and female students taught trigonometry with computer games retained higher. The findings of this study is in line with Hydea and Mertz (2009) whose reports revealed that female have reached parity with male. However, the findings is not in line with the findings of Ogunkunle (2007) whose report revealed significant difference in favour of male in another part in favor of female. Table 9 showed that there was no significant interaction between teaching method and gender on the students' academic retention in trigonometry.

Interaction between teaching method and gender on students' academic achievement and retention in trigonometry. Table 8 and 9 showed that there is no significant interaction between teaching method and gender on students' academic achievement and retention.

This result agrees with the findings of Abiam and Odok (2006) that there is no significant interaction between teaching method and gender on students' academic achievement in mathematics. This result affirms the findings of Ozomadu (2006) who revealed no significant interaction between teaching method and gender on students' academic retention in mathematics.

### CONCLUSION

Based on the findings of this study, the following conclusions were made;

Triangle solver game elicited higher achievement than conventional method.

Triangle solver game promoted higher retention than conventional method.

Interaction effect between teaching methods and gender was insignificant.

### RECOMMENDATIONS

Consequent upon the findings of the study, the following recommendations are made;

Computer game and other computer-aided instructions should be used in teaching mathematics in secondary schools.

Mathematics and science teacher should be trained through seminars and workshops should be organized to train in-service teachers on the use of computer instruction for teaching and learning of sciences generally and mathematics in particular.

Personal laptops and computer should be given to secondary school mathematics teachers by the government.

Government should established mathematics laboratories in secondary schools and equipped the laboratories with computers for effective teaching and learning of mathematics.

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## Use of Translanguaging in EMI Classroom: Perceptions of Teachers at School Level in Nepal



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**ABSTRACT:** This study attempted to address the perceptions of teachers on the translanguaging as a medium of instruction and how translanguaging facilitates in EMI classes at school level. This study would be very relevant for the secondary level teachers to address the issues of EMI in multilingual classroom. Hermeneutic phenomenological research design was adopted to analyze the lived experiences of the participants in EMI program in secondary level in the context of Kathmandu metropolitan city. The lived experiences of eight teachers from four schools were collected to find out the subjective and multiple realities of the EMI classes in community schools. In-depth-interview was employed the lived experiences as data from teachers of science, mathematics and social studies in this study to address the research objectives of this study. The findings of this study were exclusion of learners' L1 in EMI class, excessive use of Nepali in EMI class, lack of the use of linguistic repertoire of learners' L1 in EMI class, use of code mixing, code switching and translation as techniques in EMI class, and lack of workshop and training of ICT for teachers. It is concluded that translanguaging is essential to run EMI policy smoothly in non-English classes. There should be workshops and trainings on translanguaging to make the EMI policy of the Government of Nepal successful in secondary school level in Nepal.

**KEYWORDS:** Translanguaging, Hermeneutic, Phenomenological, EMI, and Linguistic Repertoire

### INTRODUCTION

Nepal is a multilingual, multiethnic, multicultural, and multireligious country situated giant countries China and India in South Asia. There are 124 indigenous ethnic languages (NPHC, 2021) which were recognized as national languages in the Constitution of Nepal (2015). Socially, Nepal is inhabited by people of diverse social, cultural, and ethnic backgrounds of people. More importantly, Nepal is a diverse country with 142 ethnic groups (NPHC, 2021) residing across the country. Approximately, 46.23% of people's first language is Nepali whereas 53.77% of people speak non-Nepali as their mother tongues in Nepal (NPHC, 2021) so non-Nepali languages should be practiced as translanguaging (TL) in the EMI classes from preschool to secondary school level for the justice of the ethnic groups. Nepali language is an official and formal in offices of Government of Nepal. More importantly, it is a mode of instruction in school and university levels as well as lingua franca across the country to bridge the people of diverse multilingual communities. On the contrary, English is regarded as a foreign language in the constitution of Nepal, 2015. Nevertheless, English is used as a second language like outer circle countries in Nepal due to the globalization and internationalization of English as a global lingua franca. English has been established as a global language in the world. Furthermore, it is acknowledged as an international language and the main language of education, trade, commerce, tourism, ICT, diplomacy and instruction in school and university levels in Nepal. Nepali is a medium of instruction (NMI) from school to university levels despite the fact that Government of Nepal introduced and implemented English as a medium of instruction (EMI) from basic to secondary levels since 2006.

The medium of instruction in the most of community schools in Nepal is both NMI and EMI from pre-school to grade 12. The medium of instruction in school level is not solely EMI since learners are from multilingual background communities so English is their third language and Nepali is second language of 53.77% of the people in Nepal. Majority of the learners' English proficiency is very low. In the classes of science, mathematics, and social studies, the learners usually use their L1 to develop the metalanguage awareness of English as the target language to comprehend the content knowledge of non-English subjects. Most of the classes of

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science, mathematics, English and social studies is diverse and heterogeneous in terms of multilingual learners from ethnic groups. However, Nepali language is used as lingua franca among multilingual learners in the English and non-English subjects. In the context of Nepal, every learner is multilingual with sound knowledge in his/her own L1 and Nepali language in EMI class. English has been prescribed as a compulsory subject from grade one to grade 12. Moreover, English has been also taught as an optional English in grades 11 and 12 in Nepal. This study explored the translanguaging practice in EMI led science, mathematics, English and social studies classes of four secondary schools in Kathmandu metropolitan city.

### LITERATURE REVIEW

The word 'translanguaging' was developed from the Welsh term 'Trawsieithu' (Lewis, et al., 2012) which refers to as purposeful cross curricular strategy for the planned and systematic use of two languages for teaching and learning in the classroom. The language and content learning approaches have been considered as immersion, content-based instruction (CBI) and English-medium instruction (Lin, 2016). More importantly, TL has been regarded as theory, method or approach of language education (Li, 2022; Li & Garcia, 2022). The learners and tutors have been using code switching, code mixing and translation as TL strategies to understand L2 or foreign language as target language to understand the content in their home language in EMI classes. In communicative language teaching, the learners and language teachers have to use only target language; however, they are not permitted to use their L1 as linguistic resources.

The restriction of using multilingual resources in the English class has brought some problems for the learners in the monolingual model since the multilingual learners have rich linguistic resources in their L1 rather than Nepali and English languages. The multilingual learners are different from monolingual ones since multilingual learners have rich linguistic repertoire of their L1. In course of acquiring English as their target language in EMI of science, mathematics, and social studies, they can use the linguistic resources of their L1 to comprehend and apply the metalinguistic features of English as their target language. They can use the linguistic resources of their L1 as a compensation strategy in the target language (Oxford, 1990). If the learners are allowed to use their prior knowledge of their L1, they can comprehend the use of metalanguage features of the target language effectively (Cenoz & Santos, 2020; Prada, 2019). Multilingual learners are smarter and more dynamics than the monolingual ones in regard to their types of competences, trajectories and discourses since they have got more exposure of languages. Having mastery over more languages means to develop critical thinking, creativity and problem-solving skills. It is very rare to find out monolingual speakers in the class in the context of Kathmandu metropolitan city in Nepal. Every learner can speak more than two languages since Nepal is a multilingual, and multiethnic country situated two giant countries like China and India. EMI policies have been implemented at education system of school level due to the transnational academic policies in the world. The globalization policies of EMI are translanguaging, neoliberal ideologies and commodification. The backdrop of implementing EMI from basic to secondary levels in Nepal is due to the globalization and internationalization of English in every walk of life. Most of the graduates of school leaving certificate (SLC/12 grade) need to be qualified with International English Language Testing System (IELTS) and Test of English as a Foreign Language (TOEFL) as the basic required credential for the admission in the tertiary level in Anglophone and non-Anglophone countries (Dewey, 2021). The notion of translingual practice in English as a foreign language helps the learners make the class interactive and engaged. The multilingual learners can develop language skills through translingual practice in English as a foreign language classroom. Translingual pedagogy states that educational language teaching uses language translation practices to facilitate the teaching and learning process by promoting the acquisition of the target language using students' native language (Wei, 2023). More importantly, translingual pedagogy is concerned with a broader teaching and learning methodology that revolves around the fundamental principles of language translation (Wei, 2023).

The communication competence in English can be developed through hybrid mode of communication. The multilingual learners can adopt code switching, code mixing and grammar translation as hybrid strategies in the TL practice. They can accomplish their communicative competence through active interaction rather than cognitive process. Moreover, they can promote their communicative skills through interaction with their peers and tutors using multimodal elements such as gestures, body language, use of semiotics etc. (Uman et al., 2023).

The teachers can use pedagogical TL in teaching and assessment framework strategically and purposefully (Gracia et al., 2017). Teachers are the social agents to make the success of EMI policy of the eGovernment of Nepal so they are the policy and pedagogy enactors in the school level (Li, 2022). Pedagogical TL can improve linguistic awareness of multilingual learners and value of their languages in the educational environment (Cenoz & Santos, 2020). According to Baker (2001 as cited in Raja et al., 2022) there are remarkable advantages of using TL pedagogy in EMI classroom which helps the learners understand the learning materials critically due to use of more than two languages by the learners. Furthermore, they can mastery over other languages of their colleagues well while sharing the content of mathematics, science, social studies and English interactively; their parents

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who speak minority languages can persuade them to learn minority languages of their parents and low learners' English can be scaffolded by the bright ones.

Teaching English as an EFL or ESL has been dominated by monolingual approach in outer and expanding circle countries where teachers and learners are expected to adopt norms and standards of English as inner circle countries (Cenoz & Gorter, 2015). The monolingual approach was successful and effective during the colonization of Britishers and Americans in Asian, African and Latin American countries. However, after the collapse of colonization, TL as decolonizing approach has been replaced with the monolingual approach in the EFL pedagogy (Liando et al., 2023). TL approach warns the tradition pedagogy of applying monolingual instruction of through English. TL encourages the learners and teachers to apply multilingual resources for the process of meaning construction in EMI classes. In TL pedagogy, the learners are granted more autonomy in using their home languages and target language independently in course of learning the content and language in the EMI classes (Garcia & Kleifgen, 2019). Translanguaging pedagogical concepts and practices have a positive influence on teachers' learning experiences because it triggers them to use their prior fixed linguistic knowledge and experience (Graham et al., 2021). In TL pedagogy, there is respect and value of learners' linguistic and cultural background.

In TL approach, there is interaction between internal cognitive ecosystem and external social ecosystem (Herdina & Jessner, 2002) so TL has been considered as a social phenomenon (Zheng, 2022). Language skills, vocabulary and grammar can be developed through massive interaction in EMI class with the help of linguistic repertoire of learners' L1 in English and non-English subjects. The students can use intrasentential translanguaging which is similar to codeswitching and codemixing. In the same vein, intersentential translanguaging refers to the exchange of linguistic elements from English language to Nepali and vernacular local languages and vice versa (Liando et al., 2023). The learners and tutors can exchange the content knowledge and linguistic elements through local vernacular languages of learners, Nepali and English languages. Nepali learners of English as a foreign language can learn language and academic content of the English through pedagogical TL. Pedagogical TL has been forward as an 'all encompassing' practice to meet linguistic inequalities and injustice in the classroom (Li, 2018 as cited in Li, 2022). In this regard, all of the languages of learners are considered as assets for meaning making process (Li, 2022).

Adhikari and Poudel (2024) conducted a study on countering English prioritized monolingual ideologies in content assessment through TL in higher education in which they attempted to find out the use of examinees' different linguistic repertoire to carry out the formative assessment effectively. The examinees used their multilingual linguistic resources to address issues asked in the formative assessment. In the same vein, Sah and Li (2022) conducted a case study on TL or uneven languaging. Disclosing the plurilingual discourse of English medium instruction policy in Nepal's public schools in which they attempted to examine the use of L1 resources of both teachers and students in the EMI classroom. The finding of this study was that EMI and NMI were only used in the EMI class; however, the learner's L1 resources (non-English as L1) were excluded in the EMI classes which is a serious violation of using learners' L1 in the EMI classes. Sharma (2022) carried out an empirical study on TL as a mediator of learning in which he attempted to investigate the benefits of TL for Nepali and English emergent bilinguals. The finding of this study was that TL can be used as a mediated strategy for cognitive, affective and interactional dimension in English language instruction. In a similar vein, Anderson (2022) conducted research in India involving 8 secondary level English teachers who attempted to use two languages with balanced manner in their English classes. It was found that English was used linguistically in the mode of written; however, learners' L1s were used orally in interaction and discussion in the class. This study attempted to address the following research questions:

- What are the perceptions of teachers on the use of translanguaging in English as a Medium of Instruction (EMI) classes at school level?
- How can the translanguaging facilitate the learners to comprehend language and content in EMI class?

## METHODS

### Context and Research Design

The qualitative research approach was used to carry out this study. The interpretive research paradigm was applied to interpret the data collected from the participants. The research design, sampling and population, research tools and ethical consideration have been incorporated this study. The hermeneutic phenomenological research design was employed to analyze the lived experiences of the participants in EMI program in the school level in Kathmandu metropolitan city in Nepal. The main reason behind to employ hermeneutic phenomenological research design was that the lived in-depth personal perspectives of the teachers of secondary level were required to find out the different techniques and strategies to make the success of EMI policy in community school. The lived experiences of the secondary level teachers of all subjects were gathered to find out the subjective and multiple realities of the EMI classes in community schools to address the research questions. The hermeneutic phenomenological research design attempts to investigate understanding of the meaning and significance of a particular lived

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phenomenon of the participants (Diaz, 2015). Phenomenology is considered as “social and cultural situatedness of actions and interactions, together with participants’ interpretation of actions” (Cohen et al., 2018, p. 21). The hermeneutic phenomenology is a constructivist approach through which multiple and socially constructed realities are amassed from the non-English teachers as participants to find out the realities of EMI situation in school level in Nepal (Hatch, 2002).

### **Participants**

Four community schools from Kathmandu metropolitan city were selected through random sampling procedure. However, 8 (4 male and 4 female) participants were selected at least 2 teachers from each community school using purposive non-random sampling procedure. The technique of inclusiveness has been adopted in terms of gender while selecting participants from each school. All of the participants comprise of 2 English, 2 science, 2 mathematics, and 2 social studies teachers who have been teaching in their respective schools for last 10 years. The academic qualifications of the participants were bachelor to master degrees in their respective subjects.

### **Research Tools**

The in-depth interview as a research tool was administered to the teachers who have been involved in EMI classes. The lived experiences of participants were recorded as required data to address the research questions through the mode of telephone and face to face interview in this study.

### **Data Collection and Data Analysis**

The approval from the each headteacher of the respective schools was accepted to employ in-depth interview to the teachers of science, English, mathematics and social studies. Having had taken approval from the headteachers of each school, the consent from each teacher was taken to administer in-depth semi-structured interview. In order to maintain confidentiality and anonymity of the participants, each participant was named pseudo names as Krishna, Raju, Bharat, Kamal, Malati, Sindhu, Sita and Jayashree. The data were collected from them adopting full-fledged liberty and personal freedom of each participant. The appointment time was arranged with them as their conducive time to administer the in-depth interview. Furthermore, permission was taken with the headteacher as well as the respective subject teachers to conduct the classroom observation. Having transcribed and translated the verbatim of each participant, the data were sent to the informants for member check to confirm their data.

### **Findings**

There are seven themes developed out of several basic and organized themes in this study. The seven themes are: exclusion of learners’ L1 in EMI class, excessive use of Nepali in EMI class, use of linguistic repertoire of learners’ L1 in EMI class, use of code mixing, code switching and translation as techniques in EMI class, interaction and discussion for translanguaging pedagogical practice, lack of workshop and training of ICT for teachers, and positive attitudes towards translanguaging in EMI class which have analyzed and interpreted as below:

#### **Exclusion of Learners’ L1 in EMI Class**

Nepal is a multilingual country with 124 national languages (NPHC, 2021). Most of the learners speak at least two languages viz. Nepali and their own mother tongue. In this regard, Raju stated that

I teach the content of science in both Nepali and English in EMI class. When the learners asked the meaning of the difficult terminology of chemistry, physics, and biology, I translated them into Nepali words. However, the learners cannot understand the concept of the meaning of terminology of science in Nepali because they do not understand in Nepali language properly because their L1 is not Nepali. Subsequently, they asked me to tell the meaning in their language; however, I did not understand their mother tongues.

The class is full of diverse learners in terms of languages, cultures, and religions. The students in the class are more diverse in terms of languages. The class is a social miniature since there are various language learners (Freire, 1970). However, the teacher does not understand other languages except English and Nepali languages. In this regard, the teacher should be trained with knowledge of multilingual languages which are existed and working actively in the society. All of the participants Krishna, Bharat, Kamal, Malati, Sindhu, Sita and Jayashree were positive in this regard. In this point, Sindhu said that in order to comprehend the abstract content knowledge of science, and mathematics, the learners’ linguistic repertoires are inevitable to internalize the concept of the science and mathematics. The concept of science is delivered in English then translated it into Nepali. This way of delivery does not help them analyze the concept clearly. So, learners’ L1 is very important for the mode of instruction in the class. The learners of ethnic group cannot be successful in higher education due to the poor background knowledge of Nepali and English languages.

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In translanguaging pedagogy, there is amalgamation of different languages for meaning making process in science and mathematics classes which are instructed through

English. The use of multilingual resources helps the teacher and learners to broaden their concept of the content in the EMI classes. The learners' cognitive academic language proficiency cannot be developed if their content knowledge has not been instructed in their L1 (Cummings, 2000). The learners are to be familiar with multilingual ideas in EMI Class (Sari, 2021). Translanguaging is the process of integrating different languages as the process of knowledge construction in the EMI classroom (Munirah et al., 2021). In the similar vein, Bharat asserted that the languages of ethnic groups are sources of indigenous knowledge so the learners should be given to use their L1 in the EMI class to construct the meaning. It is very essential to revive the indigenous knowledge which has been embedded in their language and culture.

In this point, Canagarajah (2013a) argues that multilingual learners can enhance multilingual competence using their L1 linguistic resources in English and non-English subjects. However, the overuse of translanguaging pedagogy could have negative impact in content and language learning. As such, Translanguaging could make the students as slow learners in English learning (Rosiers et al., 2018). In the same vein, Krishna, Kamal, Malati, Sindhu, Sita and Jayashree accepted that learners' L1 linguistic repertoire is very useful to construct meaning in the EMI class. I conducted classroom observation in which I found that there was exclusion of learners L1 in the class. The main cause of the exclusion of learners' L1 was that the teacher of mathematics, science and social studies could not speak and understand their mother tongues except Nepali and English. It is injustice to exclude learners' L1 in EMI class.

### Excessive Use of Nepali in EMI Class

EMI has not been executed effectively due to lack of proficiency of English of teachers and students. In this regard, Sita said that

I understand that EMI means teaching the content of English in Nepali then, students are asked to carry out their assignment in English. Moreover, the students should write their every subject in English in unit test, terminal test, mid-term and final examination.

English has become the gate way of the fortune of every people in the world due to being global language and lingua franca in every walk of life of the people. EMI was implemented in community school in 2006 to pace the globalization of English. However, there is overuse of Nepali language so called EMI classes in the context of Nepal. Teachers use Nepali language as a medium of instruction; however, the learners should write in English while attempting written paper in the examination. In this point, Kamal stated that the teachers of mathematics, science and social studies instructed through Nepali language while studying bachelor and master degrees at Tribhuvan University because there was one language and one uniform system before beginning the federal republic democratic country in 2006. Nepali language was promoted only means of instruction and an official language in Nepal; however, Government of Nepal has accepted all of languages as National language in Nepal.

It can be inferred that all of the teachers are good at Nepali; but they are not proficient at English so they have been using Nepali excessively even in the EMI class due to the poor proficient teachers and students in English. Moreover, the learners are also very poor in English. All of the participants Krishna, Raju, Bharat, Malati, Sindhu, Sita and Jayashree accepted the over use of Nepali rather than English in EMI class. When I observed a couple of classrooms of science, mathematics and social studies, I found that instruction of non-English subject is Nepali and learners are given homework and class assignment in English. They are asked to write their assignment in English since they are studying through EMI.

### Use of Linguistic Repertoire of Learners' L1 in EMI Class

The most important resource in EMI class is the learners' mother tongue to comprehend the content knowledge of science, mathematics, and social studies. In this regard, Jayashree asserted that most of learners use their mother tongues to understand any theoretical and practical contents in my mathematics class. Whenever the learners feel difficulty to understand the concept in geometry classes, they bring analogy from their own culture and indigenous knowledge which they shared in their L1 in my EMI class. Sometimes, the learners from ethnic group compare the concept of mathematics with the local indigenous knowledge which help to understand the theoretical concept knowledge with the help of the indigenous knowledge.

In fact, the learners' L1 resources are the strong background knowledge to facilitate EMI class. Until unless the learners use their L1 resources and indigenous knowledge, they cannot understand the content of science and mathematics taught in EMI. The participants Krishna, Raju, Bharat, Kamal, Malati, Sindhu and Sita asserted that learners' L1 linguistic knowledge and indigenous knowledge are the supportive concepts in the EMI class. Likewise, another participant Sindhu stated that learners' ethnic and indigenous knowledge is the backbone to understand the universal Eurocentric concepts of mathematics, science and social studies. In my class, there is conflicts and debates between the indigenous knowledge and Eurocentric theoretical concept of science and mathematics. Ultimately, the learners are persuaded with their own L1 resources to understand the concepts of science and mathematics.



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It can be inferred that learners' L1 resources and indigenous knowledge are inevitable to understand any content knowledge through English in science, social studies and mathematics.

### **Use of Code Mixing, Code Switching and Translation as Techniques in EMI Class**

Grammar translation method is used as a strategy to make the learners comprehend the sense and context of meaning in EMI class. In this regard, Jayashree stated that

EMI class can be effective in EMI class because without translation of the content in the language of learners, they cannot understand the content knowledge. 46.23% of people's first language is Nepali. Translation of content into learners' Nepali language does not help them understand the *concept of* the science, mathematics and social studies since 53.77% of people speak non-Nepali as their mother tongues in Nepal.

In reality, translation is a very useful strategy adopted in the EMI classes particularly in the expanding circle countries where English has been used as a foreign language. Rest of the participants Krishna, Raju, Bharat, Kamal, Malati, Sindhu and Sita agreed that translation into learners' mother language is the local pedagogy in EMI class. Likewise, the participants, Krishna asserted that code mixing of English and Nepali is very usual technique in the EMI classes in order to make the learners comprehend the content of science, mathematics and social studies in EMI classes. Frequently, the teacher and learners adopted the code-switching strategy in the EMI classes whenever, the learners faced difficulty to understand the main gist of the content in the EMI classes. There is practice of code switching from English into Nepali and learners' L1 time and again in the classes of non-English subjects.

Translation, code mixing and code switching have been using in EMI classes in community schools to promote EMI policy of government of Nepal. If the teachers do not use translation, code mixing, and code switching in the EMI classes, the learners cannot catch up the content knowledge of science, mathematics, and social studies. All of the participants agreed that translation, code mixing and code switching are the fundamental techniques that teacher have been used in the EMI classes. I observed the use of translation, code mixing and code switching in the EMI classes.

### **Interaction and Discussion for Translanguaging Pedagogical Practice**

The learners in EMI class remain reserved and passive due to the dominance of Nepali and English languages. In Kathmandu metropolitan city, there are dominance of Newa community since time immemorial. Nepali and English are the second and third languages respectively of the learners from Newa community. In this regard, Raju asserted that most of the learners are reluctant to respond the questions individually even in Nepali due to the poor linguistic background of Nepali language. They are poor in Nepali and English so they are reserved and passive in the mathematics, science and English classes. When I divide the class into different groups and ask them to discuss in group in their home languages about the confusing topic, the class become very interactive.

The learners are not proficient and fluent in English and Nepali so they are unwilling to share their opinions and responses in front of whole class. However, I observed that the reserved and introvert students are ready to discuss in group so. Interaction and discussion in group in learners' home languages help them to understand the content in EMI classes. In the similar vein, Sindhu stated that the girls are more enthusiastic and exciting to discuss in their home language in the group and peers' discussions. They are less shy and nervous to speak in their home language in the EMI classes. When they have understood the contents in their home language, they can write in English in the summative and formative examination.

Interaction and collaboration are the techniques of translanguaging to make the success of EMI policy of Government of Nepal. More importantly, low learners have been scaffolding by their peers while using home language in EMI classes. All of the participants agreed that interaction, discussion, and collaboration through the use of home languages of learners help to make the EMI policies of Government of Nepal.

### **Lack of Workshop and Training of ICT for Teachers**

In order to execute EMI in community schools, the local government should run workshop and training to make the teachers competent and professional to implement EMI in their respective subjects. In this regard, Bharat said that the local government should have memorandum of understanding (MoU) with university authority to hire trained professors to conduct workshop and training in different subjects. Particularly, school level education is under the local level government so the authority of local government should adopt smartness and dynamics to conduct subject-wise workshop to implement EMI.

In fact, the local government should do MoU between Kathmandu metropolitan and Tribhuvan University in regard to run the workshop and training to make the secondary level teachers competent and professional to run EMI. The authority of local government should hire university professors to conduct workshop and training in EMI to the in-service teachers. In this point, Krishna asserted that in order to make the teachers competent to implement EMI, they should be provided workshop and training on information communication technology (ICT). If the teachers are a technocrat in ICT, they can explore e-materials from e-library.

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The learners can be provided the relevant materials through videos and YouTube. English language is an international and lingua franca so every video, and e-materials are recorded in English.

The workshop and training in EMI and ICT are inevitable to make the in-service teachers competent and professional. However, the authorities of local government do not pay attention to improve the quality of teachers through workshop, and training since there are lack of visions and missions of the authority of local government regarding the EMI. Rest of the participants Raju, Bharat, Kamal, Malati, Sindhu, Sita and Jayashree acknowledged that teachers need workshop and training to be update and refreshment.

### Positive Attitudes towards Translanguaging in EMI Class

To make the EMI policy successful in community schools, learners' L1 should be employed as a pedagogical tool in English and non-English classroom. In this regard, Kamal asserted that when I ask the learners to share the teaching materials in your local language, they are more enthusiastic and energetic to interact in groups and peers in the classroom. After having discussion in group, they come up with solid conclusion of meaning of difficult words and concepts of the content very clearly so learners' L1 should be used as a pedagogical tool in the EMI classroom in order to enhance cognitive and metacognitive development of learners.

Use of learners' L1 in the EMI classroom provides the ownership to the learners. Conagarajah (2011b) asserts that the attitudes of teachers towards translanguaging require to be conducted in order to understand the pedagogical success of EMI in the multilingual classroom. In this regard, Chou et al. (2022) argue that most of the teachers opted to use Learners' L1 rather than English to facilitate them to understand the content clearly. In this point, Sindhu stated that female students feel very shy and hesitated to share their ideas through English in the male dominated classroom. When I told them to share their comments and ideas in their language, they frankly share their ideas enthusiastically in the classroom. Girl students are very happy to get opportunity to speak in their mother tongues in EMI class.

From this excerpt, we can infer that translanguaging can be a pedagogical tool to make the EMI classroom more interactive and desirable classroom. It enables the learners to grasp the teaching materials effectively. Moreover, translanguaging as a pedagogical tool in EMI class facilitate the learners to comprehend the teaching materials through the use of different languages of learners besides English and Nepali.

## DISCUSSION

The excessive use of Nepali language without prioritizing the learners' mother tongues in EMI classes inhibits the learners to use their own home language in EMI classes.

As such, they could not develop their cognitive and metacognitive skills with help of linguistic repertoire of their home language in EMI classes. The exclusion of Learners' mother tongues impedes them to understand the content knowledge through the lens of their L1 since there are more non-Nepali language speakers in the EMI class at secondary level in Nepal. Nearly, 53.77% of people speak non-Nepali languages as their mother tongues in Nepal (NPHC, 2021). According to Sah and Li (2022), in the EMI classes in Nepalese community schools, the students' mother tongues have been ignoring or forbidding in formal classroom instruction which is an example of linguistic inequalities of learners. The use of the linguistic repertoire of the learners' L1 is the social justice in language education. The advantage of the use of linguistic repertoire of learners' L1 in EMI Class is one of the findings of this study. Rasman (2018) asserted that translanguaging pedagogy has been very helpful and supportive to enhance the competencies of English for Indonesian EFL learners. Furthermore, the university student in Qatar expressed their positive attitudes to use translanguaging pedagogy in EMI courses (Graham et al., 2021).

Translanguaging pedagogy can help to address the linguistic discriminations and injustices in the classroom and to facilitate the learners for flexible and plurilingual spaces in the classroom in which their full-fledged linguistic repertoire can be leveraged as resources in the meaning making process and communication (Renandya & Chang, 2022). Translanguaging plays a role as a facilitator of language exchange enabling learners to overcome academic barriers and engage in meaningful communication in EMI classes (Jang, 2022). More importantly, translanguaging approach is against English only policy or monolingual pedagogy in EMI class adopted by Communicative Language Teaching (CLT) and Task Based Language Teaching (TBLT) (Farrell, 2022). However, translanguaging is the application of learners' L1 repertoire in EMI classes (Cummins, 2009). The use of L1 helps the learners to develop their cognitive academic language proficiency (Cummins, 2000, 2009). In a similar vein, Cenoz & Gorter, (2022) argue that learners' L1 repertoire played a vital role in EMI classes in this study. Linguistic, cultural, social and multimodal resources are acknowledged as valuable assets in language learning (Dovchin & Lee, 2019). Non-native speakers of English have incorporated their linguistic, multicultural, and multimodal of their L1 resources for effective communication in EMI class (Li, 2018). Garcia and Kleyn (2016) argue that translanguaging pedagogy can transform the monolingual EMI classrooms into multilingual ones by enhancing critical multilingual awareness. Multilingual teachers and learners play pivotal roles to make the success of

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translanguaging pedagogy in EMI classroom (Wang, 2019). Code mixing, code switching and translation are the main techniques as translanguaging in EMI classes in this study. Without intervention from L1 is impossible to make EMI policy successful. Due to the lack of academic training to contribute EMI teaching and various form of workshops such as English for academic purpose (EAP) and English for specific purpose (ESP), teacher cannot become professional and competent to run EMI in science, mathematics and social study subjects (Chen & Peng, 2019; Dafouz, 2018; Farrell, 2020).

### CONCLUSION

There is overuse of Nepali and English languages in EMI classes due to which the learners from multilingual community could not comprehend the gist of the content knowledge of science, mathematics, social studies and English since they are poor in Nepali and English language. Translanguaging is essential in EMI classes to make the learners comprehend the content of each subject, such as science, mathematics and social studies. The learners L1 resources are very useful in the process of meaning making in EMI classes. TL is much practiced even in the English classes due to the poor proficiency of grammar, vocabulary and language skills of learners who are from ethnic groups. The learners are in trouble to understand the content of each subject due to the exclusion of their L1 in EMI classes; however, the teachers only use Nepali and English without prioritizing learners' L1 in EMI classes. It is concluded that linguistic repertoires of learners' L1 play a milestone in EMI classes so translanguaging as a technique should be applied in EMI classes. Codemixing, codeswitching and translation are the main techniques of translanguaging in EMI Classes. There should be workshop to train the teachers to implement EMI and advantages of applying the techniques of translanguaging in EMI classes.

Varied use of learners' L1 can encourage critical thinking, creativity, cultural sensitivity and individualized learning. The use of learners' linguistic repertoire can enhance interactive and collaborative skills among the multilingual learners in EMI classroom. The policy makers of language policy should revisit existing language policies for school level in Nepal.

### DECLARE OF CONFLICT OF INTEREST

I would like to declare no potential conflict of interest with respect to the resource, authorship and publication of this study.

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### CONTRIBUTION OF CO-AUTHORS

The role of co-authors was to collect data by visiting the selected secondary schools where EMI policy of Government of Nepal was implemented. Moreover, his responsibility was to transcribe and translate the data from Nepali language into English. Moreover, he reviewed the empirical review of literature and collected the theoretical review of literature. He supported the principal author in every step of preparing this manuscript.

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## Racking Analysis through Rasch Modeling to Measure Critical Thinking Disposition in Education for Sustainable Development Learning In Elementary Schools



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**ABSTRACT:** Education for Sustainable Development (ESD) aims to ensure that every student acquires the knowledge and skills needed for sustainable development and sustainable lifestyles. Another important aspect of ESD is the integration of cognitive and affective components, which are dominant in broadening students' understanding. The ability to be critically disposed is necessary to underpin students' perspectives on sustainable development. This study aims to develop and measure students' critical thinking disposition in ESD-oriented learning. The method used is a pre-experimental design with a one-group pretest-posttest design. The collected data on the critical thinking disposition of elementary school students will be processed through Rasch modeling using racking analysis techniques. The results of the study show that the critical thinking disposition instrument filled out by students experienced a significant 80% change in difficulty level, indicating an improvement in students' critical thinking disposition. This implies that students are enabled to contribute and participate in the process of sustainable development in various types and dimensions, with transformative and reflective processes that strive to integrate sustainability values and perceptions not only into the education system but also into students' daily lives.

**KEYWORDS:** Racking Analysis, ESD, Critical Thinking Disposition, Rasch Modeling, Elementary School Students.

### INTRODUCTION

Education for Sustainable Development (ESD) is an integral part of supporting the Sustainable Development Goals (SDGs) program, where ESD is a global issue with 17 sustainable development goals (SDGs). One way to achieve these sustainable development goals is through education, as education serves as a means to introduce the concept of SDGs in an effort to change human perspectives and attitudes towards the environment. Most environmental problems stem from a lack of education about the environment and about ways to live sustainably. In relation to these issues, UNESCO has an approach to learning known as Education for Sustainable Development (ESD), which is seen as a solution. ESD generally focuses on the development and strengthening of individual skills, enabling individuals to contribute to and participate in the sustainable development process in various forms and dimensions (Hoffmann & Siege, 2018). ESD has three pillars that adopt the concept of sustainable development: environment, economy, and society (UNESCO, 2017). ESD is one of the ideas and principles of sustainable development conveyed to individuals through education (Nikolic et al., 2020). According to Mogensen & Schnack, ESD emphasizes action competence, which involves developing students' skills, motivation, and willingness to play an active role in finding democratic solutions to issues and problems of sustainable development (Mogensen & Schnack, 2010). In implementing ESD in learning, complete teaching tools, including instructions on how to use them, are necessary to help teachers adopt innovative teaching practices (Hamdu et al., 2021). The context for developing innovative learning lies in the concept of sustainable education as a fundamental strategy of global and national education (Hamdu et al., 2018).

In this context, education for sustainable development specifically involves acquiring a set of skills (de Haan, 2006). Developing competence requires the capacity to act and solve problems, and those with this competence can, through active participation in society, help shape and guide the future of society, as well as steer social, economic, technological, and ecological changes along the lines of sustainable development (de Haan, 1999). This means having the skills, competence, and knowledge to make changes in economic, ecological, and social behavior, without such changes merely being reactions to pre-existing problems (de Haan & Seintz, 2001). Education for sustainable development has taken on a significant role in discussions about acquiring future-oriented competence (de Haan, 2006). Therefore, in the educational process, it is necessary to apply ESD skills such as



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systems thinking, anticipatory skills, normative skills, strategic skills, collaboration skills, critical thinking skills, self-awareness skills, and problem integration skills (UNESCO, 2017). Furthermore, research in 14 countries (Australia, Belgium, Canada, China, the UK, Estonia, Finland, Germany, Japan, Mongolia, Peru, Scotland, Sweden, and the Netherlands) reported that implementing ESD in schools was able to develop stronger and deeper critical thinking skills in students (Laurie et al., 2016). Therefore, students should be given opportunities in the classroom to engage in learning experiences that promote critical thinking, which can ignite the need to build and develop knowledge, attitudes/values, thinking abilities, and standards/criteria in an integrated manner, resulting in the ability to take responsible actions in contexts and situations of personal and social relevance (Vieira & Tenreiro, 2014).

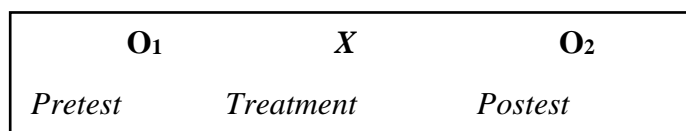
On the other hand, when someone has critical thinking skills, a disposition to engage in thinking will emerge, characterized by clear and reasoned questioning, striving for a good understanding, using relevant sources, considering the overall situation, staying focused on relevant core issues, seeking multiple alternative solutions, being open-minded, courageous in decision-making, acting promptly, believing that something is part of a complex whole, utilizing others' critical thinking, and being sensitive to others' feelings (Hendriana et al., 2016). Ennis stated that a critical thinking disposition reflects the ability for critical thinking, and having a critical thinking disposition enhances cognitive abilities, particularly critical thinking skills.

Students who develop a critical thinking disposition tend to use critical and reflective thinking when engaging in problem-solving and analysis in various domains (Giancarlo & Facione, 2001). However, it should be noted that critical thinking disposition is not the same as critical thinking skills, but rather complements critical thinking skills (Cesur & Yarali, 2019). Other studies have found a positive relationship between critical thinking skills and critical thinking disposition. Disposition has the power to enforce individual behavior and skills (Tishman, 1994). Skills will only be used if the strength of disposition increases. Given this fact, critical thinking disposition is crucial in an individual's life (Watson, 2008). Critical thinking disposition will be internalized into the mind, where there will be a desire to receive information, attempt to view events from different perspectives, reveal relationships between variables, think reflectively, seek evidence, practice skepticism, respect others' thoughts, and exercise tolerance (Eggen & Kauchak, 2006).

Based on the above explanation, this research focuses on developing items to measure critical thinking disposition applied in sustainable development-oriented learning. Another new aspect of this research is the use of Rasch modeling to analyze changes in the level of critical thinking disposition, specifically the difficulty level of critical thinking disposition items. The Rasch model analysis used is racking analysis, which can measure changes in each critical thinking disposition item. Through analysis using Rasch modeling, it is hoped to provide a picture of critical thinking disposition, helping teachers evaluate the learning process to develop critical thinking dispositions, especially in learning that promotes education for sustainable development in elementary schools.

### METHOD

The approach used in this research is a quantitative approach. The quantitative approach was conducted using an experimental research method in the form of a pre-experimental design. Pre-experimental designs do not have a control group for comparison with the group that has been tested (Walliman, 2017). The pre-experimental design used in this study is a single group design (one-group pretest-posttest design). The single group design (one-group pretest-posttest design) involves three steps: (1) conducting a pretest to measure students' critical thinking disposition; (2) implementing education for sustainable development-oriented learning; and (3) conducting a posttest, measuring students' critical thinking disposition again. The difference attributed to the application of the experimental treatment is then evaluated by comparing the pretest and posttest scores (Ary et al., 2010). The single group design (one-group pretest-posttest design) is as follows:



**Figure 1. Experimental Design One Group Pretest-Posttest Design(Creswell, 2014)**

The research instrument used is the critical thinking disposition instrument developed by Facione in the form of a Likert scale (Facione et al., 1995). A description of the developed instrument can be seen in Table 1 below

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**Table 1. Critical Thinking Disposition Instrument**

No	Indicator	Description	No. Item	Total Item
1	<i>Inquisitiveness</i>	Students tend to be curious about everything.	1,2,3	3
2	<i>Open-mindedness</i>	Students tend to allow others to voice their opinions; open-minded students have an attitude of tolerance and acceptance towards others opinions.	4,5,6	3
3	<i>Systematicity</i>	Students tend to or have the habit of working hard to solve problems with discipline, order, and systematically.	7,8,9	3
4	<i>Analyticity</i>	Students tend to be cautious about what happens next. This is related to anticipating the consequences of a situation, choice, and plan, whether good or bad.	10,11,12	3
5	<i>Truth-Seeking</i>	Students tend to always want the best understanding of a particular situation, accompanied by relevant reasons and evidence.	13,14,15	3
6	<i>Self-Confidence</i>	Students tend to trust the use of reason and reflective thinking to solve problems.	16,17,18	3
7	<i>Maturity</i>	Students tend to view complex problems, make timely judgments, and not procrastinate on what they can do.	19,20,21	3
<b>Total</b>				<b>21</b>

The instrument has undergone a field validation process, with data processed using Rasch modeling, as shown in Table 2 below.

**Table 2. Results of the Validity Test of the Critical Thinking Disposition Instrument**

Item No.	MNSQ	ZSTD	Pt. MC	Interpretation
1	1.38	3.65	0.73	Valid
2	1.24	2.17	0.74	Valid
3	1.02	0.28	0.78	Valid
4	0.95	-.48	0.77	Valid
5	1.70	5.46	0.55	Valid
6	1.03	0.38	0.75	Valid
7	1.06	0.70	0.83	Valid
8	0.81	-2.27	0.83	Valid
9	0.67	-4.13	0.85	Valid
10	0.63	-4.68	0.85	Valid
11	1.22	2.39	0.78	Valid
12	0.99	-0.13	0.82	Valid
13	1.09	1.04	0.81	Valid
14	0.99	-.05	0.78	Valid
15	0.69	-3.82	0.83	Valid
16	0.74	-3.07	0.80	Valid
17	0.69	-3.82	0.83	Valid
18	0.81	-2.23	0.82	Valid
19	1.05	0.58	0.80	Valid
20	1.04	0.44	0.80	Valid
21	0.67	2.39	0.80	Valid

To validate each item of the survey instrument, criteria were determined for measuring item validity through Rasch

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modeling, namely: 1)  $\text{Logit } 0.5 < \text{MNSQ} < 1.5$ ; 2)  $\text{Logit } -2.0 < \text{ZSTD} < +2.0$ ; and 3)  $\text{Logit } 0.4 < \text{Pt. Mc.} < 0.85$ , where an item is declared valid if it meets any of these criteria (Boone et al., 2013). For the critical thinking disposition instrument, each item has met the criteria for the instrument to be declared valid and suitable for use, while the reliability test results show a Cronbach's Alpha value of 0.836, indicating that the research instrument used has a consistency degree of 83.6%. The study was conducted on elementary school students aged 10-11 years, with 47 students in each of the control and experimental classes. The results of the critical thinking disposition were then processed through Rasch modeling (racking analysis technique) using the Winsteps 5.3.2.0 application, which provides a description to analyze the level of critical thinking disposition of students in each control and experimental class

### RESULT AND DISCUSSION

This research reveals changes or differences in the logit of each item of the critical disposition instrument in the pretest and posttest, analyzed through Rasch modeling using the racking analysis technique. The results of the pretest and posttest data processing can be seen in Table 3 below

**Table 3. Racking Analysis Results of Critical Thinking Disposition**

Item	Pretest	Posttest	Logit Difference	Description
1	-1,27	-1,83	0,56	Significant Decrease
2	-0,06	-0,35	0,29	Significant Decrease
3	0,8	0,65	0,15	Significant Decrease
4	-0,9	-0,68	-0,22	Significant Increase
5	1,30	0,49	0,81	Significant Decrease
6	-0,59	-0,55	-0,04	Non-significant Increase
7	-0,73	-1,21	0,48	Significant Increase
8	-0,64	-0,68	0,04	Non-significant Decrease
9	0,46	-0,09	0,55	Significant Decrease
10	0,11	-0,51	0,62	Significant Decrease
11	0,40	0,27	0,13	Significant Decrease
12	0,40	-0,68	1,08	Significant Decrease
13	0,62	-0,51	1,13	Significant Decrease
14	0,80	0,18	0,62	Significant Decrease
15	1,33	0,80	0,53	Significant Decrease
16	0,08	-0,31	0,39	Significant Decrease
17	1,04	0,89	0,15	Significant Decrease
18	0,18	-0,31	0,49	Significant Decrease
19	-0,51	-0,92	0,41	Significant Decrease
20	1,23	1,23	0	No Change
21	0,08	-0,55	0,63	Significant Decrease

If the logit difference of an item is  $> 0.5$ , a significant change occurs between the pretest and posttest results (Sumintono & Widhiarso, 2015). A positive value in the logit difference indicates a decrease in item difficulty, whereas a negative value indicates an increase in item difficulty. Further information on the logit differences or changes in critical thinking disposition items is presented in the following graph.

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Figure 2. Graph of Logit Differences or Changes in Pretest and Posttest Results

Table 3 and the graph in Figure 2 show the logit changes or differences for each critical thinking disposition item. Items 1, 2, 3, 5, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, and 21 (a total of 17 items or 80%) experienced a significant decrease in difficulty. The item that experienced a non-significant decrease in difficulty was item 8 (1 item or 5%). The item that experienced a significant increase in difficulty was item 4 (1 item or 5%). A non-significant increase in difficulty was found in item 6 (1 item or 5%). These findings indicate that education for sustainable development-oriented learning supports the development of students' critical thinking disposition, but there is still a possibility that students may need more in-depth cognitive teaching support. Assessing students' critical thinking disposition is a series of activities carried out by teachers to obtain and process information about students' learning processes and outcomes in a lesson (Nurlenasari et al., 2019). The analysis of changes in each indicator of critical thinking disposition is presented in the following diagram



Figure 3. Percentage of Each Critical Thinking Disposition Indicator

Overall, the results of the study for the initial and final scores of students' critical thinking dispositions have increased. These results provide an overview that the critical thinking dispositions of elementary school students can be developed and have a relevant reciprocal relationship with students' critical thinking abilities. In addition, in the study of Demirhan & Köklükaya (2014), in addition to the relationship between the guided inquiry model and critical thinking or concept mastery, there is also a relationship between critical thinking, namely critical thinking dispositions with concept mastery, where there is a positive reciprocal relationship indicated by an increase in the accumulation of average concept mastery values that are balanced by critical

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thinking dispositions. Although the critical thinking disposition value is in the middle and low criteria, there is an increase in critical thinking dispositions, this is very good because students who have critical thinking skills do not mean that the person will use them in situations that require the application of these skills. In addition, the results of the study on the internet-assisted value analysis model have a positive and significant effect in increasing critical thinking dispositions in students taking Pancasila education courses. Disposition is the willingness to use critical thinking skills (Pascarella & Terenzini, 2005). Some researchers, such as Delphi Project participants Facione (1990) and Ennis (1987) expanded the definition of critical thinking to include abilities and dispositions. Critical thinking disposition is defined as the tendency to do something given a certain condition (Ennis, 1987).

Critical thinking disposition refers to a tendency toward a certain pattern of intellectual behavior (Tishman, 1994). It is described as an individual's internal motivation to think critically when faced with and solving problems, evaluating ideas, or making decisions (Facione et al., 1995). Critical thinking disposition can be observed when someone encounters something new, and it doesn't necessarily have to be something pleasant, such as receiving new information (Widodo, 2021). Moreover, critical thinking depends on a set of skills and dispositions (Ana, 2012). Although most theories suggest that critical thinking disposition is a complex construct integrated through motivation and habits of mind, it is also recognized that, besides skills, disposition is an important component of critical thinking. This aligns with the assertion that critical thinking is a combination of two essential components: cognitive skills and dispositions (Ennis, R. H., Millman J., & Tomko, 2005). In the context of this research, within the framework of Education for Sustainable Development (ESD) and the implementation of Green Behavior, students not only engage in habitual green or environmentally friendly practices such as proper waste sorting, environmental care, water and electricity conservation, etc., but are also presented with new problems or information/news that foster critical thinking dispositions. These include understanding others' opinions, being flexible in considering alternatives and opinions, and being consistently ready to apply critical thinking skills. Furthermore, the learning approach developed is flexible, enjoyable, stimulating for student activity, and provides meaningful experiences for students, enabling them to become creative, productive, and innovative (Nur, 2019). This can be observed in responding to various problems or information about environmental issues or degradation in Indonesia that are presented or evaluated during the learning process. Cognitive skills are related to students' ability to engage in activities such as analysis, inference, evaluation, explanation, and self-correction in relation to problems, decisions, or judgments. On the other hand, disposition is a habit of mind integrated into students' beliefs or actions that foster critical thinking. Disposition also motivates students to use cognitive skills when engaging in higher-order thinking such as problem-solving and decision-making. A person with a strong tendency toward critical thinking has a consistent internal motivation to engage in decision-making problems using critical thinking (Facione, P. and Carrol, 2013). People who possess critical thinking skills do not always reflect these skills in their daily lives, and for this reason, critical thinking skills can be associated with disposition (Halpern, 1998). Critical thinking has two important dimensions: a framework of thinking and a series of mental activities (Cotton, 1991). Critical thinking consists of two components: the skill component and the disposition component (Ennis, 1996). Critical thinking disposition refers to the tendency or habit of regularly applying appropriate critical thinking behaviors. People who possess a critical thinking disposition are sensitive to opportunities for critical thinking, feel motivated to engage in it, and have the basic ability to carry it out (Emiliannur, 2019). Given the importance of the critical thinking disposition component, it has been stated that understanding one's critical thinking disposition is essential before developing critical thinking skills, as critical thinking disposition is considered the foundational requirement for possessing critical thinking skills (Facione, P. A., Norren, C.F., and Carrol, 2000). When someone effectively uses critical thinking, it indicates a congruence between their disposition and cognitive processes (Facione, 2011). This aligns with the assertion that critical thinking skills positively correlate with disposition (Facione, P. A., Norren, C.F., and Carrol, 2000).

As for the results of the analysis of each critical thinking indicator, it shows that the results of the study on the application of the education for sustainable development program with the application of green behavior have not been able to provide an optimal impact on the curiosity indicator, even though curiosity is needed to encourage students to be interested in learning and exploring information in teaching and learning activities. Curiosity in the critical thinking disposition in this study can be seen in how students can show curiosity about the importance of waste management being applied in the home environment based on data or information regarding the percentage of waste from its source location. This curiosity shows that incoming information should not be accepted for granted but students must try to understand and assess the information (Widodo, 2021). In addition, curiosity can be identified from the desire to learn, investigate, and find out (Almerico, 2014). Students' curiosity arises when the knowledge they have cannot answer the existing problem. To stimulate curiosity, it is necessary to make students aware of the gaps in their knowledge (Borowske, 2005). In particular, the concept of information gaps is a source of academic curiosity that can be explored. This information gap can actually be bridged by teachers through contextual problems that require students to find the answers.

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In addition, ESD learning with the application of Green Behavior is mostly carried out by students outside of school hours in the neighborhood, so classroom activities only reflect on a number of activities that have been carried out. Activities based on experience or trying to direct and relate to everyday life will be more meaningful (Yuliani et al., 2019). This is a deficiency experienced by researchers, the learning class should be conditioned to remain active so that it has the potential to facilitate students to think openly (Chen, 2015). However, in their learning evaluation activities, students showed a critical thinking disposition by having open minds, such as providing recommendations for making terraced or terraced agricultural land and juxtaposing it with trees to prevent erosion or soil erosion as an alternative to agricultural activities in the hills around the lake. Open thinking like this shows the disposition of people who think critically, where we must critically analyze the way of thinking, arguments and the strength of the arguments used (Widodo, 2021).

In this study, students showed critical thinking dispositions (systematic indicators) such as in overcoming the problem of clean water availability, the government made a regulation on tree felling, where the general public who were known to be felling trees either in the forest, in the garden or in the yard without prior permission would be fined at least to raise awareness to the public not to cut down trees carelessly and always close trees for the preservation of nature. The systematic reasoning process emphasizes a systematic, step-by-step, linear, convergent, straight thinking process towards a specific target goal (Ayalon & Even, 2008). Systematic ability means the ability to do something according to the right, effective, and efficient sequence, stages, steps, or planning, while analytical ability means the ability to detail or break down a problem into the necessary parts and be able to understand the relationship between these parts (Smolova, 2019). The components of systematic ability consist of determining possible strategies, implementing strategies and re-examining (Assaraf & Orion, 2010).

Furthermore, in the results of critical thinking disposition on the analysis indicator, this analysis indicator cannot be achieved if students do not master the previous cognitive aspects (Vermunt, 1996). Analytical thinking emphasizes the description of the main material into the detection of the relationships of each part that are arranged systematically (Brookhart, 2010). Analytical thinking skills include students' skills in applying logical thinking to collect and analyze information, design and test solutions to problems, and formulate plans (Arnold & Wade, 2015). Analytical thinking is useful for adapting and modifying information and includes cooperation that is useful in everyday life (Pennycook et al., 2015). Analytical thinking is very important for the success of students' professional future (Eckman & Frey, 2005). Analytical thinking assessment can be used as a benchmark for the quality of a graduate from compulsory education. This is because with analytical thinking skills a person must be able to express opinions, synthesize, solve problems, and build their ideas (Santhitwanich et al., 2014). Analytical abilities can also be used to assess a person's intelligence in constructing their knowledge independently (Kao, 2014).

For the truth-seeking indicator, students have not been able to demonstrate a critical thinking disposition in seeking the truth related to environmental conservation issues, students who have a critical thinking disposition when faced with a problem will first check the problem faced before solving it, thus it can be concluded that the most important indicator in measuring truth-seeking is the truth-checking indicator (Arth et al., 2019). This is in line with measuring truth-seeking with research that the process of seeking truth when solving problems is based on the process of checking the truth behind the information related to questions/statements and coordination to make decisions about solving problems mediated by all objects concerned (Arth et al., 2019). Efforts to develop high-level thinking skills, especially in critical thinking dispositions can be done by providing learning that presents a number of issues or problems, in this study environmental problems were given. In line with this, that the process of students in building knowledge when solving problems, students carry out the process of seeking truth and also carry out the process of understanding problems, exploring, formulating, justifying, and proving possible errors in information in the questions given (Astawa et al., 2018). The process of students in building knowledge can be used as a basis for making decisions to search for the truth when facing problems and solving them (Moore, 2010). Therefore, critical thinking dispositions must be applied and developed in the learning process to produce students who have good critical thinking qualities.

Furthermore, the less than optimal self-confidence indicator is thought to be due to the lack of student experience in interacting with friends and teachers during the teaching and learning process. Students who are not used to interacting with others when learning will have difficulty communicating when faced with problems that must be solved together (Dabaj, 2011). The importance of student-student and/or student-teacher interactions can promote self-confidence (Maclellan, 2014). Teachers who actively build on what is already positive in their classrooms by supporting students in describing their own successes and progress, which in turn, is reported to increase self-confidence. Self-confidence is one of the characteristics of students that can influence increased learning achievement (Tavani & Losh, 2003). Students who have self-confidence will feel confident in their abilities so that they appear to have higher courage, social relationships, responsibility and self-esteem. In addition, self-confidence is adequate self-ability, aware of the abilities they have, and can use them appropriately (Şar et al., 2010). A person who has self-confidence will dare to try new things in new situations, because they feel safe enough, calm, and have their own



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measures of failure and success (Wanabuliandari et al., 2021). High self-confidence can be present in students when they are confident in their strengths and this belief makes them feel capable of achieving various life goals. Self-confidence is one of the main sources of a person's potential in their life. If someone is no longer confident, for example, does not believe in their life goals and the decisions they make and does not believe in their potential and all their possibilities, then all their potential is lost. Therefore. Self-confidence is one of the characters that can make students optimistic and strong in facing various problems by optimizing all their abilities.

Finally, the low posttest score of the maturity indicator is thought to be influenced by low reasoning. The maturity indicator is characterized by the ability to actualize oneself, namely using and utilizing all talents, capacities, potentials and so on (Beaumont, 2009). The maturity in question is also the tendency to realize the complexity of problems, be open to other people's points of view, be aware of one's own and others' tendencies and biases, and consider these factors objectively before making decisions (Stedman & Andenoro, 2007). Cognitive maturity results in the acceptance that problems are often more complex than they first appear and therefore there may be more than one right solution (Friede et al., 2008). With their own will, students will train themselves to choose desires that will be realized in the form of actions, the realization of each of these desires uses the function of reasoning, so that people in their development period are able to carry out self-direction and self-control. With these two abilities, humans grow and develop towards maturity to live independently and responsibly.

### CONCLUSION

These results provide an overview that improving students' critical thinking dispositions needs to be developed in various dimensions of learning, in addition, the process of implementing ESD in learning also needs to be developed in order to provide a better impact in the context of students' ability to respond to a number of environmental problems critically as an integral part of the success of sustainable development programs. The ability to think critically at least provides an understanding that the use of issues on sustainability awareness can be used as an effort to increase students' concern for sustainable development in their surroundings. Sustainable development programs integrated into learning can empower students to make the right decisions and take responsible actions in overcoming environmental problems, so that ESD functions to develop students' attitudes so that they can reflect on their own actions, by considering their current and future social, cultural, economic, and environmental impacts from a local and global perspective.

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## Transforming Education: Inclusive Strategies in South-East Asia's Newlyconverted Universities



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**ABSTRACT:** Inclusive education is a critical approach for promoting equity and social justice in higher education, particularly in newly-converted universities in South-East Asia. This study aims to identify best practices for inclusive education by conducting a systematic literature review (SLR) using the PRISMA framework. Key themes include institutional policies, faculty development, student support systems, curriculum design, and challenges to inclusivity. Findings highlight effective strategies for ensuring accessibility, embracing diversity, and supporting marginalized students. These insights are essential for universities like the State University of Northern Negros (SUNN) as they implement inclusive practices. Recommendations provide a benchmarking framework to guide SUNN in creating an equitable learning environment where all students can thrive.

**KEYWORDS:** Inclusive Education, Inclusive Strategies, Social Justice, Transformational Education, Transformational Leadership

### I. INTRODUCTION

The trend of inclusivity with respect to educational practices is an important domain as it moves in parallel with the overall societal vertical and the diversity of student populations where educational structures must learn to adapt. In the current context of rapid economic development and globalization that heightened demand for higher education which must be equitable also, this study is very relevant to Southeast Asia.

In recent studies, inclusive education has been recognized to play a significant role in the university as a means to social cohesion and diversity (UNESCO, 2020). Indeed, the converted universities in Southeast Asia are a small version of what is happening worldwide and they attempt to put inclusive agendas into practice (such as for marginalized communities and nontraditional learners) that become reflections of global trends. Extending access to learning is not only a necessary shift, but also one that requires critically reconsidering pedagogies and policies in the different settings of higher education which are conducive with meaningful student engagement alongside improved success (Smith & Lee, 2021).

In the current setting, the State University of Northern Negros (SUNN) has recently undergone a significant transition, attaining its status as a state university. As part of this transition, SUNN aims to progressively adopt inclusive education, ensuring that all students, regardless of background, abilities, or circumstances, have equal opportunities for academic success and personal development. Inclusive education is a vital approach in modern educational systems, as it emphasizes the need to provide an equitable learning environment where diversity is embraced, and no student is left behind. Given SUNN's recent conversion, it is crucial to align its practices with global and national standards of inclusivity. However, as a newly converted state university, SUNN faces unique challenges, particularly in implementing inclusive education effectively and efficiently.

Inclusive education refers to an educational approach where all students, regardless of their abilities, backgrounds, or needs, are welcomed and supported within mainstream classrooms. This method aims to provide equal learning opportunities by accommodating diverse needs and promoting participation for everyone (UNESCO, 2017). Inclusive education emphasizes the removal of barriers to learning and fosters an environment where every student can thrive academically and socially (Ainscow & Miles, 2008). In practice, inclusive education goes beyond integrating students with disabilities into regular classrooms. It encompasses modifying teaching methods, curriculum, and classroom environments to ensure accessibility for all learners (Florian & Black-Hawkins, 2011). In the post-pandemic era, inclusive education has experienced significant transformations driven by technology, equity, and mental health priorities. The rapid adoption of digital tools for remote learning has underscored the need for accessible technologies and platforms that support diverse learning needs (Crawford et al., 2021; UNESCO, 2021). Blended and hybrid learning models, combining in-person and online instruction, provide flexibility for students with disabilities and

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accommodate differentiated instruction (Mulenga & Marbán, 2020). There is a renewed focus on mental health and well-being, incorporating counseling and social-emotional learning to support marginalized and vulnerable students (Chakraborty et al., 2021). Teacher training now emphasizes inclusive pedagogies for both physical and virtual classrooms (Bozkurt & Sharma, 2020). Additionally, bridging the digital divide has become a priority to ensure equitable access to quality education for students from low-resource settings (OECD, 2020). These trends are supported by policy developments aimed at fostering equity and accessibility in educational recovery plans (UNESCO, 2021).

To ensure the successful adaptation of inclusive educational strategies, it is essential for SUNN to learn from the experiences of other state universities that have undergone a similar conversion. Benchmarking the best practices of inclusive education from these institutions can provide SUNN with valuable insights into policy development, curriculum design, faculty training, and resource allocation. By studying the methods and initiatives of these universities, SUNN can identify effective approaches that are both practical and adaptable to its unique context.

This research aimed to explore the best practices of inclusive education from newly converted universities and how they can be tailored to meet the needs of SUNN. Specifically, the researchers seek to:

1. identify the inclusive education strategies
2. assess the impact of these inclusive strategies
3. develop a comprehensive benchmarking framework

Through this study, SUNN will be better positioned to implement inclusive education successfully, fostering an environment where all students, regardless of their abilities or backgrounds, can thrive academically and socially.

### ***Scope and Limitations***

This study focused on newly-converted universities in South-East Asia, which may have unique cultural, social, and political contexts. As a result, the findings and recommendations might not be fully generalizable to universities outside this region or to older, more established institutions. The specific historical and regional factors influencing these universities' inclusive education strategies could limit the applicability of the findings to broader contexts. The concept of inclusive education may be interpreted and implemented differently across institutions and countries. This variability in how inclusivity is defined and understood may complicate cross-university comparisons. Inconsistent policies or approaches to inclusivity across the region could challenge the identification of universal "best practices." Data collection could be limited by restricted access to internal documents, policies, or sensitive student data from some universities. Differences in institutional transparency or willingness to share information may lead to an incomplete understanding of each university's inclusive practices. Furthermore, obtaining reliable data on student outcomes, especially those related to marginalized groups, might prove challenging. Cultural factors unique to SouthEast Asian nations, such as attitudes toward disability, gender, ethnicity, or economic disparities, may influence the acceptance and effectiveness of inclusive education strategies. These contextual differences might pose challenges in drawing universal conclusions, as cultural factors often dictate the success of educational reforms.

### ***Theoretical Framework***

The theoretical framework for this study draws from key educational theories and models of inclusion that provide a foundation for understanding and analysing inclusive strategies in newly-converted universities in South-East Asia. This framework integrates Inclusive Education Theory, Transformational Leadership Theory, and Social Justice Theory to explore how newly-converted universities can effectively implement and sustain inclusive education practices.

These theoretical perspectives collectively provide a comprehensive framework for analysing the inclusive strategies of newly-converted universities in South-East Asia. Inclusive Education Theory serves as the foundation, guiding the identification of inclusive practices. Transformational Leadership Theory highlights the role of leadership in promoting and sustaining inclusive education. Social Justice Theory emphasizes the necessity of equitable practices in addressing social inequalities.

Fraser (1997) and Gewirtz (1998) argue that educational institutions have a responsibility to redress social inequalities by ensuring equal opportunities for all learners. This theory is pivotal in assessing the equity-driven policies in the universities under study.

## **II. METHODOLOGY**

### **Research Design**

This study was conducted thru a systematic literature review (SLR). This involves identifying, analysing, and synthesizing relevant research studies, reports, and articles on inclusive education strategies in newly-converted universities, particularly in



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South-East Asia. The review followed a structured, transparent methodology to ensure that the literature search is comprehensive, replicable, and minimizes bias.

### Research Instrument

In a systematic literature review, there was no primary data collected through surveys or interviews. Instead, the research instruments were:

#### *Search Strategy and Inclusion/Exclusion Criteria:*

A set of predefined inclusion and exclusion criteria were developed to guide the selection of relevant studies. It focused on research articles, reports, and studies published in the last 10 years, in English, that discussed inclusive education in newlyconverted universities or similar contexts. Databases like Google Scholar, Scopus, ERIC, and others were utilized for this search.

#### *PRISMA Framework:*

The **PRISMA** (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework was also used to document and organize the search process, including how articles are identified, screened, and selected.

### Systematic Literature Review Stages Using PRISMA Approach

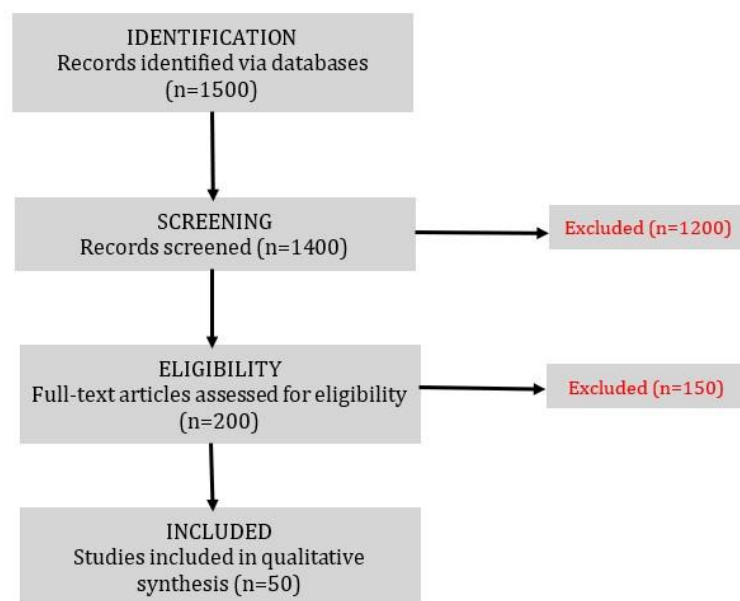


Figure 1. The PRISMA Framework

The PRISMA framework is a standardized method for conducting systematic reviews and meta-analyses. It ensures transparency, completeness, and reliability in the reporting process. Its framework consists of four main steps: Identification, Screening, Eligibility, and Inclusion.

The PRISMA framework follows a systematic approach for conducting reviews, starting with the **Identification** phase. In this step, researchers search through multiple databases such as Scopus, PubMed, ERIC, and Google Scholar, utilizing keywords, search strings, and Boolean operators to locate relevant studies. Additional sources like grey literature, conference proceedings, and reference lists may also be explored to ensure comprehensive coverage. Duplicates are removed to compile a list of unique records.

Next is the **Screening** phase, where the titles and abstracts of the identified records are reviewed to assess their relevance based on initial inclusion criteria. Studies that clearly do not meet these criteria, such as incorrect study design or population, are excluded. This process refines the list to include only potentially relevant studies.

In the **Eligibility** step, the full texts of the remaining studies are thoroughly reviewed. Researchers apply detailed inclusion and exclusion criteria, such as methodological quality or relevance to the research question. Reasons for exclusion are documented to maintain transparency in the review process.



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Finally, the **Inclusion** phase involves selecting the studies that meet all the criteria for the systematic review or metaanalysis. Researchers finalized this set of studies, organize the data, and prepare for qualitative or quantitative synthesis. This structured process ensures a rigorous and unbiased approach to identifying and including relevant studies in the review.

### Data Gathering Procedure

#### *Search Process*

The literature search was conducted systematically across multiple academic databases and gray literature sources (e.g., government reports, NGO reports, conference papers). Keywords such as "inclusive education," "newly-converted universities," "South-East Asia," "higher education reform," and "best practices" will be used, along with Boolean operators (AND, OR) to refine the search.

#### *Inclusion/Exclusion Process*

**Inclusion Criteria:** Peer-reviewed articles, research reports, or case studies focusing on newly-converted universities in SouthEast Asia or inclusive education in higher education with a year coverage of 2010 and above.

**Exclusion Criteria:** Articles outside the scope of higher education or inclusivity, studies focusing on primary/secondary education, or those published before 2010. Titles and abstracts were first reviewed, followed by a full-text review to select the most relevant studies for analysis.

#### *Data Extraction*

A standardized data extraction form was developed to systematically collect key information from the selected studies. The form captured details such as the study objective, outlining the primary aim of the research. It documented the methodology used, including the research design, data collection methods, and analysis techniques. The form also summarized the key findings on inclusive education strategies, highlighting effective practices and outcomes observed. Additionally, it recorded recommendations for practice provided by the researchers, offering insights for improving inclusive education. The context of the study, such as the country and type of university involved, was noted to understand the setting in which the research was conducted. Lastly, any limitations identified by the original studies were included to acknowledge potential constraints and provide a balanced interpretation of the findings.

#### **Data Analysis Procedure** *Thematic Synthesis:*

The extracted data from the selected articles underwent a thematic analysis. Themes or patterns related to inclusive education strategies in newly-converted universities were identified and synthesized. These themes included institutional policies, faculty development, student support systems, curriculum design, and challenges to inclusivity.

#### *Narrative Synthesis:*

The results were organized into a narrative synthesis, summarizing the inclusive education strategies found in the literature. The synthesis highlighted trends, best practices, gaps in current research, and areas for future study.

#### *Gap Analysis:*

A gap analysis was performed to identify areas where further research was needed, particularly concerning the specific needs of newly-converted universities in South-East Asia. This provided directions for future studies on the topic.

### Ethical Considerations

For a systematic literature review, direct ethical considerations regarding human participants did not apply, as no primary data collection from individuals was involved. However, several ethical practices were observed. Transparency was maintained by fully documenting the review process, including search strategies, inclusion/exclusion criteria, and data extraction methods, to ensure replicability and research integrity. Regarding intellectual property, proper attribution and citation of all studies and data sources used in the review were ensured to respect the work of original authors. To avoid bias, comprehensive search strategies, well-defined inclusion/exclusion criteria, and established appraisal tools for quality evaluation were employed to minimize selection bias. Lastly, compliance with copyright laws was upheld by ensuring that any reproduction of figures, tables, or large extracts was permissible under fair use or appropriately licensed.

## III. RESULTS AND DISCUSSION

The results of this study provide a comprehensive overview of the inclusive education strategies identified from newlyconverted universities in South-East Asia, with a particular focus on their implementation and impact. Using a systematic literature review (SLR) and the PRISMA framework, the analysis revealed key themes such as institutional policies, faculty development, student support systems, curriculum design, technology integration, and community engagement initiatives. The findings highlight both the successes and challenges these institutions face in fostering inclusive learning environments. The

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discussion examines the measurable impacts of these strategies on student performance, faculty effectiveness, and institutional equity, supported by visual data representations. These insights are critical for guiding universities like the State University of Northern Negros (SUNN) in adopting best practices to promote inclusivity and ensure equitable access to education for all students.

**Table 1. PRISMA Framework Summary**

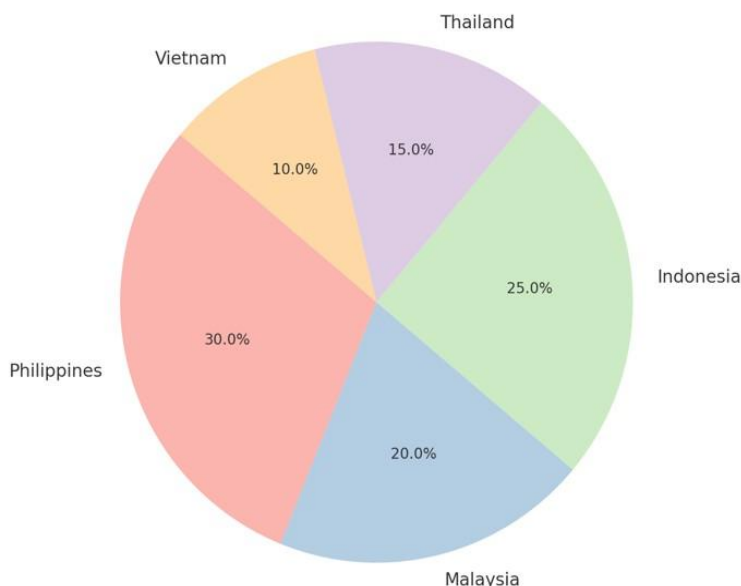
Stage	Number of Records
Identified Records	1,500
Screened Records	1,400
Excluded Records	1,200
Full-Text Articles Assessed	200
Articles Included in Synthesis	50

Table 1 summarizes the data regarding the number of studies and universities included in the search process. The 50 studies included in the synthesis covered data from 20 newly-converted universities in various countries across South-East Asia.

**Table 2. Distribution of Newly-Converted Universities by Country**

Country	Number of Universities
Philippines	6
Malaysia	4
Indonesia	5
Thailand	3
Vietnam	2

**Table 2 shows the distribution of universities by country**



**Figure 2. Distribution of the universities included in the search by country**

Figure 2 illustrates the distribution of 20 newly-converted universities by country that were included in the systematic literature review. The Philippines and Indonesia contributed the highest number of universities, reflecting the regional focus on inclusive education practices.

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**Table 3. Identified Inclusive Education Strategies**

Inclusive Strategy	Description	Examples from Literature
<b>Policy Implementation</b>	Adoption of anti-discrimination and diversity policies to ensure inclusivity in all educational processes.	UNESCO (2017), Smith & Lee (2021)
<b>Faculty Training Programs</b>	Continuous professional development for teachers to equip them with inclusive pedagogical techniques.	Florian & Black-Hawkins (2011)
<b>Student Support Services</b>	Provision of mental health services, counseling, and peer mentoring programs for marginalized groups.	Chakraborty et al. (2021)
<b>Curriculum Adaptation</b>	Designing curricula to accommodate diverse needs and promoting culturally responsive teaching.	Crawford et al. (2021), Mulenga & Marbán (2020)
<b>Technology-Assisted Learning</b>	Utilizing blended and online learning platforms to ensure accessibility for students with disabilities.	Bozkurt & Sharma (2020), OECD (2020)
<b>Inclusive Infrastructure Development</b>	Modifying physical spaces and facilities to accommodate students with physical disabilities.	UNESCO (2021)
<b>Community Engagement Initiatives</b>	Partnerships with local communities to address unique challenges of marginalized students.	Smith & Lee (2021)

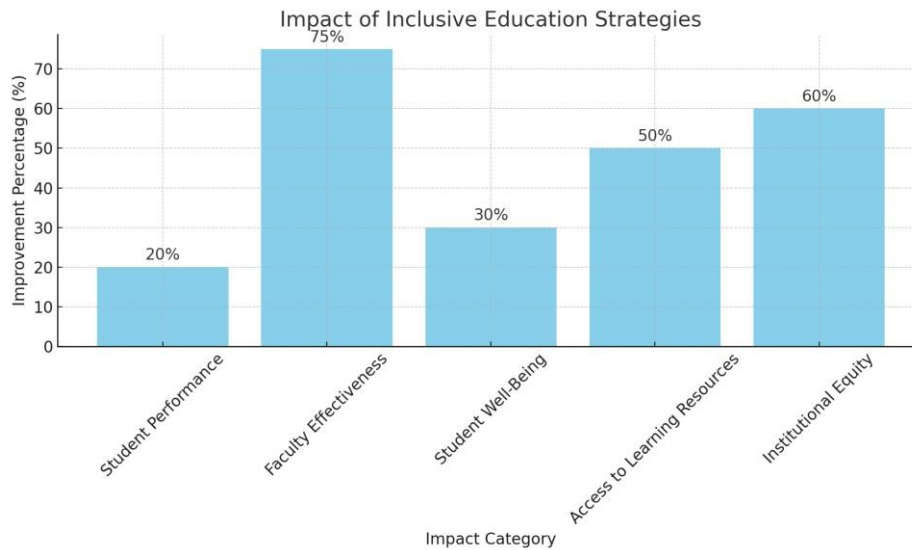
Based on the systematic literature review, the data on table 3 shows the inclusive education strategies identified across newlyconverted universities in South-East Asia.

**Table 4. Impact of Inclusive Strategies**

Impact Category	Description	Quantitative/Qualitative Data
<b>Student Performance</b>	Improved academic outcomes, higher retention rates, and increased graduation rates among marginalized students.	20% improvement in retention rates (UNESCO, 2021)
<b>Faculty Effectiveness</b>	Enhanced teaching practices and increased faculty confidence in managing diverse classrooms.	75% of teachers reported improved efficacy (Florian & Black-Hawkins, 2011)
<b>Student Well-Being</b>	Better mental health, social integration, and overall well-being due to support services.	30% reduction in counselling referrals (Chakraborty et al., 2021)
<b>Access to Learning Resources</b>	Greater accessibility to learning materials through digital platforms and blended learning models.	50% increase in online platform usage (Bozkurt & Sharma, 2020)
<b>Institutional Equity</b>	Development of equitable policies and practices leading to a more inclusive campus environment.	Positive policy evaluations (Smith & Lee, 2021)

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Table 4 shows the impact of these strategies assessed by analysing student outcomes, faculty effectiveness, and institutional progress.



**Figure 3. Impact of Inclusive Education Strategies**

Figure 3 illustrates the impact of various inclusive education strategies across key categories. The improvements in student performance, faculty effectiveness, and access to learning resources demonstrate the effectiveness of these strategies.

**Table 5. Benchmarking Frameworks**

Component	Benchmark Criteria	Metrics
<b>Policy Development</b>	Inclusive policies from leading universities	Existence of policies, enforcement mechanisms
<b>Faculty Development</b>	Effective faculty training programs	Training frequency, faculty confidence levels
<b>Student Support Systems</b>	Comprehensive counseling and support services	Counselor ratios, student satisfaction
<b>Curriculum Design</b>	Culturally responsive and adaptive curricula	Inclusive content, adaptive learning resources
<b>Technology &amp; Infrastructure</b>	Accessible technology and infrastructure	Digital platforms, accessibility features
<b>Community Engagement</b>	Successful community partnership initiatives	Number of programs, participation rates

The benchmarking frameworks is a structured approach used to compare and evaluate the inclusive education practices of newly-converted universities. The goal is to identify effective strategies and adapt them to meet the specific needs of institutions like the State University of Northern Negros (SUNN). This framework allows universities to assess their current performance against best practices and make data-driven improvements to foster inclusivity as shown in Table 5.

### Proposed Steps to Implement the Benchmarking Framework:

1. Identify Best Practices- Research inclusive education strategies from successful institutions.
2. Assess Current Practices- Evaluate SUNN's current inclusive education policies, faculty development, support systems, and infrastructure.
3. Gap Analysis- Identify gaps between SUNN's practices and best practices.
4. Set Benchmarks -Establish benchmarks for each component based on best practices.
5. Develop Action Plan - Create a plan to address gaps and implement improvements.
6. Monitor and Evaluate- Continuously track progress and adjust strategies based on outcomes.

### IV. CONCLUSION & RECOMMENDATIONS

This study explored inclusive education strategies in newly-converted universities in South-East Asia, focusing on identifying best practices, assessing their impact, and developing a comprehensive benchmarking framework. The findings highlighted key strategies, including policy development, faculty training programs, student support services, curriculum adaptation, technology integration, and community engagement initiatives. These strategies positively impacted student performance, faculty effectiveness, and institutional equity, with notable improvements in retention rates, teaching practices, and access to resources. To effectively implement these strategies, universities like the State University of Northern Negros (SUNN) should adopt the benchmarking framework developed in this study to systematically assess and enhance their inclusive practices. It is recommended that SUNN and similar institutions establish comprehensive inclusive policies, invest in ongoing faculty training, strengthen student support services, adapt curricula for diverse learners, leverage technology for accessibility, and engage with local communities to address the unique needs of marginalized students. Continuous evaluation and adaptation of these strategies will ensure that higher education environments remain equitable, fostering academic success and personal growth for all students.

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## Partnership Strategy in Renewable Energy Developm ENT Based On Community Empowerment (Case Study in IBEKA)



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**ABSTRACT:** This research examines partnership strategies in community empowerment-based renewable energy development using qualitative research methods through a case study approach. Data collection techniques include in-depth interviews with key informants as primary data sources. Interviews were conducted by selecting informants who were considered the most knowledgeable on the research topic using purposive sampling. The Pro-Poor Public Private Partnership (P4) model is applied to integrate resources from various parties to fund renewable energy projects. The results show that the partnership strategy used by IBEKA is the Pro-Poor Public Private Partnership (P4) model applied to integrate resources from various parties to fund renewable energy projects such as the Energy Patriot Program in Partnership with the Ministry of Energy and Mineral Resources (MEMR), private companies and local communities. Although there were challenges in implementation, such as limited funds and community resistance, the participatory and educative approach was able to overcome these obstacles.

**KEYWORDS:** Renewable Energy; Community Empowerment; IBEKA; Partnership

### I. INTRODUCTION

As an archipelagic country with abundant natural resources, Indonesia has a great opportunity to develop renewable Energy as a solution to overcome inequality in energy access. To optimize the new and renewable energy mix, the government focuses on building renewable energy-based power plants, especially to overcome the problem of electrification ratio, including support for renewable energy regulations, strengthening the role of the National Energy Council and setting specific targets, as well as establishing bilateral cooperation at the international level (Arsita et al., 2021). As for energy management, it is regulated in Law Number 30 of 2007 (Afif et al., 2023). Each region has renewable energy sources such as sunlight, river flows, wind, and biomass (Nelly et al., 2023) from agricultural and plantation residues (Soliditas et al., n.d.). The development of new and renewable Energy (NRE) can mainly reduce greenhouse gas emissions, which is targeted to be achieved by 2060 (Community Empowerment Through the Implementation of Solar Electricity at the Ahsanul Ibad Islamic Boarding School, Purbolinggo District, East Lampung Regency, n.d.). This potential needs to be maximized so that local people can use it for electricity needs and boost the local economy (Article et al., 2024). Until now, there has been considerable inequality in electricity distribution in various regions. Data from the Central Statistics Agency (BPS) shows that although Indonesia's electrification ratio has exceeded 99% in 2023, some provinces still face significant challenges in meeting electricity needs, especially in remote and inland areas (Journal of Electrical Automation and Renewable Energy et al., n.d.). Provinces such as Papua, West Papua, West Sumatra (Mentawai Islands Regency), and East Nusa Tenggara recorded lower electrification ratios compared to other provinces. Some regions are even still dependent on energy sources that are not environmentally friendly or do not have access to electricity at all. Based on data from PT PLN, more than 4,400 villages in the outermost, disadvantaged, and frontier areas still do not get access to electricity from PLN because they are difficult to reach, isolated, located in remote locations, and some are even located on borders between countries. Dengan tantangan distribusi listrik yang dihadapi, integrasi teknologi energi terbarukan ke dalam kehidupan sehari-hari masyarakat lokal menjadi semakin penting (Kesadaran et al., n.d.). However, the main challenge that is often faced is how to ensure that this technology can be applied sustainably (Judijanto et al., 2023) and in accordance with the needs of the local community (Irawati ICECRD et al., 2019).

Electricity is the gateway to economic justice. With electricity, local potential can be better processed and developed

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(Suhendra et al., 2023). In Indonesia, electricity needs have been supplied by state companies (PLN), but there are areas that have not received a 24-hour electricity network, or even have not been touched at all. There is even an innovation, namely Smart Electricity, which has been expected to be more efficient and effective for the Indonesian people, is also not enough (Ramli et al., 2022). The need for an equitable distribution of electricity by utilizing local potential to produce electricity that can be sustainable and renewable (Mursalim & Susanto, n.d.). The use of local resources for the development of renewable Energy not only provides a solution to inequality in access to electricity but also an opportunity to empower local communities (Ma'arif et al., 2023). The development of renewable energy based on local resources such as biomass and micro-hydro energy has proven to be effective in increasing energy independence in remote areas (Asmaranto et al., 2020). These resources, which are generated from the potential of the environment, are also able to create new jobs and increase people's incomes. Community empowerment in resource management is very important so that the sustainability of renewable energy projects can be guaranteed. Community involvement in every stage of management, from planning to the operationalization of renewable energy-based power plants, will strengthen a sense of ownership and responsibility, which ultimately increases the sustainability of the project (Arifin & Djafar, 2021; Budiono & Susetiawan, 2023; Muarifa et al., 2023). In addition, community-based empowerment approaches are also considered relevant in this context, where communities are trained and given the knowledge to manage local energy resources independently (Utami & Fadilah, 2021). Therefore, it is appropriate for all lines to carry out an energy processing that aims to improve energy efficiency and find renewable energy sources such as water, wind, and solar (Raharjo et al., 2023). In addition, the target group must also be considered to know the purpose of the program itself (Arief et al., 2023). In this context, a partnership strategy between various stakeholders (Juwita et al., 2023) by empowering resources in the village to develop renewable Energy that is worked on and owned by the community is crucial (Winda Amilia et al., 2024). Thus, this approach can be a long-term solution to overcoming the challenge of uneven electricity distribution.

Until 2022, IBEKA has built 89 renewable energy-based power plants spread throughout Indonesia, and one of them is the Mbakuhau PLTMH and a small-scale wind turbine in East Sumba developed by IBEKA in 2011-2014. This PLTMH unit supplies electricity to 353 beneficiary households. In 2021, IBEKA collaborated with the Ministry of Energy and Mineral Resources to organize the Patriot Energy program in order to support efforts to increase the village electrification ratio through the provision of electricity access in 4T areas based on renewable Energy. This project was built with the concept of a Pro-People Public-Private Partnership in Partnership with the Ministry of Energy and Mineral Resources (MEMR) of the Republic of Indonesia with the aim of accelerating electrification in disadvantaged villages. The People's Economic Business Initiative Foundation (IBEKA) is one of the institutions committed to developing community empowerment programs by utilizing renewable energy and local resources. IBEKA is also one of the pioneer institutions in the development of micro-hydro technology in rural areas of Indonesia (Swasti & AL-HADID Surabaya Pasuruan, 2021). The foundation has built partnerships with governments, the private sector, academia, and local communities to achieve sustainable empowerment goals. The partnership strategy implemented by IBEKA is the backbone of the success of its programs, considering the complexity and challenges faced in implementation in the field. IBEKA believes that electricity is the main foundation for economic development. By utilizing renewable energy, IBEKA paves the way for the empowerment of target groups and the increase of added value from the potential of local resources. IBEKA's goal is to support small-scale local social enterprises in creating economic diversity. IBEKA provides access to affordable and reliable Energy based on renewable Energy and implements empowerment programs after electrification. These programs include the provision of clean water, crop processing, household businesses, community workshops, and local cooperatives. IBEKA believes that the more diverse an economy is, the more sustainable it is. Renewable energy will create many jobs in various sectors, such as manufacturing and distribution of renewable energy equipment, project development, construction and installation, operation and maintenance, and various other cross-sectoral fields (Al-Hakim, 2020).

Villages, as the smallest part of this nation, must have the power and control to manage their resources (Angelina Laksmiati Rachma Purnaditya, 2024). When a village has power and control over its resources, it will be able to achieve food, Energy, health, and cultural sovereignty (Empowerment of Santri through Assistance in Water Quality Measurement to Improve Understanding of Clean Water and Sanitation, n.d.). Community empowerment has become the main focus of various development programs, especially in developing countries such as Indonesia. Community development and empowerment at the village level are very important to overcome various obstacles faced by the community (Firman, 2021) and limited access to state development (Badaruddin et al., 2021). Community empowerment is a development process in which people take the initiative to start social activities to improve their own conditions (Mujahiddin et al., 2023). This empowerment can only occur if the community plays an active role. Therefore, the essence of empowerment lies in the development process, community initiatives, and efforts to improve their own conditions (Magalhaes & Hartanto, 2024; Ambarsari et al., 2022). In other words, the success of community empowerment programs is determined not only by the party that carries out empowerment but also by the active participation

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of the empowered community in changing the situation and conditions for the better (Maryani & Nainggolan, 2019).

In the scope of villages, Article 1, Number 12 of Law 6 of 2014, concerns the empowerment aspect of villages. This empowerment aims to improve public attitudes, behaviours, knowledge, skills, abilities, and awareness, as well as maximize the use of existing resources. This is done through the implementation of policies, programs, activities, and assistance that are tailored to the challenges and urgent needs of the village (SDGs-Based Infrastructure Development Planning (Environmental Development Pillar) in Regency B, n.d.). Community awareness is the first step in empowerment, and it is designed to help them identify development opportunities in their village environment (Astuti, 2015).

The Partnership with the Ministry of Energy and Mineral Resources (MEMR) of the Republic of Indonesia with the aim of accelerating electrification in disadvantaged villages not only serves as a means to flow funds or resources, but also as a platform to share knowledge, technology, and best practices. As such, solid partnerships can increase the capacity of local communities, accelerate the adoption of renewable energy technologies, and create a broader and sustainable impact (Susanto et al., 2023). And to reach remote areas for equal distribution of electricity, renewable Energy is needed by involving a partnership system (Assiddiq et al., n.d.). Partnership is generally a form of cooperation between two individuals or groups based on mutual trust and an agreement to work together in developing a business or achieving certain benefits that support the achievement of common goals (Conservation in Mangrove Forests in Traditional Utilization Zones et al., 2023). Through partnerships, the Energy needed to achieve results or benefits can be saved, especially if all parties involved have the same vision in carrying out the cooperation (Sulistiyani, 2017). However, the extent to which this partnership strategy plays a role in the success of IBEKA's empowerment program still requires a more in-depth study.

This study aims to explore and analyze the partnership strategy in the development of renewable energy applied by IBEKA to increase the electrification ratio and empower the community. By understanding this strategy, it is hoped that the key factors that support the success of the program, as well as the challenges faced in collaboration between stakeholders, can be identified. The findings of this study are expected to contribute not only to the academic literature, but also as a practical guide for other institutions that want to adopt similar models.

## 2. METHOD

The research method used is qualitative descriptive with a case study approach. The research was conducted from July to August 2024 at IBEKA Farm, Jalan Raya Cicadas.

Kp. Panaruban, Ciater, Cicadas, Subang, Subang Regency, West Java. The reason for choosing the location is because, based on more than 30 years of experience in building villages, IBEKA formulated four program pillars to be able to make villages empowered, independent, and sustainable based on renewable energy and local resources, namely 3S Mapping (Social, Spatial & Sectoral), Organizing resource-aware communities, Participatory-based development, and Social Business Development. Throughout 2022, it has built 89 renewable energy plants and empowered more than 450 villages in Indonesia by involving 1,200 young statesmen. It is interesting to see how the partnership strategy carried out by IBEKA, a pioneer of social business entities, focuses on realizing a just economy with community empowerment programs based on renewable energy and local resources.

**Table 1. Composition of informants**

Actors/Institutions	Sum
IBEKA Supervisor	1
Chairman of the IBEKA Foundation	1
Staff IBEKA	2
IBEKA Facilitator	4
Energy Patriot Program Participants	1
Total	9

This study uses primary and secondary data. Primary data were obtained through in-depth interviews with semi-structured models. The selection of informants was carried out using purposive techniques, which was very useful due to the researcher's limited prior knowledge of the research location. By visiting key actors, namely the coach and Chairman of the IBEKA Farm foundation, researchers can more easily reach other parties, especially empowerment facilitators and participating communities based on renewable energy programs and local resources that play an important role in the field of beneficiary areas. The composition of the informants is presented in Table 1. The informants were interviewed in-depth to find out their roles and

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contributions to IBEKA's partnership strategy. These interviews will take place in the form of discussions, where researchers will ask open-ended questions and provide opportunities for respondents to share their views. Each interview is expected to last 30-45 minutes, depending on the respondent's involvement in the discussion. The IBEKA Trustees provided insights related to strategic policies and long-term visions, while the Chairman of the Foundation explained the implementation and partnership challenges faced. IBEKA staff focused on operations and coordination with stakeholders, while facilitators provided perspectives on the implementation of programs on the ground as well as the effectiveness of partnerships with the Ministry of Energy and Mineral Resources, local governments, and local communities. This interview explores their views on the success of the renewable energy development program based on community empowerment. Then, observations were made to define the role of partnerships in community empowerment programs and describe how the implementation of the partnership strategy takes place in the field. Meanwhile, the literature study was carried out by referring to books, journals, and other documents that make important contributions related to the concept of Partnership, community empowerment, and the use of renewable energy and local resources in the context of this research. To ensure the credibility of the research, the triangulation method is used (Flick, 2018). This method focuses on the descriptive analysis process of methods, theories, and various data that have been collected. By observing information, social reality, and a series of events in the field, triangulation helps researchers in ensuring the accuracy of research findings.

### **RESULTS AND DISCUSSION**

#### **3.1. Understanding Partnerships**

Partnership is an approach designed to involve others in participation (Wong et al., 2007). Another definition explains that Partnership is a form of cooperation between organizations that aims to create shared value by combining complementary resources, knowledge, and skills. Effective collaboration can spark innovation and provide a more significant social impact than if the organization worked independently (Austin & Seitanidi, 2012; Reed et al., 2009). This means collaboration between two or more parties to obtain benefits for each party.

From the explanation of the definition above, it can be concluded that Partnership is a form of collaboration between organizations that utilizes complementary resources, knowledge, and skills to achieve common values. Good collaboration not only drives innovation and greater social impact than individual work, but also enhances the decision-making process through the diverse perspectives involved, thereby increasing the effectiveness and sustainability of the resulting initiatives.

#### **3.2. Study on Community Empowerment**

Community empowerment must be seen as a sustainable process, in which communities are actively involved in decision-making and the implementation of development programs (Sarjiyanto et al., 2022). Monitoring and strengthening based on community participation by placing the community as a key actor in the empowerment process is an innovative approach to sustainable empowerment models (Sururi et al., 2022). Conceptually, community empowerment is defined as an approach to economic development that includes social values. This concept reflects a new development paradigm, which is people-centred, participatory, empowering, and sustainable (Habib, 2021).

Based on the presentation that has been delivered, it can be concluded that community empowerment is a sustainable process where the community is actively involved in decision-making and the implementation of development programs. An approach that places the community as a key actor and implements participation-based monitoring and strengthening is essential to creating an innovative and sustainable empowerment model. In addition, community empowerment is not only an effort for economic development but also includes social values, reflecting a more human-focused, participatory, empowering, and sustainable development paradigm.

#### **3.3. Analysis of Partnerships Applied at IBEKA**

Partnerships not only serve as funding channels but also as platforms for sharing knowledge and technology. The Partnership between IBEKA and MEMR is a clear example of cooperation that aims to improve energy access in underserved areas. In this situation, partnerships not only serve as a way to earn money but also as a place where people can exchange technology and knowledge (Nurjannah, 2023). Effective partnerships can save energy and resources.

In this study, IBEKA implements the Pro-Poor Public Private Partnership (P4) model through the Energy Patriot Program, which is a form of strategic Partnership between IBEKA and the Ministry of Energy and Mineral Resources (MEMR) of the Republic of Indonesia. The main goal of this Partnership is to accelerate electrification in disadvantaged villages through a collaborative program called Patriot Energi. The Patriot Energi program itself focuses on community empowerment through the placement of youth in 4T (Frontier, Outermost, Disadvantaged, and Transmigration) areas spread throughout Indonesia. The youth involved in

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this program, referred to as "Patriots," play a role in assisting the community for 12 months in developing and maintaining renewable energy-based power plants, especially in areas that have not been reached by the electricity grid.

The Energy Patriot program begins with an intensive 45-day training that focuses on local energy utilization techniques and strategies as well as community empowerment approaches. This training emphasizes the development of four main competencies, namely: (1) sincerity, which trains Patriots to work with sincere intentions and make a real contribution to society; (2) struggle, which includes the fighting spirit in facing challenges in the field; (3) populism, which prioritizes the approach of community empowerment in every activity; and (4) technicality, which emphasizes the mastery of renewable energy technologies and their technical applications. The training curriculum includes social intervention theories and methodologies, renewable energy lessons in the classroom, wildlife survival training, mindfulness sessions, and live-in villages for social mapping practicums.

In this Partnership, IBEKA acts as the organizer of the training, which includes the recruitment of participants and Patriot Energy facilitators. IBEKA collaborates with various training speakers who are in line with the vision and mission of the Ministry of Energy and Mineral Resources and IBEKA. Until 2021, as many as 261 scholars have been trained and assigned for 12 months in the 4T region and in other regions spread across 18 provinces throughout Indonesia. A total of 260 villages have been assisted in various development programs, including Microhydro Power Plants (PLTMH), Solar Power Plants (PLTS), MSME development, and other educational activities.

The Ministry of Energy and Mineral Resources acts as the main fund provider in the Patriot Energi program, ensuring the continuity and success of the program through financial support that enables the implementation of the program in various hard-to-reach areas. The program not only focuses on providing technology but also integrates aspects of community empowerment to ensure long-term sustainability.

Since it was first launched in 2015, this program has gone through several implementation cycles, namely in 2016 and 2021, and is planned to be implemented again in 2024. Each cycle of the program has a significant impact on increasing the electrification ratio in disadvantaged areas while strengthening the local economy and technical capacity of local communities.

### **3.4. The Role of Partnership in Community Empowerment**

Partnerships between the Ministry of Energy and Mineral Resources, local communities, cooperatives, and foundations such as IBEKA in the development of renewable energy have proven to be able to accelerate the process of community empowerment. The Kamanjara and Kalilang PLTMH in East Sumba provides a clear example of how this Partnership contributes to the welfare of the community through the provision of electricity not only for household needs but also to support the agricultural sector with the use of irrigation pumps.

"It is very felt that the electricity supplied by this PLTMH not only provides lighting for our houses but also supports agricultural activities. For example, the irrigation pumps we use for rice fields are very helpful in increasing crop yields" (interview with E.K and R).

The construction of the PLTMH involves the active participation of the community, including in the construction process and material transportation, showing that the development of energy infrastructure also provides opportunities for the community to be directly involved. The traditional methods used in transporting materials show that these partnerships value and leverage local wisdom, reinforcing a sense of ownership toward the project being developed.

"Yes, many villagers, both men and women, are involved. We assist in the construction of distribution lines, transformers, and turbines. To transport heavy tools, we used ancient methods, similar to the way sarcophagi was transported in the past" (interview with F)

The Jasa Peduli Kasih Kamanggih Cooperative, which manages this PLTMH, also plays an important role in maintaining the sustainability of the project. Cooperative-based management allows the community to be economically and technically independent and ensures that the benefits obtained from these renewable energy facilities are still felt by the community in the long term. The success of this cooperative in managing previous PLTMH, such as the Mbakuhau PLTMH and small-scale wind turbines, is proof that community empowerment through partnerships in the renewable energy sector can be managed sustainably.

"Our cooperative is fully responsible for operation and maintenance. We also have previous experience with the Mbakuhau PLTMH and wind turbines in East Sumba. Through the cooperative, we can ensure that the facility continues to run well and provides electricity to more than 350 households" (interviews with A.M and T.I).

"With cooperatives, the community is able to manage local resources independently. Cooperative members are trained to operate and maintain the system, so the technical ability of the community is also improved. In addition, the operational results are used



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for local economic empowerment activities" (interviews with patriots and facilitators).

The impact of the energy patriot program is the sustainability of the country's patriot program: Building Community Empowerment-Based Villages. The State Patriot Program in Berau Regency, East Kalimantan, which took place in 2017-2018, is also an important example of a partnership based on community empowerment. By involving 55 Patriots living in the village for one year, the program focuses on participatory mapping and data-driven development to plan village programs.

Patriot Negeri plays a role in various aspects of village development, such as the production of organic fertilizers, the application of biogas systems, and the assessment of the potential of micro hydropower plants. In addition, they are also involved in educational programs, creative economy initiatives, and the empowerment of village-owned enterprises. The program not only strengthens the technical capacity of the community in managing local resources but also builds awareness about the importance of sustainability through renewable Energy and environmental management.

In addition to partnering with the Ministry of Energy and Mineral Resources, such as the development of PLTMH in East Sumba, IBEKA also partners with large companies for renewable energy projects in various regions of Indonesia. For example, in 2018, PT Paiton Energy collaborated on the construction of a 30 kWp On-Grid Solar Power Plant (PLTS) at the An-Annur Islamic Boarding School, Sumenep, East Java, and a 15 kWp On-Grid Solar Power Plant at SMA Negeri 8 Malang, East Java.

This Partnership not only helps in the provision of greener Energy but also promotes the sustainability of social programs, such as the empowerment of Islamic boarding schools and schools through stable access to electricity. Similarly, the collaboration with BAZNAS and Paragon in 2020, which produced 27 kWp of solar power plants for a clean water system in Sragen, Central Java, shows how renewable Energy can be a solution to the problem of access to clean water in rural areas.

Thus, partnerships in the development of renewable energy are not only about providing infrastructure but also about increasing the capacity and welfare of the community through active participation and management based on community empowerment.

### **3.5. Challenges and Solutions in the Implementation of Partnerships by IBEKA**

In implementing partnerships for the development of renewable energy projects, IBEKA faces various challenges, including limited funding, community resistance, and regulatory constraints. Projects such as Micro Hydro Power Plants (PLTMH) and Solar Power Plants (PLTS) require large funds for infrastructure development, equipment procurement, and community training in facility management. Limited funds are an obstacle to accelerating project implementation in many regions, especially in the 4T (Frontier, Outermost, Disadvantaged, and Transmigration) areas.

In addition, resistance from local communities often arises, especially in remote areas that are not yet familiar with renewable energy technology. People's concerns about social disturbances or changes in daily activities are challenges that must be overcome. Projects such as Patriot Energi, which involves the placement of youth in remote areas, also face obstacles in terms of adaptation to local culture, lack of public understanding of the benefits of renewable Energy, and resistance to infrastructure change.

On the other hand, regulatory constraints are also a big challenge. Every renewable energy project requires complex licensing and involves various government agencies, both central and regional. This process is often time-consuming and requires extra effort from IBEKA and its partners to get approval.

IBEKA uses the Pro-Poor Public Private Partnership (P4) model, which is a strategic partnership between IBEKA and the Ministry of Energy and Mineral Resources (MEMR) through the Patriot Energi program to overcome limited funds. In this model, IBEKA has succeeded in collaborating with partners from the private sector, such as PT Paiton Energy and BAZNAS, who fund the construction of solar power plants in various regions. The Partnership brings together government, private, and community resources to finance renewable energy projects aimed at accelerating electrification in disadvantaged villages.

In addition to the funding aspect, IBEKA overcomes community resistance through a participatory and educational approach. In the Energy Patriots program, for example, youth called "Patriots" are placed in 4T villages for 12 months to assist communities in the development and maintenance of renewable energy power plants. Intensive training for 45 days was conducted before the Patriots were sent to the field. This training includes four main competencies: sincerity, struggle, people, and technicality. This approach ensures that the community is actively involved in the management of new energy technologies so that they feel they own and support the sustainability of the project.

IBEKA is also actively establishing close relationships with local governments and the Ministry of Energy and Mineral Resources to facilitate the licensing and regulatory process. Through effective communication with government agencies, IBEKA has succeeded in accelerating the licensing process for various renewable energy projects, such as PLTMH and PLTS. The governments direct involvement in programs such as Patriot Energi helps facilitate regulatory implementation, especially in hard-



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to-reach areas.

## 4. CONCLUSION

This research highlights the importance of partnerships in the development of renewable energy based on community empowerment, with a focus on the Patriot Energy program initiated by IBEKA. Partnerships between IBEKA, the Ministry of Energy and Mineral Resources, and local communities have proven effective in improving energy access in disadvantaged areas in Indonesia. Through the Pro-Poor Public Private Partnership (P4) model, IBEKA has successfully integrated resources from the government, the private sector, and the community to fund sustainable renewable energy projects. Although challenges such as funding constraints, community resistance, and regulatory constraints exist, participatory and educational approaches have helped overcome these barriers. Community empowerment through training and direct involvement in energy project management not only strengthens local capacity but also improves the overall well-being of the community. Thus, partnerships in renewable energy development focus not only on providing infrastructure but also on capacity building and community well-being, making it a viable model to adopt in other regions.

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## The Influence of Certification Policy and Lecturer Teaching Performance on the Quality of Education



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**ABSTRACT:** The certification policy aims to enable lecturers to optimally implement the three pillars of higher education (Tridharma Perguruan Tinggi), thereby maximizing the quality of education. This study aims to determine the extent of the influence of certification policy and lecturer teaching performance on the quality of education. The research method employed is a survey method. The study's subjects consist of 80 lecturers randomly selected from Universitas Indraprasta PGRI Jakarta. Data collection was carried out using a questionnaire instrument with a Likert scale. To ensure data validity, validity and reliability tests were conducted. The test results indicated that all data followed a normal distribution. The research findings reveal that the lecturer certification policy significantly influences the quality of education. Similarly, lecturer teaching performance also has a significant impact on the quality of education. The coefficient of determination ( $R^2$ ) shows that the certification policy and lecturer teaching performance have a moderate relationship with the quality of education. The implication of these findings is that the lecturer certification policy can encourage lecturers to conduct teaching activities more effectively, thereby improving the quality of education. Nevertheless, continuous efforts are still needed to further enhance the quality of education.

**KEYWORDS:** certification policy, lecturer teaching performance, quality of education

### INTRODUCTION

Indonesia has a firm stance on the development of education. This commitment is explicitly stated in the fourth paragraph of the Preamble to the 1945 Constitution of the Republic of Indonesia: "...thereafter, to establish an Indonesian government that protects all the people of Indonesia and their entire homeland, to promote public welfare, to educate the nation's life, and to participate in the establishment of a world order based on freedom, perpetual peace, and social justice." This mandate underscores that education is one of the key pillars of national development.

Education plays a strategic role in shaping the direction of a nation's progress. If the direction of education is designed properly and its processes are carried out scientifically, the nation will develop into one that is advanced, wise, just, prosperous, and civilized. Conversely, if the direction of education is misguided and its processes are irrational, the nation will fall behind and lose its identity as a civilized nation. Therefore, improving the quality of education has become a key concern for education experts and the government.

One of the concrete steps taken by the government to improve the quality of education is the enactment of Law No. 20 of 2003 on the National Education System and Law No. 14 of 2005 on Teachers and Lecturers. These measures reflect the government's seriousness in realizing the goals of national education development, which are to educate the nation's life and promote public welfare, in line with Indonesia's role in world order based on freedom, eternal peace, and social justice. This commitment is reinforced in Article 31, paragraph (1) of the 1945 Constitution of the Republic of Indonesia, which states: "Every citizen has the right to education."

As a follow-up to this mandate, the government enacted Law No. 20 of 2003 on the National Education System. Article 3 of this law states that the national education functions to develop capabilities and shape the character and civilization of a dignified nation to educate the life of the nation. The goal of national education is to develop the potential of learners to become human beings who are faithful and pious to God Almighty, have noble character, are healthy, knowledgeable, competent, creative, independent, and responsible citizens in a democratic society. Furthermore, Article 5, paragraph (1) of Law No. 20 of 2003 emphasizes that every citizen has the right to quality education without discrimination.

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In line with these policies, Universitas Indraprasta PGRI consistently strives to improve the quality of its graduates. One of the strategies implemented is enhancing the quality of its lecturers, given the strategic role of lecturers in shaping quality graduates. On a global scale, Indonesia's education quality can be seen from various indicators, one of which is global competitiveness. Empirical data shows that Indonesia ranks 41st among 46 leading countries in the field of science and technology, which is lower than Malaysia (ranked 23rd), Thailand (ranked 30th), and the Philippines (ranked 31st). In the field of mastery of science and technology, Indonesia ranks 40th overall. These indicators include the 39th position in research and development (R&D), the 43rd position in the quality of research and development human resources, and the 38th position in technological management capabilities (Jawa Pos in Fakhruddin, 2008). These data indicate that the quality of Indonesia's education is still low and requires significant improvement.

To address this issue, the government issued Law No. 14 of 2005 on Teachers and Lecturers. Article 82, paragraph (1) of this law regulates the certification policy for lecturers. The purpose of certification is to create professional and competent educators, so that lecturers are expected to conduct optimal learning activities to achieve high-quality national education goals.

In the context of internal bureaucratic reform, the lecturer certification system has been thoroughly reviewed by the Ministry of National Education in 2011. Based on this review, the lecturer certification aims to improve the quality of national education and enhance the welfare of lecturers. Certification encourages lecturers to continuously improve their professionalism. The educator certificate, awarded to lecturers through the certification process, serves as formal recognition of the lecturer as a professional in higher education.

Based on the explanation above, lecturer certification not only aims to enhance the competence of lecturers but also has an impact on improving the quality of teaching and graduates. Consequently, it is expected that higher education institutions in Indonesia will be able to compete at the global level and contribute to enhancing the nation's competitiveness on the international stage.

### THEORETICAL FRAMEWORK

#### 1. Quality of Education

Education is the primary key to a nation's progress. Therefore, continuous efforts to improve the quality of education must be made so that Indonesia can compete on a global scale. Currently, the quality of education in Indonesia is still considered low. Education is defined as the process of transmitting culture from one generation to the next, encompassing knowledge, skills, and attitudes. The educational process occurs continuously throughout human life, as people constantly face changes that demand new ways of thinking and acting. Hence, education is a forward-looking process.

Manan (1989) defines education as a process of instilling knowledge, skills, and attitudes in each generation through institutions, such as schools, which are deliberately created for this purpose. Fasli Jalal, as cited by Ratna (2015), asserts that the quality of education heavily depends on the quality of educators. High-quality educators are professional, well-compensated, and dignified. Therefore, the presence of qualified educators is a fundamental prerequisite for the establishment of a quality education system and practice.

Tilaar (2001) identifies two main problems within the education system:

- a. Low quality of education,
- b. The relevance of educational outcomes to development needs, especially concerning the availability of a sufficient number of skilled workers

Rifandi, as cited by Kardoyo (2016), argues that higher education is one of the essential pillars of national development. Hence, higher education institutions must implement effective management systems to produce high-quality graduates. Supranto, as cited by Kardoyo (2016), emphasizes that quality is something that must be well-realized by service providers, including higher education institutions.

According to Law No. 20 of 2003 on the National Education System, as cited by Sabar (2012), education is a conscious and planned effort to create a learning environment that allows students to develop their potential optimally. Therefore, education must be understood as essential and systematically planned. Hamalik (1999) contends that education is a conscious process of guidance from educators to the physical and spiritual development of students to shape good character. This view is reinforced by Purwanto (2016), who states that the goal of education is to foster human character in accordance with the cultural values of society.

#### 2. Lecturer Certification Policy

Patton and Sawicky, as cited by Nugroho (2000), state that a policy is an effort made to create new policies or as a consequence of existing policies. Dunn, as cited by Putu and Ni Kadek (2021), identifies three approaches to policy formulation:

- a. Empirical approach, which aims to address issues based on factual evidence.
- b. Evaluative approach, which aims to assess something from the perspective of values or interests.

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- c. Normative approach, which aims to provide recommendations or actions that should be taken.

According to Eulau and Kenneth, as cited by Jones (1984), a policy is a fixed decision characterized by consistency and repetitive behavior from both the policy makers and those who comply with it. Edward and Sharkansky (1998) define public policy as an action or decision taken by the government to achieve certain objectives. Jones (2001) identifies six components of public policy, namely:

- a. The initial intention or purpose of the action
- b. The ultimate goal to be achieved
- c. The plan to achieve the goal
- d. The program authorized to achieve the goal
- e. The decisions or actions taken
- f. The measurable impact of the policy

Lecturer certification is one of the critical policies aimed at improving the quality of higher education. Zainuddin, as cited by Kadek and Ni Wayang (2015), defines lecturer certification as the process of granting an educator's certificate to lecturers. The objectives of lecturer certification are as follows:

- a. Assessing lecturer professionalism,
- b. Protecting the teaching profession,
- c. Improving the process and outcomes of education,
- d. Promoting the achievement of national education goals,
- e. Enhancing lecturers' awareness of academic ethics.

### 3. Lecturer Teaching Performance

Lecturer performance serves as an indicator of a university's success in educating and shaping the character of students in accordance with the mandate of the 1945 Constitution of Indonesia and the values of Pancasila. According to Byars and Rue, as cited by Hary (2012), performance reflects the degree to which an individual accomplishes a task. Hilgard (1982) defines performance as knowledge-based behavior that can be observed. Similarly, Whitmore (1996) asserts that performance encompasses behaviors that can be directly or indirectly observed by others.

Jones et al., as cited by Trie (2018), emphasize that performance is a combination of behaviors and results achieved by an individual in a particular task. Meanwhile, Mitchell, as cited by Kadek and Ni Wayang (2015), notes that lecturer performance encompasses several aspects, including:

- a. Quality of work,
- b. Timeliness,
- c. Initiative,
- d. Ability,
- e. Communication

Teaching is a critical aspect of lecturer performance. Rusman, as cited by Bektı and Herman (2013), defines teaching as a system comprising various components, such as objectives, materials, methods, and evaluation. Gagne and Wanger, as cited by Bektı and Herman (2013), describe teaching as a series of activities designed to facilitate the learning process.

According to Law No. 20 of 2003 on the National Education System, Article 39, paragraph (2) states that lecturers are professional personnel responsible for planning and implementing the learning process, evaluating learning outcomes, and providing guidance and training. Article 40, paragraph (2) outlines the obligations of lecturers as follows:

- a. Creating a meaningful, enjoyable, creative, and dynamic learning environment,
- b. Committing to improving the quality of education,
- c. Providing role models and upholding the good reputation of their institution and profession.

Lecturer performance, especially in teaching, is a key driver of educational quality. Lecturers are expected to create a meaningful learning environment that motivates students to learn, fosters creativity, and supports students' intellectual development. Performance assessments of lecturers should therefore not only consider the quantity of output but also emphasize the quality of teaching and the lecturer's capacity to inspire student development.

The alignment between the lecturer certification policy and the enhancement of lecturer performance is essential for achieving high-quality education. Certification encourages lecturers to fulfill their professional roles in accordance with national education standards. The interrelationship between these factors demonstrates that the effectiveness of higher education is largely



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dependent on the competence and professionalism of its lecturers. Hence, a continuous effort is required to develop and maintain lecturer performance in line with global educational standards.

## RESEARCH METHODOLOGY

### 1. Research Approach and Method

This study employs a quantitative approach using the survey method. The survey method was chosen as it allows the researcher to collect data directly from respondents through questionnaires. The primary aim of the survey is to describe, explain, and analyze the relationship between independent variables and the dependent variable. By using a survey, the researcher can obtain an accurate and objective depiction of how the independent variables influence the dependent variable.

### 2. Research Variables

This study involves three key variables, namely:

- Dependent Variable (Y): Quality of Education
- Independent Variable (X1): Certification Policy
- Independent Variable (X2): Lecturer Teaching Performance

The quality of education (Y) is influenced by both the certification policy (X1) and lecturer teaching performance (X2). The relationship between these variables is illustrated through the following research constellation, which depicts the interactions and influence pathways among the dependent and independent variables.

### 3. Research Constellation

Independent Variables (X)	Dependent Variable (Y)
X1: Certification Policy	Y: Quality of Education
X2: Lecturer Teaching Performance	

Description:

- Y = Quality of Education
- X1 = Certification Policy
- X2 = Lecturer Teaching Performance

This research constellation illustrates that the quality of education (Y) is influenced by two independent variables, namely the certification policy (X1) and lecturer teaching performance (X2). This model enables the researcher to identify the extent to which each independent variable affects the quality of education.

### 4. Research Population and Sample

The population of this study includes all lecturers teaching at Universitas Indraprasta PGRI Jakarta during the 2024 academic year. This population was chosen because lecturers play a strategic role in improving the quality of education through teaching activities and the implementation of certification policies.

The research sample consists of 80 lecturers, selected using random sampling. This sampling technique ensures that every member of the population has an equal chance of being selected as a sample. The use of this technique minimizes selection bias and allows the research findings to be generalized to a broader population.

### 5. Data Collection Techniques

The data collection technique used in this study is a questionnaire designed using a Likert scale. The Likert scale is applied to measure respondents' perceptions or attitudes toward the statements related to the research variables. Respondents are asked to indicate their level of agreement with each statement. The Likert scale used in this study consists of five response categories, namely:

- Strongly Disagree (SD)
- Disagree (D)
- Neutral (N)
- Agree (A)
- Strongly Agree (SA)

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The data collection instrument is systematically designed to accurately and reliably measure the independent variables (X1 and X2) and the dependent variable (Y). Before the questionnaire is used, it is subjected to validity and reliability tests to ensure that the instrument is suitable for collecting accurate and credible data.

### 6. Validity and Reliability Tests

To ensure the accuracy and consistency of the data, the questionnaire underwent validity and reliability testing.

#### a. Validity Test

- Validity was assessed using the construct validity method, which measures the extent to which the items on the instrument represent the concept being measured.
- The construct validity test aims to determine whether the items on the questionnaire accurately reflect the dimensions and concepts of the variables being studied.
- The results of the validity test revealed that all items in the questionnaire had significant correlation values, indicating that they are valid and suitable for use in data collection.

#### b. Reliability Test

- Reliability was measured using the Cronbach's Alpha coefficient.
- An instrument is considered reliable if its Cronbach's Alpha coefficient is  $\geq 0.70$ .
- The results of the reliability test showed that all items in the questionnaire had a Cronbach's Alpha coefficient greater than 0.70, indicating that the instrument is reliable and capable of producing consistent data.

### 7. Data Analysis Techniques

The data obtained from the questionnaires were processed and analyzed using descriptive and inferential statistical analysis methods.

#### a. Normality Test

- Before conducting further analysis, a normality test is carried out to ensure that the data follows a normal distribution.
- The normality test is conducted using the Kolmogorov-Smirnov test or the Shapiro-Wilk test, with a significance level ( $\alpha$ ) of 0.05.
- The results of the normality test indicate that the data follows a normal distribution since the significance value is greater than 0.05.

#### b. Multiple Linear Regression Analysis

- To determine the influence of the independent variables (X1 and X2) on the dependent variable (Y), a multiple linear regression analysis is conducted.
- The multiple linear regression equation is formulated as follows:

$$Y = a + b_1X_1 + b_2X_2 + e$$

Explanation:

- Y = Quality of Education (dependent variable)
- a = Constant (intercept)
- b1 = Regression coefficient for variable X1 (Certification Policy)
- b2 = Regression coefficient for variable X2 (Lecturer Teaching Performance)
- X1 = Certification Policy (independent variable)
- X2 = Lecturer Teaching Performance (independent variable)
- e = Error term (residual error)

#### c. Hypothesis Testing

- Hypothesis testing is conducted using the t-test and F-test.
- The t-test is used to test the partial influence of each independent variable (X1 and X2) on the dependent variable (Y).
- The F-test is used to test the simultaneous influence of both independent variables (X1 and X2) on the dependent variable (Y).
- The test results are considered significant if the p-value is less than 0.05.

#### d. Coefficient of Determination ( $R^2$ )

- The coefficient of determination ( $R^2$ ) was used to measure the proportion of variance in the dependent variable (Y) that could be explained by the independent variables (X1 and X2).
- The higher the value of  $R^2$ , the greater the influence of the independent variables on the dependent variable.

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## 8. Research Timeline and Location

This research was conducted at Universitas Indraprasta PGRI Jakarta during the 2024 academic year. This location was chosen because Universitas Indraprasta PGRI Jakarta implements a lecturer certification policy and employs teaching staff from diverse educational and professional backgrounds. This diversity allows for a more comprehensive analysis of the influence of lecturer certification policy and lecturer teaching performance on the quality of education.

By conducting the research at Universitas Indraprasta PGRI Jakarta, the findings are expected to provide valuable insights into how these factors influence educational quality, offering implications for policy development and academic practice in other higher education institutions.

## RESEARCH RESULTS

### 1. Analysis of the Influence of Certification Policy on the Quality of Education

The results of the multiple linear regression analysis reveal that the certification policy has a significant influence on the quality of education. This information is presented in Table 2: Coefficients of Multiple Regression and Significance Levels.

**Table 2: Coefficients of Multiple Regression and Significance Levels**

Model	Unstandardized Coefficients	Standardized Coefficients	t	Sig.
Constant	23.264	5.897	-	3.542
Certification Policy	0.598	0.137	0.375	3.183
Lecturer Performance	0.487	0.142	0.426	3.254

Based on Table 2, the regression coefficient (B) for the certification policy is  $B = 0.598$ , meaning that for every 1-unit increase in the certification policy, the quality of education increases by 0.598 units, assuming all other variables remain constant.

The t-value ( $t_{count}$ ) = 3.183 with a p-value = 0.002 indicates that the certification policy has a significant influence on the quality of education, as the p-value (0.002) is less than 0.05. Therefore, it can be concluded that the certification policy significantly affects the quality of education.

### 2. Analysis of the Influence of Lecturer Teaching Performance on the Quality of Education

The results of the multiple linear regression analysis indicate that lecturer teaching performance also has a significant influence on the quality of education. This information is also displayed in Table 2: Coefficients of Multiple Regression and Significance Levels.

The regression coefficient (B) for lecturer teaching performance is  $B = 0.487$ , which implies that for every 1-unit increase in lecturer teaching performance, the quality of education increases by 0.487 units, assuming other variables remain constant.

The t-value ( $t_{count}$ ) = 3.254 with a p-value = 0.001 indicates that lecturer teaching performance significantly influences the quality of education since the p-value (0.001) is less than 0.05. Therefore, it can be concluded that lecturer teaching performance significantly affects the quality of education.

### 3. Simultaneous Influence of Certification Policy and Lecturer Teaching Performance on the Quality of Education

To determine the simultaneous influence of the certification policy and lecturer teaching performance on the quality of education, an F-test was conducted. The results are presented in Table 3: Multiple Linear Regression Coefficient Test (ANOVA).

**Table 3: Multiple Linear Regression Coefficient Test (ANOVA)**

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	2157.765	2	1356.758	34.275	0.002
Residual	2431.563	75	28.905		
Total	4671.072	77			

Based on Table 3, the F-value ( $F_{count}$ ) = 34.275 with a p-value = 0.002. Since the p-value (0.002) is less than 0.05, it can be concluded that the certification policy and lecturer teaching performance simultaneously have a significant influence on the quality of education.

Test Criteria:

- $F_{count} (34.275) > F_{table} (3.11)$  at  $\alpha = 0.05$

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- p-value (0.002) < 0.05

Therefore, it can be concluded that the certification policy and lecturer teaching performance simultaneously have a significant impact on the quality of education.

### 4. Coefficient of Determination ( $R^2$ ) and Relationship Between Variables

To determine the extent to which the certification policy and lecturer teaching performance contribute to the quality of education, the coefficient of determination ( $R^2$ ) was calculated. The results are shown in Table 4: Multiple Correlation Coefficient and Coefficient of Determination.

**Table 4: Multiple Correlation Coefficient and Coefficient of Determination**

	Model R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.793	0.519	0.517	5.43217

From Table 4, the following can be concluded:

- Correlation coefficient ( $R$ ) = 0.793, indicating a strong relationship between certification policy, lecturer teaching performance, and quality of education.
- Coefficient of determination ( $R^2$ ) = 0.519, which means that the certification policy and lecturer teaching performance collectively explain 51.9% of the variance in the quality of education, while the remaining 48.1% is explained by other factors not included in this study.

### 5. Multiple Linear Regression Equation

Based on the data analysis, the following multiple linear regression equation is obtained:

$$Y = 23.264 + 0.598X_1 + 0.487X_2$$

Explanation:

- $Y$  = Quality of Education
- $X_1$  = Certification Policy
- $X_2$  = Lecturer Teaching Performance

Interpretation of the regression equation:

- Constant ( $a$ ) = 23.264  
This means that if both the certification policy ( $X_1$ ) and lecturer teaching performance ( $X_2$ ) are zero (0), the predicted value of the quality of education ( $Y$ ) is 23.264.
- Coefficient of  $X_1$  (0.598)  
This indicates that for every 1-unit increase in the certification policy ( $X_1$ ), the quality of education increases by 0.598 units, assuming the other variable remains constant.
- Coefficient of  $X_2$  (0.487)  
This indicates that for every 1-unit increase in lecturer teaching performance ( $X_2$ ), the quality of education increases by 0.487 units, assuming the other variable remains constant.

## DISCUSSION

### 1. The Influence of Lecturer Certification Policy on the Quality of Education

The findings of this study indicate that the lecturer certification policy has a significant influence on the quality of education. This is consistent with the view of Putu and Ni Kadek (2021, p. 15), who state that policy serves as a technique or method for evaluating and optimizing the implementation of certification policies. The primary objective of such policies is to enhance lecturers' performance in fulfilling the Tri Dharma of Higher Education, ultimately contributing to the improvement of the quality of education.

Sri W (2016, p. 126) further emphasizes that public policy is a decision that is binding on the general public. The lecturer certification policy aims to promote lecturer professionalism to ensure that they can deliver optimal learning experiences. This is supported by Article 82, paragraph (1) of Law No. 14 of 2005, which stipulates that lecturers, as educators, are required to conduct professional teaching so that the goals of national education can be achieved.

The findings of this study reveal that the regression coefficient for the certification policy is  $B = 0.598$ , with a t-value ( $t_{count}$ ) = 3.183 and a p-value = 0.002. These values indicate that the certification policy has a significant influence on the quality of

## **The Influence of Certification Policy and Lecturer Teaching Performance on the Quality of Education**

education. This confirms that the implementation of the lecturer certification policy is effective in improving both the quality of learning and the overall quality of education.

The implication of this finding is that the lecturer certification policy must be continuously strengthened and improved to enhance lecturer professionalism. Through certification, lecturers are expected to conduct the learning process more effectively. The findings also align with the result that the Beta coefficient for the certification policy is 0.375, which indicates that the influence of the certification policy on the quality of education is relatively strong.

### **2. The Influence of Lecturer Teaching Performance on the Quality of Education**

The results also indicate that lecturer teaching performance has a significant influence on the quality of education. This finding is consistent with the argument of Hary (2012, p. 200), who states that performance reflects the degree of task completion within a given period. Therefore, lecturer performance serves as a crucial indicator of the success of the learning process.

In the context of learning, Bektı and Herman (2013, p. 181) explain that learning involves structured interactions between lecturers and students. During the learning process, lecturers are responsible for creating an enjoyable, creative, and interactive learning environment. An effective learning process not only increases student engagement but also positively impacts the quality of education.

The results of the analysis reveal that the regression coefficient (B) for lecturer teaching performance is  $B = 0.487$ , with a t-value (tcount) = 3.254 and a p-value = 0.001. Since the p-value is less than 0.05, it can be concluded that lecturer teaching performance has a significant influence on the quality of education. The regression coefficient  $B = 0.487$  implies that a 1-unit increase in lecturer performance will lead to an increase of 0.487 units in the quality of education.

Furthermore, the Beta coefficient for lecturer teaching performance is 0.426, indicating that lecturer performance plays a significant role in explaining variations in the quality of education. This finding suggests that the better the lecturer's performance in conducting the learning process, the higher the quality of education that will be achieved.

The implication of this result is that higher education institutions should provide greater support to lecturers to improve their performance. Such support can take the form of competency development through training, strengthening motivation, and enhancing learning facilities. Improving the performance of lecturers will have a direct impact on achieving better educational quality.

### **3. The Simultaneous Influence of Certification Policy and Lecturer Teaching Performance on the Quality of Education**

This study also found that the certification policy and lecturer teaching performance have a simultaneous and significant influence on the quality of education. The results of the F-test reveal that the F-value (Fcount) = 34.275, with a p-value = 0.002. Since the p-value is less than 0.05, it is concluded that the two independent variables — certification policy and lecturer teaching performance — simultaneously have a significant impact on the quality of education.

This finding aligns with the theory presented by Jones (1984, p. 47), who argues that public policy is a binding decision aimed at directing processes toward achieving specific objectives. In this context, the goal is to improve the quality of education through the effective implementation of a lecturer certification policy.

Trie H (2018, p. 216) points out that lecturer performance encompasses various aspects, including the quality of work, timeliness, and ability to carry out the learning process. With the certification policy in place, lecturers have a moral and professional obligation to improve their performance. The findings of this study show that the certification policy encourages lecturers to carry out the learning process more effectively and responsibly, which ultimately leads to an improvement in the quality of education.

The results of the multiple regression analysis reveal that the coefficient of determination ( $R^2$ ) = 0.519, meaning that 51.9% of the variation in the quality of education can be explained by the certification policy and lecturer teaching performance. The remaining 48.1% of the variation in the quality of education is explained by other variables that were not included in this study.

The correlation coefficient ( $R$ ) = 0.793, which indicates that the relationship between the certification policy, lecturer performance, and quality of education is strong. This finding demonstrates that changes in the certification policy and improvements in lecturer performance jointly have a significant impact on the quality of education.

## **CONCLUSIONS, IMPLICATIONS, LIMITATIONS, AND RECOMMENDATIONS**

### **Conclusions**

Based on the results of the study, the following conclusions were drawn:

1. The Influence of Certification Policy on the Quality of Education

The certification policy has been proven to have a significant influence on the quality of education at Universitas Indraprasta PGRI. The analysis results indicate that the regression coefficient ( $B$ ) = 0.598, with a t-value (tcount) = 3.183 and a p-value = 0.002, signifying that the certification policy has a positive and significant impact on the quality of

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education. This finding implies that the more effectively the certification policy is implemented, the higher the quality of education that can be achieved. The certification policy is intended to enhance the professionalism of lecturers, enabling them to conduct learning optimally and support the achievement of national education goals.

### 2. The Influence of Lecturer Teaching Performance on the Quality of Education

Lecturer teaching performance has a significant influence on the quality of education. The regression analysis shows that the regression coefficient ( $B$ ) = 0.487, with a t-value ( $t_{count}$ ) = 3.254 and a p-value = 0.001, which indicates that lecturer teaching performance has a positive and significant influence on the quality of education. This finding implies that the better the teaching performance of lecturers, the higher the quality of education that can be achieved. Effective teaching performance involves planned, interactive learning and adherence to the principles of meaningful learning.

### 3. Simultaneous Influence of Certification Policy and Lecturer Teaching Performance on the Quality of Education

Simultaneously, the certification policy and lecturer teaching performance have a significant influence on the quality of education. The results of the ANOVA test indicate that the F-value ( $F_{count}$ ) = 34.275, with a p-value = 0.002, signifying that certification policy and lecturer teaching performance together have a significant impact on the quality of education. The coefficient of determination ( $R^2$ ) = 0.519, which means that the certification policy and lecturer teaching performance collectively explain 51.9% of the variance in the quality of education, while the remaining 48.1% is influenced by other factors not included in this study.

## Implications

The findings of this study have important implications for the management of higher education policy, especially at Universitas Indraprasta PGRI. The implications include:

#### 1. Strengthening the Certification Policy

The existence of a lecturer certification policy is expected to encourage lecturers to improve their professionalism in teaching. To achieve this, there is a need for continuous efforts to strengthen and improve certification policies, not only in terms of administrative processes but also in the context of continuous professional development for lecturers.

#### 2. Enhancing Lecturer Teaching Performance

Good lecturer performance plays a vital role in creating a meaningful and high-quality learning process. Therefore, universities must provide institutional support to enhance lecturer performance. This support can be in the form of training, capacity development, and performance incentives that motivate lecturers to carry out effective and interactive learning.

#### 3. Increasing the Quality of Education

Certification policies and lecturer performance improvements have been proven to influence the quality of education. Therefore, higher education institutions must ensure that lecturers adhere to the principles of certification and continuously improve their teaching skills. This approach will enhance student engagement and contribute to the achievement of national education goals.

## LIMITATIONS

While this study has produced important findings, several limitations should be noted, including:

#### 1. Limited Sample Size

This study only involved 80 lecturers from Universitas Indraprasta PGRI. Although the sample size is sufficient for multiple regression analysis, the results still need to be tested on a larger population or at other universities. A larger sample size would enhance the external validity of the study and enable broader generalizations of the findings.

#### 2. Focus on Two Independent Variables

This study only examines the influence of certification policy and lecturer teaching performance on the quality of education. However, the quality of education can also be influenced by other variables, such as:

- Learning facilities
- Support from university leadership
- Learning environment
- Student motivation

Since these variables were not included in the model, the study only explains 51.9% of the variance in the quality of education, with the remaining 48.1% unexplained.



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### 3. Research Conducted at a Single Institution

This study was conducted exclusively at Universitas Indraprasta PGRI Jakarta, so the results may not fully represent conditions at other universities. Therefore, future research should expand its scope to include other institutions, such as public universities, private universities, and universities in different regions. This would allow for more comprehensive generalizations and insights into how certification policies and lecturer performance impact education across different contexts.

### 4. Quantitative Approach Without Qualitative Exploration

This study employs a quantitative approach using a Likert scale questionnaire. While this approach allows for objective measurement, it does not explore qualitative aspects such as lecturer motivation, experiences during certification, and the challenges faced in teaching. Qualitative exploration could provide a deeper understanding of the dynamics of certification policies and lecturer performance, offering richer insights.

## RECOMMENDATIONS FOR FUTURE RESEARCH

Based on the above research limitations, the following recommendations are suggested for future research:

### 1. Expand the Research Sample

Future studies should consider involving larger samples and expanding the study to other universities, including public and private universities. This approach would improve the generalizability of the findings, providing a broader and more accurate understanding of how certification policies and lecturer performance influence the quality of education in Indonesian higher education.

### 2. Include Additional Independent Variables

To improve the accuracy of the research model, future studies are encouraged to incorporate other independent variables that may influence the quality of education, such as:

- Lecturer motivation: How motivated lecturers are in conducting learning activities.
- Institutional support: The extent to which university leaders and management provide support for lecturers.
- Learning facilities: The availability of learning support facilities, such as classrooms, access to technology, and learning infrastructure.
- Student participation: The extent of active student participation, which can affect the quality of education.

### 3. Broaden the Research Location

To increase the generalizability of the findings, future research should be conducted at other higher education institutions, both public and private. Research in public universities may provide a broader perspective due to the differences in institutional policies, organizational culture, and student demographics. In contrast, private universities often have diverse accreditation statuses and different socio-economic characteristics of students, which can produce more comprehensive and relevant data for generalization.

### 4. Adopt a Mixed-Methods Approach

Future research should consider using a mixed-methods approach, combining both quantitative and qualitative methods. This approach would enable researchers to gather more in-depth information through interviews, focus group discussions (FGD), or field observations. Qualitative insights could provide a richer perspective on lecturers' experiences related to certification, their performance, and the challenges they face in teaching. Mixed methods research would also facilitate the exploration of lecturer motivation, institutional support, and the practical impact of certification on learning processes.

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## The Effect of Teaching Games for Understanding (TGfU) Learning Model and Problem-Based Learning (PBL) Model towards the Social Skills and Basketball Playing Skills



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**ABSTRACT:** This research aims to determine: (1) the effect of the Teaching Games for Understanding (TGfU) learning model towards the students' social skills, (2) the effect of the Teaching Games for Understanding (TGfU) learning model towards the basketball playing skills, (3) the effect of the Problem Based Learning (PBL) learning model towards the students' social skills, and (4) the effect of the Problem Based Learning (PBL) learning model towards the basketball playing skills. The type of this research was a quasi-experiment using a 2x2 factorial design. The research subjects were 72 eleventh grade students of SMA N 1 Yogyakarta (Yogyakarta 1 High School) from 2 classes: Class XI F 3 with the TGfU model treatment while class XI F 9 with the PBL model. The social skills instrument used the Social Skills Rating System (SSRS) Instrument, and the basketball playing skills instrument used the Game Performance Assessment Instrument (GPAI) test. The data analysis technique used ANCOVA. The research findings reveal that: 1) there is an effect of the Teaching Games For Understanding (TGfU) learning model towards the improving social skills of the students with a significance value of  $0.042 < 0.05$  and a percentage of 5.1%. 2) There is an effect of the Teaching Games For Understanding (TGfU) learning model towards the improving basketball playing skills of students with a significance value of  $0.000 & 0.000 < 0.05$  and a percentage of 59.9% skills, 110% performance. 3) There is an effect of the Problem Based Learning (PBL) learning model towards the improving social skills of students with a significance value of  $0.012 < 0.05$  and a percentage of 5.3%. 4) There is no effect of the Problem Based Learning (PBL) learning model towards the improving social skills of students with a significance value of  $0.907 & 0.298 > 0.05$  and a percentage of 0.92% skills, 13.9% performance.

**KEYWORD:** TGfU, PBL, Social Skills, Playing Skills, Basketball

### I. INTRODUCTION

Education is crucial in developing a nation's quality of life since it is fundamental to social, economic, and cultural establishment. A well-distributed education contributes to working opportunity equity, lessening social injustice, and constructing a more inclusive and just society. By enhancing education quality, people can establish more competent workforces, advance research and development, and set smarter and higher-quality people that are projected to elevate their living quality. The attempt to shape students' character in school starts with creating a good environment for them to inflict respect, appreciation, and mutual help on each other (Firdausi & Taufina, 2020). It will succeed when the goal gets the realization and students get involved in society. It indeed agreed with Nurhayati (2020) that as social beings, one needs others to survive, thus it is important for children to have positive social behaviour.

Social skills are the ability possessed by a person to interact and communicate with others. People acquire these skills through a learning process, which later is used to build relationships with their environment. As stated by Kusadi (2020), social skills owned by an individual can be the foundation for establishing good relationships and solving problems to generate good relationships with each other. Social interaction skills are developed from an early age within education in the school environment. As Wulandari (2022) stated, social skills are acquired in several ways. The most common process is learning from peers. In addition, social interaction skills generation is mandatory in the school environment.

Nonetheless, social skills in physical education classes are taught in the class. Physical education allows pupils to participate in physical activities that help them build social skills and communicate well with others. Physical education on the body is the most

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popular and considered a unique contribution of physical education, which includes physical fitness, motor skills, and knowledge of physical fitness and motor skills, all of which lead to an understanding of an active and healthy lifestyle throughout life (Jayul and Irwanto, 2020).

Based on observations collected using basketball game materials, students in class XI at SMA Negeri 1 Yogyakarta were less eager to participate in class activities. The teacher focused most of the class on dull shooting and passing techniques. Teachers should be able to deliver effective, efficient, and inventive teaching to meet several competency-related goals or requirements.

The implementation of monotonous and conventional learning tends to affect student learning outcomes. Using conventional learning models cannot maximize student motor skills and learning outcomes. Learning carried out with good models and approaches not only covers psychomotor and affective aspects but also can also provide cognitive aspects in critical thinking. Based on the analysis of learning outcomes of class XI students of SMA Negeri 1 Yogyakarta on basketball game material, most are still below <50%, meaning that the achievement of student learning outcomes on basketball game material has not met the Learning Objective Achievement Criteria (KKTP).

Teaching Games for Understanding (TGfU) and Problem-Based Learning (PBL) are two learning strategies used to solve the problem. The implementation of this TGfU learning model provides researchers with an overview of how the TGfU learning model will affect students' social skills because the TGfU learning model requires students to work together, communicate, and interact with one another, thereby indirectly improving social skills and basketball playing skills. In line with the realities of the field, students frequently struggle to understand how to play basketball, making it difficult for them to master the basketball curriculum. It is compounded by classifying each student into a group, which, if left alone, will struggle to welcome new students. In addition to this paradigm, another learning model utilized to help with physical education learning is the PBL learning model.

This Problem-Based Learning approach was invented using the concepts proposed by Jerome Bruner. According to (Zulfa, 2023), issue-based learning is taught by presenting a problem, asking questions, and facilitating investigations and discussions. Students with strong academic standing and innovative classes can benefit from the PBL model. The benefits of this methodology include the ability to build student independence by addressing problems that are relevant to students' lives. This demonstrates that PBL is a learning paradigm focused on students' issues. Teachers and students, or students and other students, work together to tackle the difficulties discussed in this concept, which goes beyond merely imparting knowledge.

Based on the explanation above, the researcher attempted to test the Teaching Games for Understanding (TGfU) and Problem-Based Learning (PBL) learning models to evaluate how they affected students' social skills and basketball playing abilities. The TGfU and PBL learning models are intended to enhance students' social skills. They comprehend the concepts of the content being taught and reduce learning challenges to achieve positive learning outcomes. Basketball playing abilities are what this study refers to as learning outcomes.

## **II. METHOD**

This is a quasi-experimental design study, meaning that all intact participants (intact group) will be treated. This study was carried out in the city of Yogyakarta, Special Region Province. Specifically, it was carried out in SMA Negeri 1 Yogyakarta. This study ran from July to August 2024, with four meetings in total. The meetings consist of one the initial test (pretest), three treatment, and one final test (post-test). The subjects are the primary source of research data, including data on the variables researched. The subjects in this study were class XI students from SMA Negeri 1 Yogyakarta, divided into F3 class and F9 class, with 72 students in total. A research instrument is a tool or test used to gather information. This study used Social Scale Rating System (SSRS). Assessment using SSRS focused on various areas. Game Performance Assessment Instrument (GPAI) was used to administer both the Social Skills Test and the Basketball Skills Test.

## **III. RESULT AND DISCUSSION RESULT**

The results of this study cover (1) data result descriptions, (2) prerequisite analysis test, and (3) hypothetic test.

### **1. Data result descriptions**

The data of this study are in pretest and post-test data, which are a general description of each variable related to the study. This study was conducted at SMA Negeri 1 Yogyakarta in 11 graders, classes F3 and F9, totalling 36 students in each class. The pretest data collection began on July 18-19, while the post-test data collection was on August 1-2. The treatment was carried out in three times meetings within 2 weeks.

### **2. Prerequisite analysis test result**

#### **a. Normality test**

## The Effect of Teaching Games for Understanding (TGfU) Learning Model and Problem-Based Learning (PBL) Model towards the Social Skills and Basketball Playing Skills

The normality test in this study used the Shapiro-Wilk method. The results of the data normality test contained in each analysis group were carried out using the SPSS version 25.00 for Windows software program with a significance level of 5% or 0.05. The data summary is presented in Table 1 as follows:

**Table 1: Normality test result**

Variables		Classes	Normality
Social Pretest		TGfU	0.203
		PBL	0.588
Social Post-test		TGfU	0.050
		PBL	0.095
Basketball Skills Pretest	Involvement	TGfU	0.750
		PBL	0.212
	Appearance	TGfU	0.116
		PBL	0.849
Basketball Skills Posttest	Involvement	TGfU	0.138
		PBL	0.195
	Appearance	TGfU	0.808
		PBL	0.444

According to the statistical analysis of the normality test performed using the Shapiro-Wilk test, in all pretest and posttest data of social skills and basketball skills, the results of the data normality test obtained a significance value of  $p > 0.05$ , indicating that the data is normally distributed. After the research data has been pronounced normal, it will be examined to ensure homogeneity.

### b. Homogeneity test

The homogeneity test determines if the data has equal variation or is homogeneous. The homogeneity rule states that if the  $p$ -value exceeds 0.05, the test is considered homogeneous. A  $p$ -value  $< 0.05$  indicates that the test is not homogeneous. Table 2 shows the homogeneity test results for the pretest and post-test of social skills and basketball games:

**Table 2: Homogeneity test result**

Variables		Homogeneity
Social Pretest		0.256
Social Post-test		0.058
Basketball Skills Pretest	Involvement	0.70
	Appearance	0.771
Basketball Skills Post-test	Involvement	0.186
	Appearance	0.611

Based on the statistical analysis of the homogeneity test conducted using the Levene Test. Both pretest and posttest results based on mean findings indicate higher than  $< 0.05$ , indicating homogeneous variance within the data set. Thus, the population has the same variance and is homogeneous.

### c. Hypothetic test

The hypothesis in this study was investigated using a paired sample test and an independent t-test with SPSS 25. The similarities between the pretest – post-test scores of students in the TGfU and PBL groups can be determined by comparing the post-test scores of each group. After performing a normality and homogeneity test on the pretest – post-test data, it was discovered that the distribution of the pretest – post-test scores was normally and homogeneously distributed, so parametric test statistics, specifically the t-test, were used for testing with a significance level of 5%.

## The Effect of Teaching Games for Understanding (TGfU) Learning Model and Problem-Based Learning (PBL) Model towards the Social Skills and Basketball Playing Skills

Table 3 t-Test pretest and post-test results

Variable	Sig. (2-tailed)	Mean			Percentage %	
		Pretest	Posttest	Dif.		
Pretest – Post-test Social TGfU	0.042	72.73	76.5	3.76	5.1%	
Pretest – Post-test Social PBL	0.012	73.52	77.43	3.90	5.3%	
Pretest – Posttest basketball skills TGfU	Skills	0.000	11.81	18.89	7.08	59.9%
	Performance	0.000	1.46	3.09	1.63	110%
Pretest – Post test basketball skills PBL	Skills	0.907	15.00	15.14	0.13	0.92%
	Performance	0.298	2.11	2.41	0.29	13.9%

i. The influence of the Teaching Games For Understanding (TGfU) learning model on students' improving social skills.

Based on the results of the analysis in Table 3 above, it implied that the Sig value (2-tailed) in the pretest and posttest of the TGfU class social has a mean difference of 3.76 or, if expressed as a percentage of 5.1% and a significance value of  $0.042 < 0.05$  indicates that there is a significant difference. Thus, the alternative hypothesis ( $H_a$ ) shows that "There is an influence of the Teaching Games For Understanding (TGfU) learning model on improving social skills in students." **Accepted.**

ii. The influence of the Teaching Games For Understanding (TGfU) learning model on students' improving basketball skills.

Based on the results of the analysis in Table 3 above, it implied that the Sig value (2-tailed) in the pretest and posttest of basketball skills, both playing involvement and playing performance of the TGfU class, have a mean difference of 7.08 for skills and 1.63 for playing performance, or if expressed as a percentage of 59.9% and 110% and the significance value for both is  $0.000 < 0.05$ , indicating that there is a significant difference. Thus, the alternative hypothesis ( $H_a$ ) said that "There is an influence of the Teaching Games For Understanding (TGfU) learning model on improving basketball playing skills in students." **Accepted.**

iii. The influence of the Problem-Based Learning (PBL) learning model on students' improving social skills.

Based on the analysis results in Table 3 above, it implied that the Sig value (2-tailed) in the pretest and post-test of PBL class social skills has a mean difference of 3.90 or, if presented as 5.3% and a significance value of  $0.012 < 0.05$ , indicating that there is a significant difference. Thus, the alternative hypothesis ( $H_a$ ) said that "There is an influence of the Problem-Based Learning (PBL) learning model on improving social skills in students." **Accepted.**

iv. The influence of the Problem-Based Learning (PBL) learning model on students' improving basketball skills.

Based on the results of the analysis in Table 3 above, it implies that the Sig (2-tailed) value in the pretest and posttest of basketball skills, both playing involvement and playing performance of the PBL class, has a mean difference of 0.13 for skills and 0.29 for playing performance or if presented as 0.92% and 13.9% and a significance value of  $0.907 > 0.05$  for skills and  $0.298 > 0.05$  for performance shows that there is no significant difference. Thus, the alternative hypothesis ( $H_o$ ) stated that "There is no effect of the Problem-Based Learning (PBL) learning model on improving social skills in students." **Accepted.**

## DISCUSSION

### The TGfU learning model influence for the students' social skills.

According to the findings of the analysis, the TGfU learning model has an impact on increasing students' social skills, as evidenced by the results of the t-test done on the pretest and post-test results of social skills using the Social Scale Rating System (SSRS) questionnaire. The SSRS assessment focusses on various categories, including Social Skills, which is made up of sub-indicators such as cooperation, assertiveness, empathy, and self-control. The Teaching Games for Understanding (TGfU) learning paradigm can help students enhance their social skills since it emphasises learning through games and real-world settings that encourage students to interact.

### The influence of the Teaching Games For Understanding (TGfU) learning model on improving basketball playing skills.

According to the analysis findings, the TGfU learning paradigm influences and enhances students' social skills. This fact is supported by the results of the t-test on the pretest and post-test results of basketball playing skills using the Game Performance Assessment Instrument (GPAI). In other words, this learning style has a big influence on students' basketball skills. This effect is



## **The Effect of Teaching Games for Understanding (TGfU) Learning Model and Problem-Based Learning (PBL) Model towards the Social Skills and Basketball Playing Skills**

expected to occur since the TGfU learning model is novel for pupils. The students feel eager and love learning basketball while using the game-drill-game strategy. GPAI is a tool for assessing game-playing skills and tactical knowledge in TGfU-based games. GPAI works by observing player performance in real-game circumstances and assessing characteristics such as decision-making, team support, and tactical awareness. According to Webb (2009), TGfU is not the only pedagogical approach for teaching the game, but it is beneficial in terms of student learning results. This reasoning leads to the conclusion that the adoption of the TGfU model in learning has an impact on student skill development, knowledge, and playing performance. Awareness of game tactics or techniques must be aimed at improving playing abilities. As a result of the above discussion, it is possible to conclude that TGfU learning can help XI-grade students enhance their basketball skills.

### **The influence of the Problem-Based Learning (PBL) learning model on improving social skills in students.**

According to the results of the data analysis, the PBL learning approach improves students' social skills. Problem-Based Learning (PBL) in Physical Education and Health (PEH) in secondary schools (SHS) is a method that places a premium on solving real-world problems as the primary learning objective. PBL requires students to solve real-world problems or difficulties through study, discussion, and cooperation. Students, for example, may be challenged to build a fitness program suitable for different age groups or to devise a game plan to encourage teamwork. This method not only helps students build a thorough understanding of sports and health ideas, but it also encourages critical and creative thinking. The link between PBL and high school students' social skills is quite important. The PBL approach encourages students to work in groups, discuss ideas, and collaborate while developing solutions to issues. Deep (2019) found that students who participated in PBL improved significantly in communication and cooperation abilities. Participation in PBL projects allows students to engage more actively, share ideas, and settle problems constructively. This study discovered that the PBL method not only increases students' conceptual comprehension but also their social skills, which are essential for career success.

### **The influence of the Problem-Based Learning (PBL) learning model on improving social skills in students.**

The data analysis utilizing the t-test revealed that PBL did not significantly improve basketball skills. PBL frequently focuses on solving theoretical problems and real-world scenarios that need investigation and analysis. Basketball, on the other hand, is a practical skill that requires extensive physical training. PBL may be less effective in this setting since technical skills like dribbling, shooting, and passing necessitate a lot of hands-on practice and repetition, which is incomprehensible through discussion and problem-solving alone. PBL can assist coaches in better understanding and implementing holistic ideas in training exercises. PBL promotes athletes to solve real-world problems, collaborate, and put theory into practice. As a result, combining PBL with other learning approaches, such as Direct Instruction, which focuses on technique demonstration and practical exercises, can be more effective at improving basketball abilities. This combination enables students to master not just the strategies and ideas underlying the game, but also the technical abilities required to succeed on the court.

## **IV. CONCLUSIONS**

The conclusion in this study is divided into four parts, including:

1. The Teaching Games for Understanding (TGfU) learning paradigm influences students' social skills.
2. The Teaching Games for Understanding (TGfU) learning approach has an impact on basketball skill development.
3. The problem-based learning (PBL) paradigm has an impact on students' social skills.
4. There is no effect of the Problem-Based Learning (PBL) learning approach on basketball abilities.

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## Analysis of Human Capital Development, Information Technology (ICT) and Economic Growth Nexus in Nigeria



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**ABSTRACT:** The study examined human capital development, information technology, and Economic Growth in Nigeria from 1991 to 2021. The Augmented Dickey-Fuller and Phillips Perron test indicated that real gross domestic product, information technology, and secondary school enrolment are stationary at first difference. At the same time, growth capital formation is stationary at level. Tertiary school enrolment is also stationary at first difference in the ADF test while it is stationary at a level in the PP test. The ARDL model showed that growth capital formation has a positive but statistically significant effect on the gross domestic product in Nigeria. The labor force has a positive but statistically significant effect on the real gross domestic product in Nigeria. Information technology has a positive but statistically significant effect on the real gross domestic product in Nigeria. Tertiary school enrolment has a positive but statistically significant effect on the real gross domestic product in Nigeria. Secondary school enrolment has a positive but statistically significant effect on the real gross domestic product in Nigeria. The study recommends that for Nigeria to enhance its economic growth, there is a need to implement specific policies that facilitate investment in ICT in the country by empowering youth on the different aspect of information technology to become self-reliant and achieve higher economic growth.

**KEYWORDS:** Human capital development, Information technology, Economic growth

**JEL Classification O15, L86, O40**

### 1 INTRODUCTION

Despite Nigeria's wealth of natural and human resources, the country's economy has long been underdeveloped and has remained so. Nigeria, Malaysia, Indonesia, Taiwan, Singapore, and South Korea all had comparable GDP growth rates, per capita incomes, and undeveloped political systems in the 1960s and early 1970s. (World Bank Development Report). Because of the way their economies have been run, the so-called "Asian Tigers" have managed to escape poverty and underdevelopment. They are now thriving both economically and technologically as a result of significant and ongoing investments in the development of human capital. The Nigerian economy, on the other hand, has grown slowly.

According to available data, the GDP expanded by 7.5 percent between 1970 and 1997. Between 1980 and 1987, the rate fell to 0.5 percent. The rate improved from 1988 to 1991, reaching 5.6 percent. Many policy and reform initiatives were implemented to enhance the creation and exploitation of human capital in Nigeria in response to a variety of issues, including brain drain, low absorption capacity, underemployment, falling educational quality and relevance, and professional shortages.

The Millennium Development Declarations and Goals (2000), the National Economic Empowerment and Development strategy (NEEDS, 2005), the Universal Basic Education (2004), the Dakar framework for Action/Education for All (1990), the National Policy on Education 1977 (revised in 1981, 1998, and 2004), and the Sustainable Development Declarations and Goals (2015) were among them. Between 1988 and 2018, public spending on health and education also increased steadily. According to CBN annual reports from 1988 to 2018, public spending on education increased from an average of 1.5% of GDP in 1981 to 1991 to 2.4% to 15% of GDP in 2018 and 6.4% on average between 1999 and 2018.

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national education spending. 1989–2018 National Education Index, United Nations Educational, Scientific, and Cultural Organization (UNESCO).

The knowledge, abilities, and health that people invest in and collect over the course of their lives—all of which help them reach their full potential as contributing members of society—make up human capital (World Bank, 2021). A higher standard of life through access to quality healthcare, education, employment opportunities, and skill development contributes to the development of human capital, which is essential for eradicating severe poverty and fostering more inclusive societies. It takes more than just skills, health care, and quality education to develop human capital. This is because the conditions that surround, precede, and follow a human being's conception all affect and define the type of human capital that the kid will develop into in the future.

Major health care indicators in Nigeria show that the effects of health sector reforms are being seen slowly. As per the 2008 Millennium Development Goals midpoint assessment, the infant mortality rate decreased from 113 per 1000 in 1990 to 57.701 per 1000 in 2021. Between 1999 and 2021, the maternal mortality ratio deteriorated from 289 to 1047. Between 2001 and 2021, access to basic sanitation increased somewhat, from 24.5% to 11%. Additionally, the percentage of people with access to safe drinking water increased somewhat from 15.7% in 2001 to 26.5% in 2021.

Since the launch of Global Systems of Mobile Communications (GSM) networks, Nigeria's telecommunications industry has seen substantial changes in terms of investments, coverage, and regulatory environment.

This was made possible by the sector's deregulation, which brought in large players including Globacom, Mobile Telecommunication Network, Visafone-Mobile, and Etisalat.

Following the liberalisation process, the telecommunications industry grew rapidly. In comparison to December 2011, the sector's subscriber strength increased by 18.1% to 113,195,951 lines as of December 2012, with 418,166 connected fixed lines and 112,777,2785 mobile lines. In addition, the teledensity increased from 68.1 lines per 100 people in 2011 to 80.9 lines per 100 people in 2012 (CBN, 2012).

In both developed and emerging nations, the necessity to increase and enhance services serves as justification for privatising the telecommunications industry. Policymakers now find it extremely unpleasant that a modern economy cannot run properly without a strong communication sector, and that building such a system necessitates capital investment spending on a scale that few countries can either do or efficiently manage (Leila, 2019).

Higher levels of private investment have a bigger impact on economic growth because of the increased technical spill over on the whole economy. "In many cases the biggest gains from private provision come through increased investments to meet increasing demands and serve previously unattended consumers," according to a 2003 World Bank report on private participation of infrastructure in developing countries, illustrating the importance of high telecommunication private investment.

According to the World Bank research, where competitive regimes have been introduced, the outcomes have been notably outstanding in the telecommunications sector (Leila, 2019). This study's primary goal is to investigate how Nigeria's economic growth and information technology are affected by the development of human capital.

## **2 LITERATURE REVIEW**

### **2.1 Theoretical Literature**

According to Romer (1986), the best way to think of human capital as an intangible asset is as a store of embodied and disembodied knowledge, which includes knowledge about education, health, entrepreneurship, and innovation. Learning skills are developed through research and development initiatives, informal knowledge transfer, and investments in education, job training, and health. Human capital is the culmination of an individual's unique set of skills, knowledge, and talents, according to Sheehan (2012). Nonetheless, from the standpoint of traditional economic theory, human capital is viewed as a labour commodity that is exchangeable through buy and sell transactions. This traditional paradigm heavily emphasises how capital exploits labour. However, human capital development refers to the information, expertise, skill, and health that one acquires through education, training, and medical care, which is different from the meaning that is typically associated with the term labour.

### **2.2 Empirical Literature Review**

The impact of human capital development in Kaduna State's public tertiary education was investigated by Afang, Kumai, and Kwaji (2023). All public tertiary institutions in Kaduna State, including Ahmadu Bello University Zaria, Kaduna State University, Nuhu Bamalli Polytechnic Zaria, and Kaduna Polytechnic, comprised the study's population. Gidan Waya of Kaduna State College of Education and National College of Education Zaria. Each public entity received twenty-five questionnaires. The sample size was determined by administering 150 questionnaires and retrieving 112 from the responders. Thus, the importance and influence of human capital development in Kaduna State's public tertiary education system will undoubtedly improve learning and growth in

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all spheres of human endeavour. The Nigerian government should build a sufficient human capital with global skills and e-learning techniques, along with appropriate training partnerships with other domestic companies, technical training institutions, and research institutes abroad, according to the findings. Additionally, in order to meet the 26% UNESCO criterion, the federal and state governments must immediately increase their education spending by raising staff wages and costs.

This will promote national progress, boost output, and advance knowledge. Johnson, Olabisi, and Folake (2021) used the Error Correction Model and Ordinary Least Squares methodology to investigate how Nigerian telecommunications affects economic growth. The results demonstrate that, in the short-term equilibrium, labour employed, capital stock, real investment in telecommunication, and electricity supply are statistically important to economic growth in Nigeria. The study suggests that effective and well-coordinated policies on labour productivity, price control, investment encouragement, and steady electricity supply can achieve positive economic growth. Chimbo (2020) looked into how ICT affects economic growth and whether energy use and the development of human capital are two ways that ICT affects economic growth in Africa. Pooled OLS and the dynamic GMM yielded results that indicated that ICT had a non-significant positive influence on economic growth in Africa, while fixed effects, random effects, and pooled OLS and the dynamic GMM revealed a significant positive relationship running from ICT towards economic growth. From 1990 to 2019, Chika and Cookey (2020) examined whether returns on human capital helped the Nigerian economy.

Returns on intellectual capital (RITC) and intellectual property (RIPR) are proxied by return on human capital. Our study's reasoning is based on Paul's theories of human capital and Romer Growth, and we use residual diagnostic techniques and Autoregressive Distributive Lag (ARDL) for data analysis. The findings show that while RIPR does not significantly boost RGDP, RITC does. This suggests that the Nigerian economy is not as affected by the two human capital metrics. We therefore draw the conclusion that returns on intellectual capital, rather than returns on intellectual property, are more important in boosting the Nigerian economy. Therefore, among other things, we advise that the government defend citizens' intellectual property by fortifying and revitalising the organisations tasked with carrying out these duties in order to maintain and intensify the war against piracy. Using a Generalised Method of Moments (GMM), Nasab and Aghaei (2019) investigated the connection between ICT investments and economic growth in the geographic arrangement of OPEC member nations

According to the projections, ICT investments in OPEC member nations have a major impact on economic growth. This suggests that these nations must put in place particular laws that encourage ICT investment if they hope to boost economic growth. Using a panel Generalised Method of Moment (GMM) growth model, Bahrini and Qaffas (2019) assessed the effect of information and communication technology (ICT) on the economic growth of a subset of developing nations in the Sub-Saharan Africa (SSA) and Middle East and North Africa (MENA) regions from 2007 to 2016.

The econometric model's results indicate that, aside from fixed telephones, the primary drivers of economic growth in developing nations in MENA and SSA are other ICTs like mobile phones, Internet use, and broadband adoption. Using a panel-GMM growth model, Sepehrdoust and Ghorbanseresht (2019) examined the effects of financial development and information and communication technology (ICT) on the emerging economies of the petroleum exporting nations (OPEC). According to the econometric model's conclusions, economic growth increased by 0.048 and 0.050 percent for every 1% increase in the financial development index and ICT variables, respectively. Additionally, the influence of factors like inflation (negative), growth in the active labour force (positive), investment growth (positive), and gross fixed capital formation growth (positive) on the nations' economic progress.

Akinwale, Sanusi, and Surujjal (2018) investigated how ICT related to and affected Nigeria's economic development. The results of the autoregressive distributed lag (ARDL) analysis show that ICT and economic growth cointegrate, indicating a long-term relationship between the two. The findings imply that a strong political will is required to support an enabling environment and to advance the sector's ease of doing business in order to draw in private and foreign investment. This is because doing so would enhance the secure internet server, boost mobile usage in rural areas, and improve the performance of other economic sectors that would support Nigeria's economic growth.

Adekojo, Ebiefie, and Akinyem (2016) used time series data from 1981 to 2013 to examine the relationship between capital production and economic growth in Nigeria. The Harrod-Domar model was used to Nigeria in the research project. The Auto Regressive Distributed Lag Models (ARDL) approach was examined in the paper. According to the study's findings, capital formation and economic growth in Nigeria are significantly correlated.

The findings supported the Harrod-Domar model, which established a direct relationship between the saving ratio and/or capital formation and the growth rate of national income (i.e., the more an economy can save and invest out of a given GNP, the greater the growth of that GDP). Adetiloye and Adeyemo (2012) conducted a study on Nigerian population growth, capital formation, and domestic investment. The time series data was analysed using the power regression and growth regression methods. The study's findings indicate that bank loans, government spending, and capacity utilisation all contribute to Nigerians' rising incomes. The

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findings also indicate a negative correlation between capital formation and population growth rates. The investment rate can stimulate economic growth using the curve estimation approach, albeit slowly and linearly. This study demonstrates that Nigeria's per capita GDP growth rate is not aided by the rate of investment. Alika, Iyere Joseph, and Stan Aibieyi (2014) emphasised the concepts, methods, and management dynamics of human capital. The methods used and discovered in the study have their roots in business economics theory, which, when used well, can influence employee performance and result in organisational success. According to the report, organisations that are ready for significant business cannot overlook management principles, which are ingrained in management dynamics. The definitions of human capital and the explanation of its methods for comprehending the nature, status, and significance of human capital in all areas of life serve as the primary foundation for the study's findings. Kanu and Ozurumba (2014) used the multiple regressions technique to investigate the relationship between capital production and Nigeria's economic growth.

However, the long-term VAR model estimate shows that total exports, gross fixed capital formation, and the lagged GDP values have positive long-term correlations with Nigeria's economic growth. While GDP was found to have a unidirectional causal relationship with export (EXP), gross fixed capital formation (GFCF), import (IMP), and total national saving (TNSV), it was also determined that there is an inverse relationship between imports (IMP), TNSV, and economic growth.

### 2.3 Literature Gap and Value addition

The majority of the reviewed literature looked at how information technology and human capital development affected economic growth in Nigeria and other nations. However, none of them combined the two topics. In light of the aforementioned, the current study looked at how Nigeria's economic growth and information technology-related human capital development interacted between 1991 and 2021.

## 3 METHODOLOGY

### 3.1 Theoretical framework

The human capital theory model, which is based on Romer (1990), will be employed in this investigation. According to the idea, as the equation illustrates, human capital has an impact on growth in addition to labour and capital.

$$Y_t = f(K_t L_t H_t) \dots \dots \dots (3.1)$$

Where  $Y_t$  is output,  $K_t$  is capital,  $L_t$  is the labour and  $H_t$  is human capital. Introducing technology explicitly into the model (Equation 3.1), we have the following:

$$Y_t = f(K_t L_t H_t T_t) \dots \dots \dots (3.2)$$

$$RGDP_t = \alpha_0 + \alpha_1 GCF_t + \alpha_2 GEE_t + \alpha_3 LFR_t + \alpha_4 IT_t + \alpha_5 TSE_t + \alpha_6 SSE_t + \varepsilon_t \dots \dots \dots (3.3)$$

The above equation is the econometric model where the error term ( $\varepsilon_t$ ) is added to account for the effect of all other omitted variables in the model as well as the influence of any measurement error that might affect the dependent variable. The error term is assumed to be normally, independently and identically distributed with zero mean and constant variance [i. e.  $\varepsilon_t \sim NIID(0, 1)$ ]

In order to arrive at a reliable result, the variables are transformed into natural logarithm. Thus, the empirical equation is formulated as followings:

$$RGDP_t = \alpha_0 + \alpha_1 \ln GCF_t + \alpha_2 \ln GEE_t + \alpha_3 \ln LBF_t + \alpha_4 \ln IT_t + \alpha_5 \ln TSE_t + \alpha_6 \ln SSE_t + \varepsilon_t \dots \dots \dots (3.4)$$

Where

$RGDP_t$  = Real Gross domestic product

$\ln GCF_t$  = Gross Capital Formation

$\ln GEE_t$  = Government Expenditure on Education

$\ln LBF_t$  = Labour Force

$\ln IT_t$  = Information Technology

$\ln TSE$  = Tertiary School Enrolment

$\ln SSE$  = Secondary School Enrolment

$\varepsilon_t$  = is the error term

$\alpha_0, \alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5,$  and  $\alpha_6$  are the parameters to be estimated whereas, the a priori expectations are  $< > 0$ .

### 3.2 ARDL Model and Error Correction Mechanism

The appropriate test for such a model is ARDL when variables are shown to be stationary at different orders of co-integration. To guarantee a long-term link between the variables and that the data-generation process complies with the model, it is necessary to test for both co-integration and stability. If the variables are co-integrated then there is the need to test for ECM which shows how much of the disequilibrium is being corrected over a period; what is called 'adjustment effect' (Asteriou and Hall, 2007). ECM



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possesses advantages of resolving the problem of spurious regression because it eliminates trend in the variables involved; and that the disequilibrium error term is stationary variable, which is prevented from exploding over time (Asteriou and Hall, 2007). The general autoregressive distributed lag (ARDL) ECM is presented in equation

$$\Delta y_t = \mu + \sum_{i=1}^{n-1} a_i \Delta y_{t-i} + \sum_{i=0}^{m-1} Y_i \Delta x_{t-i} - \pi \hat{e}_{t-1} + \varepsilon_t \dots \dots \dots (3.5)$$

Where  $\Delta$  is the difference operator,  $y_t$  is a vector of dependent variable,  $x_{t-i}$  is the matrix of lag values of explanatory variables and  $\pi$  is the adjustment effect or error correction coefficient which is expected to be negative for the error to be corrected. Specifically, the ECM model to be tested is specified in equation

$$\Delta RGDP_t = \mu + \sum_{i=1}^{n-1} a_i \Delta RGDP_{t-1} + \sum_{i=0}^{m-1} \beta_i \Delta GCF_{t-i} + \sum_{i=0}^{m-1} Y_i \Delta GEE_{t-i} + \sum_{i=0}^{m-1} u_i \Delta IT_{t-i} + \sum_{i=0}^{m-1} v_i \Delta TSE_{t-i} + \sum_{i=0}^{m-1} Y_i \Delta SSE_{t-i} - \pi \hat{e}_{t-1} + \varepsilon_t \dots \dots \dots (3.6)$$

If  $\pi = 1$  then 100% of the adjustment takes place within single period (instantaneous/full adjustment). If  $\pi = 0$  then there is no adjustment. Thus, any other value is interpreted accordingly; a value of  $\pi$  closer to 1 implies quick adjustment, and value closer to 0 implies slow adjustment. To select the most fitted model lag length are chosen automatically by Akaike Information Criterion (AIC).

The null and alternative hypothesis for bound test concerning the test for cointegration is:

Ho:  $a_i = \beta_i = \gamma_1 = u_i = v_i = \omega_i = 0$  (No long run relationship).

H1:  $a_i \neq \beta_i \neq \gamma_1 \neq u_i \neq v_i \neq \omega_i \neq 0$  (there is long run relationship).

## 4 RESULT AND DISCUSSION

### 4.1 Descriptive statistics

Table 4.1 Descriptive statistics

Statistics	LRGDP	LGCF	LIT	LLB	LTSE	LSSE
Mean	3.276491	0.791406	2.061701	1.458379	0.193962	1.478659
Median	3.247944	0.834560	2.004794	1.480697	0.150384	1.488311
Maximum	3.427729	1.610062	4.149815	1.506681	0.100097	1.728453
Minimum	3.155156	-0.283884	-0.036212	1.371788	0.489254	1.328882
Std. Dev.	0.103581	0.402142	1.644043	0.048466	0.114060	0.142515
Skewness	0.185631	-0.622051	0.005017	-0.890184	-0.599324	0.279903
Kurtosis	1.345915	4.210905	1.263727	2.013568	4.313414	1.473918
Jarque-Bera	2.514604	2.637323	2.637901	3.624916	10.46186	2.312021
Probability	0.284420	0.267493	0.267416	0.163252	0.005349	0.314739
Sum	68.80632	16.61952	43.29573	30.62596	-4.073211	31.05185
Sum Sq. Dev.	0.214581	3.234356	54.05752	0.046980	0.260194	0.406212
Observations	33	33	33	33	33	33

Source: Researchers' computation using E-views 10, (2023).

Table 4.1 shows the result of descriptive statistics of the study, it indicates that the standard deviations of the variables employed are far away from their means. The Skewness of the distribution shows positive values of real gross domestic product, information technology, and secondary school enrolment while negative values of growth capital formation, labor force, and tertiary school enrolment this means that all the variables employed are normally distributed. Kurtosis in the table shows that all the variables employed are normally distributed because their values are less than 3 except growth capital formation, labor force, and tertiary school enrolment. The Jarque-Bera test for normality is also estimated. It indicates that all the variables employed are normally distributed as their p-values are greater than 5% except tertiary school enrolment.

### 4.2 Unit root test

The study estimated the unit root test of both Augment Dickey-Fuller and Phillips Perron to identify the order of integration of the variables under study.

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**Table 4.2 Unit root test Augment Dickey-Fuller and Phillips Perron**

Variables	Test at level		Test at first difference		Order of Integration
	ADF test	PP test	ADF test	PP test	
LRGDP	-2.327482	-1.417637	-3.581136**	-3.710813**	I(1)
LGCF	-10.07331	-7.791702	-	-	I(0)
LIT	-1.020686	-1.700972	-4.954166	-19.60773	I(1)
LLB	-2.772428	-1.668479	-4.049879	-3.083836**	I(1)
LTSE	-3.001766	-3.721270**	-3.614389**	-	I(0), (1)
LSSE	-2.235372	-2.251121	-5.856152	-5.854082	I(1)

**Source:** Researchers' computation using E-views 10, (2023).

Asterisks \*\*indicates a stationary 5% level of significance.

Table 4.2 presents the result of the Augment Dickey-Fuller and Phillips Perron unit root test, the tests show that real gross domestic product, information technology and secondary school enrolment are stationary at first difference in both ADF and PP while growth capital formation is stationary at level in both ADF and PP, tertiary school enrolment is stationary at first difference in ADF while is stationary at level in PP test. Therefore, there is mixture of order of integration among the variables employed.

### 4.3 Bound Test for Long Run

The test is conducted to ensure that the variables employed are related in the long run.

**Table 4.3 Result of cointegration Bound test**

Statistics	Value	Critical bound			
F-statistics	4.926074**	1%	2.5%	5%	10%
	I (0) Bound	3.06	2.7	2.39	2.08
	I (1) Bound	4.15	3.73	3.38	3.

**Source:** Researchers' computation using E-views 10, (2023).

From table 4.3, the result of the cointegration bound test indicates a higher value of F-statistics than any of the critical values of all bounds. Therefore, there is strong evidence of cointegration in the model. This provides evidence of adopting Autoregressive Distributed Lag model (ARDL) in the study.

### 4.4 Results of the Autoregressive Distributed Lag (ARDL) Model

After conducting the unit root tests, it suggests the use of the ARDL model, this section presents the results of the model as demonstrated in chapter three. The appropriate model (number of lags) is selected automatically using the Akaike Information Criterion (AIC) which is seen as more parsimonious. Below, both short-run and long-run parameters of the model are presented. The results of the diagnostics checks are also presented.

#### 4.4.1 Short Run Relationship

Table 4.5 presents the short-run parameters of the ARDL tests conducted. AIC suggests a 2, 0, 0, 2, 1, 0, model after testing for up to 54 different models (see appendix for the results of the top 20 models).

**Table 4.5 Short run parameters of the ARDL Model**

Variables	Coefficient	Std error	t- statistics	Prob.
D(LRGDP (-1))	0.184444	0.093430	1.974149	0.0523
D(LIT)	0.002616	0.006139	0.426196	0.0245
D(LIT (-1))	0.028373	0.006132	4.627416	0.0002
D(LTSE)	0.069960	0.018280	3.827113	0.0011
R-squared	C			
Adjusted R-squared	0.992594			
S.E. of regression	0.008874			
Sum squared resid	0.001575			

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Log-likelihood	109.2701			
F-statistic	403.0520			
Prob(F-statistic)	0.000000			

Source: Researchers' computation using E-views 10, (2023).

The result from Table 4.5 indicates a positive autoregressive and statistically significant impact-dependent variable (real gross domestic product), this means that real gross domestic product largely depends on itself in the short run. Information technology shows a positive but statistically significant effect on gross domestic product in Nigeria, at lag 1 also indicates a positive and statistically significant effect on gross domestic product in Nigeria. Tertiary school enrolment indicates a positive and statistically significant effect on gross domestic product in Nigeria. The R-squared and its adjusted value are very high The R-squared and its adjusted value are very high 0.989313, this implies that 98% change in gross domestic product is explained by growth capital formation, information technology, labour force, tertiary school enrolment and secondary school enrolment in Nigeria. The p-value of f-statistics indicates (0.000000), this means that growth capital formation, information technology, labour force, tertiary school enrolment and secondary school enrolment have 100% significance influence on the real gross domestic product in Nigeria.

### 4.4.2 Long Run and Error Correction Result

Evidence from the bound test result in Table 4.4, indicates a long-run relationship among the variables in the ARDL model; hence, the next task is to compute the cointegrating and long-run form of the model. This is done to enable the researcher to observe whether there exists a long-run among trade openness, industrial output and economic growth in Nigeria. Thus, the result is presented in table 4.6.

**Table 4.6 ARDL Cointegrating and Long Run Form Results**

Variables	Coefficient	Std error	t- statistics	Prob.
GCF	0.060658	0.000763	0.862245	0.0088
LLB	0.738444	0.629764	1.172571	0.0347
LIT	0.018622	0.030773	0.605147	0.0419
LTSE	0.166910	0.236733	0.705056	0.0289
LSSE	0.782895	0.474948	1.648379	0.0149
ECM	-0.197396	0.033025	-5.977230	0.0000

Source: Researchers' computation using E-views 10, (2023).

The result from Table 4.6 indicates that growth capital formation has a positive but statistically significant effect on the real gross domestic product in Nigeria in the long run, by implication one-unit increase in growth capital formation will result 6% increase in gross domestic product in Nigeria. The labor force shows a positive but statistically significant effect on the real gross domestic product in Nigeria in the long run, this means that if the Labor force increases by a single digit the real gross domestic product in Nigeria will increase by 73%. Information technology shows positive but statistically significant effect on the real gross domestic product in Nigeria in the long run, this implies that single digit increase in information technology will bring about 1% increase in the real gross domestic product in Nigeria. Tertiary school enrolment indicates positive but statistically significant effect on the real gross domestic product in Nigeria in the long run, by implication one unit increase in tertiary school enrolment will result 16% increase in gross domestic product in Nigeria. Secondary school enrolment shows a positive but statistically insignificant effect on the real gross domestic product in Nigeria in the long run, this means that a unit increase in school enrolment will result 78% increase in gross domestic product in Nigeria. The error correction term (ECT) meets all the theoretical and statistical requirements both in the sign and size. The ECT coefficient is -0.197396 and the significance at 5%. This indicates that 19.73% of the disequilibrium due to the shock in the previous years is adjusted back to the long-run equilibrium in the current year.

### 4.4.3 Post-estimation tests

**Table 4.7 post-estimation tests**

Tests	P-value
Serial correlation	0.2373
Heteroscedastic	0.9652
Normality	0.138053
Ramsey test	0.8108

Source: Researchers' computation using E-views 10, (2023).

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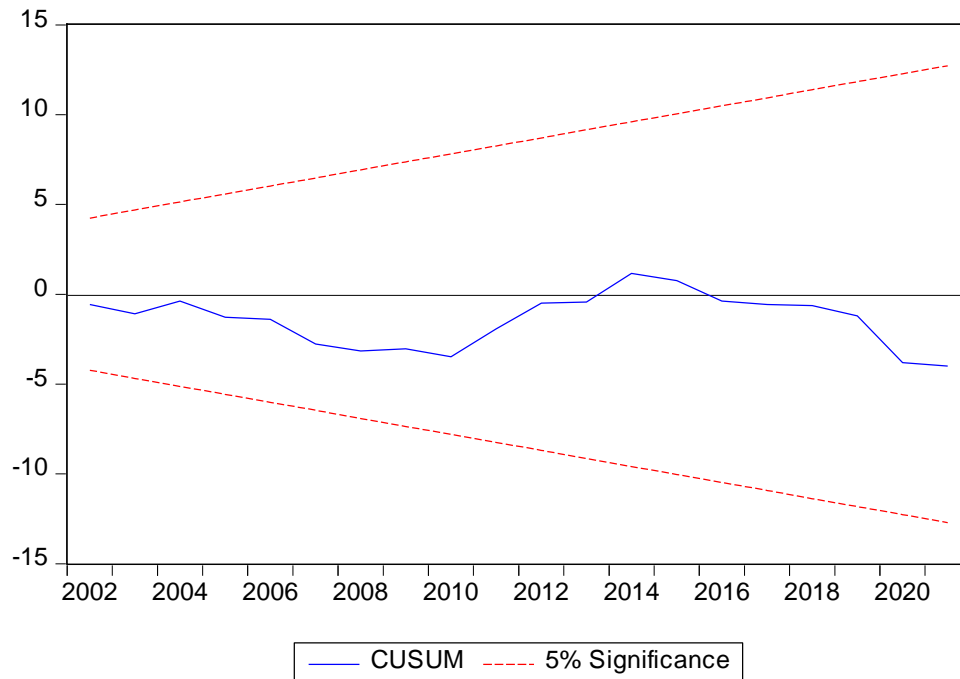
The model passed all post-estimation tests such as serial correlation, Heteroscedasticity, Normality and Ramsey reset test, as their probability values are greater than 5%. We can conclude that the model is robust.,

### 4.4.4 Stability

A stability test of the model is employed to ensure the data-generating process is compatible with the estimated coefficient of the model.

**Figure 4.1 CUSUM Plot Recursive Residuals of ARDL model.**

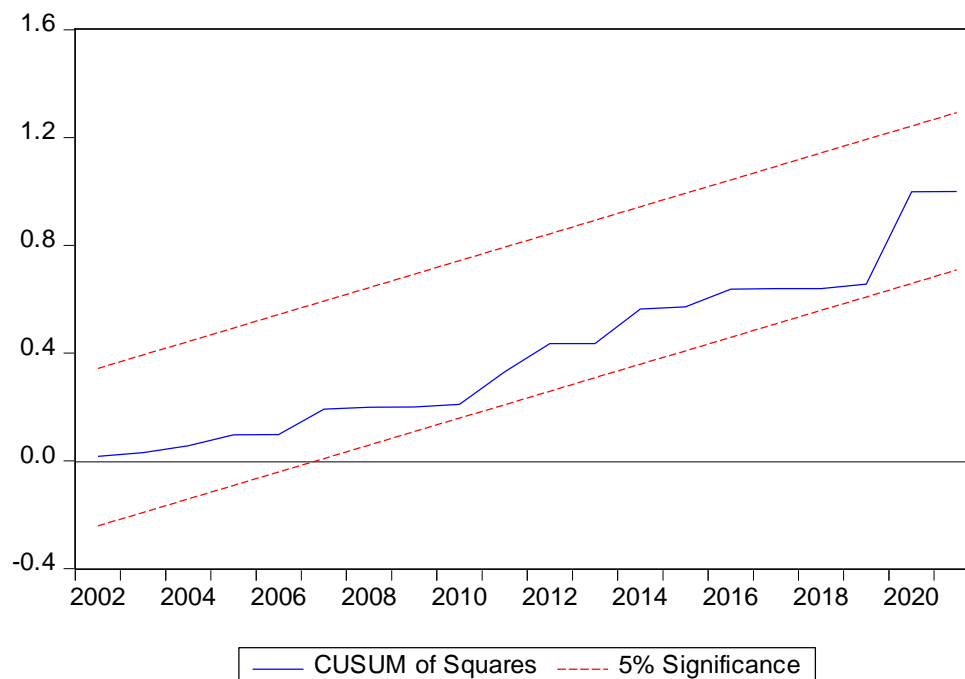
**Figure 4.2 CUSUM SQUARE Plot Recursive Residuals of ARDL model.**



*Source: Researcher computation using E-views 10, (2023).*

From Figure 4.1, the CUSUM plot is within 5% level of significant, this means that the model is stable. This shows that there is no chance of having spurious regression.

**Figure 4.2 CUSUM SQUARE Plot Recursive Residuals of ARDL model.**



*Source: Researchers' computation using E-views 10, (2023).*

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From Figure 4.2, the Cumulative sum square plot is within 5% level of significant, this means that the model is stable. This shows that there is no chance of having spurious regression.

### 5 CONCLUSIONS AND RECOMMENDATIONS

The study examines the impact of Human Capital Development on Information Technology and Economic Growth in Nigeria. Variables employed in the study include real gross domestic product, growth capital formation, information technology, labour force, tertiary school enrolment and secondary school enrolment. The Augmented Dickey Fuller and Phillips Perron indicate that real gross domestic product, information technology and secondary school enrolment are stationary at first difference while growth capital formation is stationary at level, tertiary school enrolment is stationary at first difference in ADF while is stationary at level in PP test. Akaike information criteria (AIC) based on lag (2, 0, 0, 2, 1, 0) was used, the model is free from heteroscedasticity and serial correlation. Bound test for long run shows that f- statistics is 4.92 which are more than upper and lower bound critical values at 1%, 2.5%, 5%, and 10%. This indicated that there is a long run relationship among the variables employed. In the short run, relationship among the variables employed shows that Information technology has a positive but statistically significant effect on gross domestic product in Nigeria, at lag 1 also indicates positive and statistically significant effect on gross domestic product in Nigeria. Tertiary school enrolment has a positive and statistically significant effect on gross domestic product in Nigeria. In the long run relationship indicates that growth capital formation has a positive but statistically significant effect on the real gross domestic product in Nigeria. Labour force has a positive but statistically insignificant effect on the real gross domestic product in Nigeria. Information technology has a positive but statistically significant effect on the real gross domestic product in Nigeria. Tertiary school enrolment has a positive but statistically significant effect on the real gross domestic product in Nigeria. Secondary school enrolment has a positive but statistically significant effect on the real gross domestic product in Nigeria. The study recommended For Nigeria to enhance its economic growth, there is need to developed and implement specific policies that facilitate investment in ICT in the country by empowering youth on the different aspect of the information technology so as to become self-reliant and achieve higher economic growth. Policy makers should set ICT objectives that fall in line with the economic goals to realize the benefits. Efficient ICT sector does not work in isolation but could blend with the various economic sectors to achieve productivity in Nigeria. Development policies and strategies should consider investments in ICT as very important.

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## The Relationship between Eating Behavior, Physical Activity, and Sleep Quality with Physical Fitness



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**ABSTRACT:** The purpose of the study was to determine the relationship of eating behavior, physical activity, and sleep quality to the physical fitness of students. This type of research is correlational research. The population in the study was class XI students at SMTI Yogyakarta. Researchers did not examine the entire population, but calculated the sample size of a population that had been determined using the Slovin formula with an error rate of 10% totaling 60 students. The analysis technique used regression with Statistical Package for Social Science (SPSS) version 21 software. The results show (1) There is a significant relationship between eating behavior and physical fitness of class XI students at SMTI Yogyakarta, with a p-value of  $0.022 < 0.05$ . (2) There is a significant relationship between physical activity and physical fitness of class XI students at SMTI Yogyakarta, with a p-value of  $0.000 < 0.05$ . (3) There is a significant relationship between sleep quality and physical fitness of class XI students at SMTI Yogyakarta, with a p-value of  $0.002 < 0.05$ . (4) There is a significant relationship between eating behavior, physical activity, and sleep quality on physical fitness of grade XI students at SMTI Yogyakarta, with a p-value of  $0.002 < 0.05$  and a contribution of 73.20%.

**KEYWORDS:** eating behavior, physical activity, sleep quality, physical fitness

### INTRODUCTION

Technology today has advanced rapidly. Technology is a current trend in the world of business, health education, entertainment, military training, medical, engineering design, robots, and telerobotics, manufacturing, education, and so on (Muktiani, et al., 2022). The rapid development of technology also has a negative impact on children's health and tends to use brain activity more than physical activity. Physical fitness owned by each individual is different, this depends on how the individual does physical activity. The development of physical fitness of each person through a sports activity that has the intention of increasing endurance and physical condition.

This change in lifestyle has resulted in a change in diet that refers to a diet high in calories, fat, and cholesterol but low in fiber, especially fast food, which has an impact on increasing obesity (Evert et al., 2019). Poor diet has been identified as a risk factor for chronic health conditions (Heath, 2016). The eating habits shown by adolescents are one of them consuming snack foods such as eating fried foods, drinking colored drinks, soft drinks, and consuming fast food (Costa, et al., 2018). Research by Larson et al., (2018), on the diet of adolescents in the United States showed that as many as 54% of US adolescents consumed all three main meals (breakfast, lunch and dinner).

The term physical activity is the movement of the limbs that causes energy expenditure which is very important for maintaining physical and mental health, as well as maintaining the quality of life to stay healthy and fit throughout the day (Ma'arif & Hasmara, 2021). Reduced physical activity will certainly result in weak physical condition or physical fitness. Weak physical fitness results in reduced productivity in carrying out daily activities (Mattioli, et al., 2020). Lack of movement activity causes students to easily experience fatigue during sports activities, overweight or obesity (Koleilat, et al., 2021).

Sleep is defined as a behavioral state characterized by reduced motor activity, decreased interaction and response with and to the environment, a specific posture (lying down and eyes closed) and can be easily awakened (Stormark et al., 2019). Someone who applies good quality sleep and regularly will have a better level of physical fitness (Zaky & Wati, 2020). The body experiencing excess sleep will also have an unfavorable impact on the body. This will result in the appearance of discomfort in the body and laziness to carry out activities the next day, resulting in a decrease in physical fitness (Handriana, et al., 2021).

## The Relationship between Eating Behavior, Physical Activity, and Sleep Quality with Physical Fitness

Gunarsa & Wibowo's research (2021) shows the results that sleep quality and physical fitness have a close relationship, by maintaining sleep quality it also maintains physical fitness. The results of Prasetyo & Winarno's research (2019) show that physical activity has a significant relationship with the level of physical fitness. The results of Syampurma's research (2018) show that there is a significant relationship between physical activity and physical fitness. The results of Anwar's research (2019) show that physical activity has a significant relationship with the level of physical fitness.

Based on the results of interviews, researchers found that 80.00% of learners often sleep late at night above 10 pm. The reasons for learners often sleeping late at night are quite diverse, 9 learners stated that they played online games, 5 learners stated that they played social media such as Tik Tok, Instagram, watching Youtube, and 2 other learners because they had problems sleeping. Most learners prefer to laze around while playing smartphones. Another problem found was the low physical fitness of learners. Teachers stated that they often see students sleepy during lessons, especially at the end of the lesson. Based on the explanation of the results of these observations, this study intends to find out more about "The Relationship between Eating Behavior, Physical Activity, and Sleep Quality with Physical Fitness".

### MATERIALS AND METHODS

#### Research Design

This type of research is correlational research. Correlational research is research conducted to determine whether there is a relationship between two or more variables. The population in the study were grade XI students at SMTI Yogyakarta. Researchers did not examine the entire population, but calculated the sample size of a population that had been determined using the Slovin formula with an error rate of 10% totaling 60 students.

The eating pattern instrument uses the Dutch Eating Behaviour Questionnaire which includes 3 aspects of eating styles namely emotional eating, restraint eating, and external eating made by Van Strien, et al (1986) with a total of 28 questions. The score on each questionnaire answer uses a range of 1-5. The physical activity instrument is The Physical Activity Questionnaire for Adolescent (PAQ-A) by Kowalski (2014) which has been translated into Indonesian and has been modified. The sleep quality instrument used the Pittsburgh Sleep Quality Index (PSQI). The research instrument used was the TKSI for SMA / Phase EF students, which consists of five tests, namely the Coordination Test: Hand Eye Coordination Test, Explosive Power Test: Standing Broad Jump, Agility Test: T-Test, Arm and Shoulder Muscle Endurance Test: Dipping Test, Cardiorespiratory Endurance: Multi-Stage Fitness Test.

#### Statistical Analysis

The statistical analysis technique used the Statistical Package for Social Science (SPSS) version 21 software. Tingkat p-value statistik ditetapkan pada p-value < 0.05.

### RESULTS

The results of descriptive statistics of eating behavior variables, physical activity, sleep quality, and physical fitness of students can be seen in Table 1.

**Table 1. Descriptive statistics**

Variable	Mean ± SD
Eating Behavior	61.90 ± 10.64
Physical Activity	2.44 ± 0.51
Sleep Quality	9.88 ± 4.45
Physical Fitness	13.30 ± 2.07

#### Normality Test

The normality test uses the Kolmogorov-Smirnov Test, namely by looking at the significance value of the residual variable if the p-value > 0.05, it can be said that the data is normally distributed. The results are presented in Table 2.

**Table 2. Normality test results**

Variabel	p-value	Keterangan
Eating Behavior (X1)	0,142	Normal
Physical Activity (X2)	0,308	Normal
Sleep Quality (X3)	0,481	Normal
Physical Fitness (Y)	0,074	Normal

## The Relationship between Eating Behavior, Physical Activity, and Sleep Quality with Physical Fitness

Based on the statistical analysis of the normality test that has been carried out using the Kolmogorov-Smirnov test, the normality test results are obtained with a p-value > 0.05, which means that the data is normally distributed.

### Linearity Test

The linearity test is used to determine whether the independent variable and the dependent variable in this study have a linear relationship if the increase in the independent variable score is followed by an increase in the dependent variable score. The results of the Linearity test of this study can be seen in Table 3.

**Table 3. Linearity test results**

Variable	p-value	Keterangan
Physical Fitness (Y) * Eating Behavior (X1)	0.466	Linear
Physical Fitness (Y) * Physical Activity (X2)	0.072	Linear
Physical Fitness (Y) * Sleep Quality (X3)	0.423	Linear

Based on the table above, it can be seen that the relationship between the independent variable and the dependent variable is obtained p-value > 0.05. So, the relationship between the independent variable and the dependent variable is declared linear.

### Hypothesis Test Results

The analysis technique used to test the hypothesis uses the t test (partial) and the F test (simultaneous), the results are as follows:

**Table 4. Partial test analysis results (t test)**

Coefficients <sup>a</sup>						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error			
1	(Constant)	6.400	1.259		5.083	.000
	Eating Behavior (X1)	.036	.015	.184	2.355	.022
	Physical Activity (X2)	.303	.041	.594	7.349	.000
	Sleep Quality (X3)	-.123	.037	-.264	-3.335	.002

a. Dependent Variable: Physical Fitness (Y)

Based on the analysis results in Table 4 above, it can be explained as follows.

- 1) The physical fitness variable on physical fitness obtained a p-value of 0.022 < 0.05, then H<sub>0</sub> is rejected, meaning that the hypothesis that reads "There is a significant relationship between eating behavior and physical fitness of class XI students at SMTI Yogyakarta" is accepted. The correlation coefficient is positive, meaning that if physical fitness is getting better, then physical fitness in class XI students at SMTI Yogyakarta will be better.
- 2) The physical activity variable on physical fitness obtained a p-value of 0.000 < 0.05, then H<sub>0</sub> is rejected, meaning that the hypothesis that reads "There is a significant relationship between physical activity and physical fitness of class XI students at SMTI Yogyakarta" is accepted. The correlation coefficient is positive, meaning that if physical activity is getting better, then physical fitness in class XI students at SMTI Yogyakarta will be better.
- 3) The variable of sleep quality on physical fitness obtained a p-value of 0.002 < 0.05, then H<sub>0</sub> is rejected, meaning that the hypothesis that reads "There is a significant relationship between sleep quality and physical fitness of class XI students at SMTI Yogyakarta" is accepted. The correlation coefficient is negative, meaning that if the quality of sleep is getting better, then the physical fitness of class XI students at SMTI Yogyakarta will be better.

The F (Simultaneous) test aims to determine the relationship of eating behavior, physical activity, and sleep quality to the physical fitness of class XI students at SMTI Yogyakarta. Analysis using ANOVA test. Analysis rules if F count > F table and p-value < 0.05, then the alternative hypothesis is accepted and vice versa..

**Table 5. Simultaneous analysis results (ANOVA)**

ANOVA <sup>b</sup>						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	188.251	3	62.750	54.608	.000 <sup>a</sup>

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Residual	64.349	56	1.149
Total	252.600	59	

a. Predictors: (Constant). Sleep Quality (X3). Eating Behavior (X1). Physical Activity (X2)  
b. Dependent Variable: Physical Fitness (Y)

Based on the results of the analysis in Table 5, the relationship between eating behavior, physical activity, and sleep quality on physical fitness obtained Fcount value 54.608 and p-value  $0.000 < 0.05$ . Thus the hypothesis that reads "There is a significant relationship between eating behavior, physical activity, and sleep quality on the physical fitness of class XI students at SMTI Yogyakarta", is accepted. It can be concluded that the regression model chosen is feasible to test the data and the regression model can be used to predict that eating behavior, physical activity, and sleep quality together relate to the physical fitness of grade XI students at SMTI Yogyakarta. Based on the Coefficient of Determination ( $R^2$ ), it shows that the Adjusted R Square coefficient of determination is 0.732. This means that the contribution of eating behavior variables, physical activity, and sleep quality to the physical fitness of class XI students at SMTI Yogyakarta is 73.20%, while the remaining 26.80% is influenced by other factors outside this study.

### DISCUSSION

Based on the results of the study, it shows that there is a significant relationship between physical fitness and physical fitness. The results of the study are supported by several studies including Mitchell's research (2018) which concluded that there is a relationship between BMI and eating behavior, where adolescents often consume fast food and are at a low level of physical activity. Makmun's research (2021) shows the influence of diet on obesity. Sirico, et al., (2018) revealed that in children, making better food choices is highly recommended for people who are overweight and obese. Eating habits are habits in choosing the type, amount and frequency of food consumed and how to choose food. Learners prefer to snack and try new things, so the higher to try new snacks. Adolescent snack habits are fried foods, colored drinks and high-fat foods. The role of parents is very important in shaping children's eating habits. When children become teenagers, environmental factors, peers and social life outside the home greatly influence their eating habits. External factors such as family support and food environment affect consumption behavior (Safitri & Rahayu, 2020). The content of nutritional status consumed should contain nutritional values that the body needs. The nutritional values of these foods are fat carbohydrates, vitamins, protein, minerals, and water and balanced protein so that they can be used for activities in daily life (Beerman, et al., 2020). The body's work function will depend on the intake that enters the body, the better the nutritional intake, it will support the performance of organs that will produce energy to improve body performance, although the supporting factors for the level of physical fitness are not only nutritional factors but can also be influenced by training, age, gender (Fühner et al., 2021).

Based on the results of the study, it shows that there is a significant relationship between physical activity and physical fitness. This means that the better the interpersonal intelligence, the better the physical fitness. The results of the study were supported by several studies including by Wanjaya (2019) which showed a relationship between physical activity and the level of physical fitness of students as indicated by a significance value of 0.000. The results of Prasetyo & Winarno's research (2019); Vania, et al., (2018); shows physical activity has a significant relationship with the level of physical fitness. The results of Putro & Winarno's research (2022); Calestine, et al., (2017) show that there is a relationship between physical activity and physical fitness.

The Muntaner et al. study (2018) states that if you have a habit of doing physical activity and have good physical fitness, it will support the health of students and will also have a good impact on the cognitive and academic abilities of students at school. The Cadenas-Sanchez et al. study (2020) found that children with good muscle strength, agility and speed are generally correlated with their academic abilities. Physical fitness is closely related to one of the health coaching efforts on the human factor whose goal is to increase the degree of health and human productivity. Physical activity to improve physical fitness must meet adequate intensity that will increase the level of physical fitness. Physical fitness is relative, meaning that physical fitness is not free but is related because it is always related to the physical activity carried out. The results of Martin's research, et al., (2018) revealed that physical activity will improve achievement learning. Physical activity is linked to improved overall health and can improve socialization and mental health skills. In addition, research has consistently identified a variety of specific benefits such as improved physical and physiological health and positive health outcomes in the areas of mental health and well-being (Chekroud et al., 2018).

Based on the results of the study, it shows that there is a significant relationship between sleep quality and physical fitness. This means that the better the emotional intelligence, the better the physical fitness. The results of the study are supported by several studies including by Gunarsa & Wibowo (2021) which show that sleep quality and physical fitness have a close relationship, by maintaining sleep quality it is the same as maintaining physical fitness. Research conducted by Safaringga & Herpandika (2018) shows the results that the level of physical fitness has a relationship with sleep quality. The results of Aminuddin's research, et al.,

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(2022) show that there is a significant relationship between sleep quality and physical fitness level. It is known that sleep is very important for overall body health (Paruthi et al., 2016). Lack of sleep or poor sleep quality will have a negative impact on health, including mental health such as depression, worry, anxiety, impaired physiological functions of the body such as motor disorders, cognitive impairment, emotions, performance during sports and is likely to increase the risk of injury, drug use, poor diet, obesity, poor academic performance, and drug use (Chaput et al., 2016; Freeman et al., 2017). The negative impact of sleep deprivation will affect skills, submaximal strength and muscle power, motor disorders, cognitive impairment, emotions, academic performance, poor diet (Fullagar et al., 2015; Medic, et al., 2017).

### CONCLUSIONS

Based on the results of data analysis, description, testing of research results, and discussion, it can be concluded that: (1) There is a significant relationship between eating behavior and physical fitness of class XI students at SMTI Yogyakarta, with a p-value of  $0.022 < 0.05$ . (2) There is a significant relationship between physical activity and physical fitness of class XI students at SMTI Yogyakarta, with a p-value of  $0.000 < 0.05$ . (3) There is a significant relationship between sleep quality and physical fitness of class XI students at SMTI Yogyakarta, with a p-value of  $0.002 < 0.05$ . (4) There is a significant relationship between eating behavior, physical activity, and sleep quality on physical fitness of grade XI students at SMTI Yogyakarta, with a p-value of  $0.002 < 0.05$  and a contribution of 73.20%.

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## Effectiveness of Exercise Therapy Based on Loosening, Stretching and Strengthening in the Treatment of Chronic Pelvic Disorders



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**ABSTRACT:** Exercise Therapy is one part of the treatment of chronic pelvic disorders. This study aims to determine the effectiveness of Exercise Therapy based on loosening, stretching and strengthening in handling chronic pelvic disorders to reduce pain, increase range of motion, and joint motion function in symptoms of chronic pelvic disorders. The study used pre-experimental with a one-group pretest-posttest design conducted on members at Darah Muda Squad (DMS) Fitness Klaten, Central Java who experienced chronic pelvic disorders as many as 15 people. The research instrument used in the form of a numeric rating scale (NRS) in measuring pain intensity, a goniometer measuring instrument used to measure range of motion, and harris hip score functions in assessing motion function. The treatment given is Exercise Therapy based on loosening, stretching, and strengthening for approximately 30 minutes for 6 treatments. The data analysis technique uses paired t-test or Wilcoxon sign rank test according to the data to compare pretest and posttest data. The results showed that pain intensity decreased from  $6.5 \pm 1.3$  to  $2.5 \pm 1.03$  (64%) with  $p=0.001$ , flexion movement increased from  $78.1 \pm 7.4$  to  $100.5 \pm 4.5$  (29%) with  $p=0.000$ , extension movement increased from  $13.2 \pm 2.1$  to  $23.3 \pm 2.5$  (76%) with  $p=0.000$ , abduction movement increased from  $11.2 \pm 1.8$  to  $20.1 \pm 1.2$  (53%) with  $p=0.000$ , adduction movement increased from  $19.8 \pm 5.06$  to  $30.4 \pm 3.4$  (79%) with  $p=0.000$ , internal rotation movement increased from  $18.8 \pm 4.9$  to  $29.7 \pm 1.5$  (58%) with  $p=0.001$ , external rotation movement increased from  $25.2 \pm 4.05$  to  $33.7 \pm 3.8$  (33%) with  $p=0.000$ , motion function increased from  $56.7 \pm 5.7$  increased to  $82.9 \pm 5.6$ . (46%) with  $p=0.000$ . It can be concluded that Exercise Therapy based on loosening, stretching, and strengthening is effective in reducing pain, increasing range of motion and joint function, so it is recommended in the treatment of chronic pelvic disorders.

**KEYWORDS:** exercise therapy, pain, range of motion, movement function

### I. INTRODUCTION

Basically, the general public and sportsmen are inseparable from physical activities that can result in the risk of injury. The occurrence of injury is caused by impact (trauma) or *overuse* in the form of *strains*, *sprain*, *bone fractures*, and bruises characterised by pain (dolor), swelling (tumour), redness (rubor), increased temperature (calor) and a decrease in body function. (Arovah, 2021: 2). Cases of injury to the joints are injuries that are often experienced, ranging from the wrist, elbow, shoulder, waist, pelvis, knee, ankle to toe joints. Each injury has a different way of healing. Injury healing is based on the time of injury and the duration of the incident such as acute and chronic.

One of the most common joint injuries is the hip joint. Cases of pelvic disorders can occur due to sports activities, doing daily activities or accidents. (Hernowo & Ambardini, 2019: 2). In Asia, the risk of hip joint disorders in men is 5.6% because it is caused by an abnormality in the inclination angle in the hip joint which can lead to joint discongruence. (Al-Muqsith, 2017: 1). In Indonesia, the percentage of hip-pelvic disorders in a hospital in Surabaya was. 45.5% of 46 people studied with various factors attributed as the cause of pelvic disorders due to heavy physical workload and poor positioning (Lusianawaty, 2013: 2). The situation is in accordance with observations made in the sports injury therapy "MAFAZA" in January - July 2022, there were 2,000 patients treated and there were 165 (8.25%) patients experiencing complaints of pelvic injuries (Krismantoro, 2023: 1). The results of the study stated that as many as 249 people with a percentage of 18.99% experienced pelvic disorders (Graha, 2012: 7). While

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other data states that 95% of patients experiencing dislocation of the hip joint also experience injuries to other parts of the body, for example, *acetabulum fractures*, *inferior limb fractures* (23%), *superior limb fractures* (21%), head injuries (24%), *thoracic* injuries (21%) and *abdominal* injuries (15%). (Al-Muqsith, 2017: 1). Based on the data above, it can be concluded that injuries to the hip joint are often experienced and can interfere with daily activities such as walking, standing, sitting and sports. The *pelvis* is an *acetabulofemoral* joint formed from the junction of the *femur* and *pelvis* bones (Arovah, 2021: 125). There are various types of pelvic disorders including *arthritis*, *fracture* (broken or cracked), *dislocation* (misplaced), and *bursitis*. (Graha, 2019: 60).

Injury can result in discomfort, namely the perception of pain. Pelvic pain can be caused by prolonged sitting and standing, causing discomfort in the pelvic area and can affect many systems in the body such as endocrine, urinary, reproductive and digestive nerves (Bradley, 2017: 1). Injury is closely associated with discomfort in the body, which is the body's natural response to signal that something is not right in the body. Discomfort can be in the form of pain, Anderson & Parr (2011: 62) state pain is a negative sensory and emotional experience associated with actual or potential tissue damage. It is also a symptom that is common to most injuries. Pain is multidimensional and with varying degrees of variation. Based on the aspect of intensity, pain can be categorised into mild, moderate and severe pain. Based on duration, pain can be categorised into *transient*, *intermittent*, and *persistent*. Based on quality, pain can be categorised into sharp, dull, hot, and so on. Based on time, it can be categorised with 3 phases, namely acute, sub-acute and chronic phases. (Arovah, 2021: 48-49).

According to the period of occurrence, pain can be divided into acute and chronic pain. Acute pain is pain in a short period of time and can act as a stimulus that helps individuals to protect injured tissue in order to avoid repeated injury. Healing of the injured tissue will be followed by a decrease in acute sensitisation of the injured area and the sensory threshold will return to normal. Chronic pain is pain that continues after the tissue has healed and continues beyond the period that should be, this is due to pain receptors that continue to turn on (Janasuta & Putra, 2017: 21). According to Kurniawan (2015: 4) in addition to acute and chronic pain there are several other types of pain, including: (1) *Nociceptive* pain is pain that arises due to mechanical, chemical, temperature stimuli that result in activation or sensitisation of peripheral nociceptors (nerves responsible for pain stimulation); (2) *Neuropathic* pain arises as a result of neural damage to the peripheral nerves or to the central nervous system which includes central and peripheral afferent nerve pathways. *Neuropathic* pain is projected as pain that gives a feeling or sensation such as stabbing or burning; (3) *Somatic* pain is pain described as sharp, stabbing, and easily localised pain and burning that usually originates from the skin, subcutaneous tissue, skeletal muscles, tendons, mucous membranes, bones, and peritoneum. Examples of somatic pain are stage two labour pain and peritoneal irritation; (4) *Visceral* pain is pain characterised by pain that radiates and leads to the surface area of the body and away from the site of pain. *Visceral* pain occurs as rhythmic contractions of smooth muscle, as an example of visceral pain is cramping often associated with gallbladder disease, ureteral obstruction, menstruation, gastroenteritis, and uterine distension in the first stage of labour. *Visceral* pain may occur due to ischaemia, smooth muscle spasm, ligament stretching, distension of soft structures such as the gall bladder, bile ducts and ureters.

Bahrudin (2017: 8) explains that pain is a sensory and emotional experience due to actual or potential tissue damage or described through the damage. Pain can occur due to stimuli received by pain receptors (*nociceptors*). Pain receptors are free nerve endings found in muscles, joints, skin, *visceral*, and *vascular*. These pain receptors are responsible for the nociceptive stimulus arising from mechanical, temperature, and chemical changes (Kurniawan, 2015: 2). The mechanism of injury occurs in soft tissue (muscles, tendons, ligaments) which will result in closed bleeding in the tissue and swelling. The occurrence of swelling causes increased pressure on the tissue and will result in pain and stiffness (Zein, 2016: 16). Symptoms of pelvic disorders can cause painful sensations, limited *range of motion* and joint function. Measurement of *range of motion* in the pelvis is a measurement of *flexion*, *extension*, *abduction*, *adduction*, *internal rotation* and *external rotation* movements which can be measured using a goniometer. Limitations in motion function can be measured using the *Harris hip score* questionnaire.

In an effort to manage symptoms of pelvic disorders, pharmacological and non-pharmacological treatments can be used. One of the non-pharmacological treatments used is *Exercise Therapy*. The use of *Exercise Therapy* is one of the efforts that can be made in injury rehabilitation with the aim of achieving a 100% healing rate. (Nugroho and Ambardini, 2016: 30). The systematic application of *Exercise Therapy* has the benefit of increasing the range of motion of the joints, strengthening weak muscles and increasing ability in daily activities (Nagavani, 2012: 18).

The form of therapy used in the management of pelvic disorders in the form of *Exercise Therapy* or exercise therapy in the form of providing physical exercise programmes is increasingly being recommended in the management of chronic injuries. *Exercise Therapy* is a systematic physical activity that improves or prevents musculoskeletal disorders, especially injuries to the joints and restores joint function to near its original function or optimises joint function. (Arovah, 2021: 49). *Exercise Therapy* is the performance of body movements or physical activities carried out systematically and planned in preventing physical weakness and improving body function (Pristianto, 2018: 2). *Exercise Therapy* is a recovery program that has systematic performance,

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planned body movements, postures, and physical activities aimed at clients to improve or prevent physical weakness in improving body function and preventing and reducing health-related risk factors, optimising overall health and fitness conditions (Amanati, Purnomo, Abidin, Wibisono, 2018: 63). The main focus of *Exercise Therapy* is a programme that emphasises the healing process for physical weakness and improved body function. *Exercise Therapy* is one of the efforts to manage injuries using body movement exercises, both actively and passively. The purpose of *Exercise Therapy* is rehabilitation to overcome functional and movement disorders, prevent complications, reduce pain and train postoperative functional activities (Damping, 2012: 24).

*Exercise Therapy* is designed to suit the individual needs of each patient with the main goal of optimising body function. Body function is related to several parameters such as balance, cardiorespiratory fitness, coordination, flexibility, mobility, motor control, neuromuscular control, postural control and stability. The whole system reacts, adapts and develops in response to *physical stress* including physical activity. Physical activity helps the body to maintain functional ability, cardiorespiratory endurance and mobility. However, if done in excess, physical activity can also result in injury in the form of *strains, sprain, fractures* or chronic degenerative conditions. Therefore, *Exercise Therapy* must be designed so that the physical activity programmed is suitable for the needs of the patient with the minimum risk of injury due to exercise and get the maximum possible increase in the functional capacity of the body.

The use of *Exercise Therapy* used in this study is based on *loosening, stretching and strengthening*, this is used as a treatment for chronic pelvic disorders, some studies that use *Exercise Therapy* in handling injuries include the effectiveness of exercise therapy to reduce pain and improve ankle function after ankle injury researched by Hendrawan (2019: 46-52) obtained the results of a decrease in pain by 77.00%, and an increase in function by 8.66%. The effectiveness of masage therapy followed by *core stability exercise* for healing chronic pelvic disorders researched by Sari (2020: 90-91) obtained the results of a decrease in pain by 92.28%, an increase in ROM with an average value of 16.24%. The effect of "geregkutara" exercise therapy on reducing pain and improving function after ankle injury in GPS futsal players researched by Fadilla (2018: 6) obtained the results of a decrease in pain by 87.5% and an increase in motion function when walking by 12.5%, running 25% up the stairs 25% tiptoe 18.92%, jumping 18.18%, jumping 21.21%. Previous research tends to focus on one particular aspect, such as *stretching or strengthening* and has not fully integrated the elements of *loosening, stretching and strengthening* as a whole.

Therefore, this study aims to determine the effectiveness of *Exercise Therapy* that integrates *loosening, stretching and strengthening* in reducing pain, increasing *range of motion* and motion function in chronic pelvic disorders.

## II. METHODS

This study uses a pseudo-experimental method with a *one group pretest-posttest design*, where the research subjects become one group, then a sampling technique is carried out using *purposive sampling* based on inclusion and exclusion criteria. The inclusion criteria in this study are 1) patients with chronic pelvic disorders, 2) willing to become respondents, 3) age 15-40 years, 4) experiencing decreased function of movement and feeling pain in the pelvis occurs in the chronic phase. while the exclusion criteria are 1) anatomical abnormalities in the pelvic bones such as fractures, dislocations and joint damage. 2) there is no history of tumours, kidney disease, diabetes, heart disease and osteoporosis, 3) no open wounds. The research was conducted centred on Darah Muda Squad Fitness Klaten Central Java with sample determination using *sample size calculator* considerations.

In its implementation, the sample will be measured in the *pretest* and *posttest* phases including pain using the *numeric rating scale* (NRS) *instrument* which is a tool used to measure the degree of pain felt (Nugent, Lovejoy, Shull, Dobscha, Morasco, 2021: 2235). The scale used uses a range of 0-10. NRS has a validity value of  $r = 0.90$  and reliability = 0.95. Based on research conducted by Li, Liu & Herr in Swarihadianti (2014: 46), so this instrument is valid and reliable for use in the data collection process. To measure the level of pain felt by patients can use the *Numeric Rating Scale* (NRS), because it can measure with a range of parameters from no pain to the most severe pain on a scale of 0-10. The smaller the number shown, the smaller the pain felt by the patient and the greater the number shown by the NRS, the greater the pain felt by the patient. Measurement of *range of motion* is carried out using a goniometer measuring instrument is a tool for measuring *range of motion*. The goniometer measuring instrument has been tested for validity and reliability in research conducted by Rosmita in Noviani (2023: 40). The validity and reliability tests on the goniometer resulted in a validity of 0.95 and a reliability of 0.51. Then measuring joint motion function using the *Harris hip score* questionnaire. Based on research conducted by Soderman, P & Henrik, M (2001: 192), this study compares *WOMAC, SF-36, and Harris Hip Score* in patients randomly selected through a computer algorithm from Sahlgrenska University Hospital showing that among the three instruments there is no significant difference, *WOMAC* has the highest domain value ( $r = 0.91$  for pain and  $r = 0.93$  for function). Reliability tests on the *Harris Hip Score* showed excellent reliability in pain 0.93 and function 0.95, it can be concluded that the research instruments are valid and reliable.

# Effectiveness of Exercise Therapy Based on Loosening, Stretching and Strengthening in the Treatment of Chronic Pelvic Disorders

Samples that have been measured will receive *treatment* in the form of *Exercise Therapy* by integrating *Loosening*, *Stretching* and *Strengthening*. Analysis of the data that has been collected using the SPSS *Statistic* application to test the effectiveness of *exercise therapy treatment* integrating *loosening*, *stretching*, and *strengthening* is carried out with a normality test step to determine whether the data is normally distributed or not normally distributed and continued with a different test using *paired t test* or *wilcoxon test*.

### III. RESULT AND DISCUSSION

#### A. RESULT

This research was conducted centered on Darah Muda Squad Fitness Klaten Central Java, based on the criteria of the research sample experiencing pelvic disorders, the research sample received treatment in the form of Exercise Therapy based on loosening, stretching, and strengthening. This treatment was carried out for 30 minutes per session and given 6 times. This Exercise Therapy program was given to research samples who experienced chronic phase pelvic disorders which aimed to reduce pain sensations, increase range of motion, and restore joint function in patients with chronic pelvic disorders. The results of the study can be seen below:

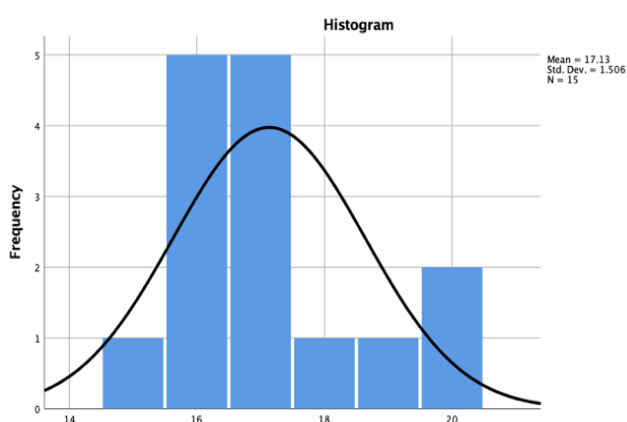


Diagram 1. Frequency Distribution Based on Age

#### Age

The age range of the research subjects was between 15-40 years, with an average age of 17.13 years, with a standard deviation of 1.5. The research data showed that most complaints of pelvic disorders were at the age of 16-17 years.

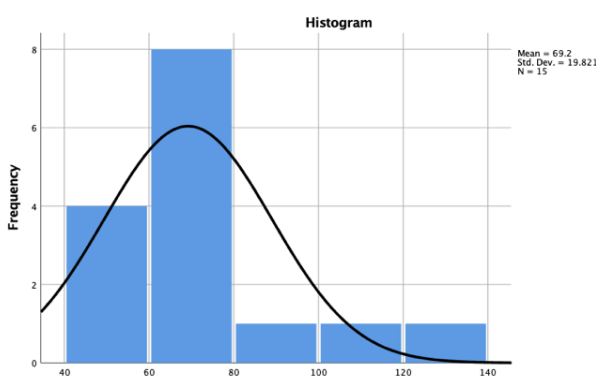
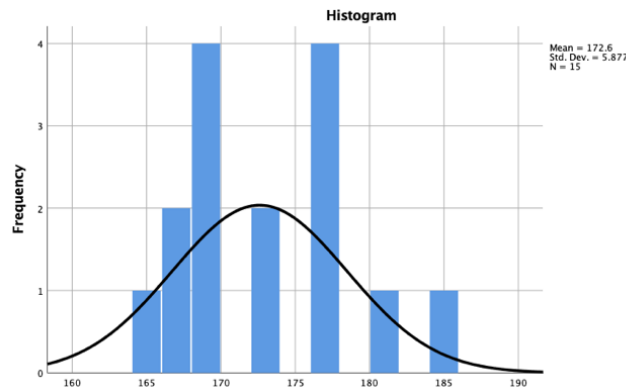


Diagram 2. Frequency Distribution Based on Weight

#### Weight

The range of body weight of the subjects of this study was 49-120 Kg, with an average body weight of 69.20 Kg and a standard deviation of 19.8.

# Effectiveness of Exercise Therapy Based on Loosening, Stretching and Strengthening in the Treatment of Chronic Pelvic Disorders



**Diagram 2. Frequency Distribution Based on Height**

## Height

The research subjects in this data had an average height of 172.6 cm, with a standard deviation of 5.8. The range of subject height is between 165-185 cm.

**Table 1. Data Based on Cause of Injury**

Penyebab Cedera	Jumlah
Latihan	8
Angkat Beban	3
Diam dalam waktu lama	4
Total	15

Table 1 presents the data obtained based on the cause of injury, showing that exercise is the most common cause of chronic pelvic disorders.

**Table 2. Results of Normality Test with Shapiro-Wilk**

	Shapiro-Wilk	
NRS	Sig.	Information
	0,004	Not Normally Distributed
ROM Flexion	Shapiro-Wilk	
	Sig.	Information
	0,892	Normally Distributed
Extension ROM	Shapiro-Wilk	
	Sig.	Information
	0,995	Normally Distributed
Abduction ROM	Shapiro-Wilk	
	Sig.	Information
	0,592	Normally Distributed
Adduction ROM	Shapiro-Wilk	
	Sig.	Information
	0,623	Normally Distributed
Internal ROM of Rotation	Shapiro-Wilk	
	Sig.	Information
	0,003	Not Normally Distributed
Rotational External ROM	Shapiro-Wilk	
	Sig.	Information
	0,689	Normally Distributed
Motion Function	Shapiro-Wilk	
	Sig.	Information
	0,050	Normally Distributed

## Effectiveness of Exercise Therapy Based on Loosening, Stretching and Strengthening in the Treatment of Chronic Pelvic Disorders

Based on Table 4, it explains that the results of the NRS Scale normality test have a significance value of 0.004. The normality test of Flexion ROM gets a significance value of 0.892. The normality test of the Extension ROM gets a significance value of 0.995. The normality test of the Abduction ROM gets a significance value of 0.592. Adduction ROM normality test gets a significance value of 0.623. The normality test of Internal Rotation ROM gets a significance value of 0.003. The normality test of External Rotation ROM gets a significance value of 0.689. Motion function normality test gets a significance value of 0.050.

In the normality test other than the NRS and Internal Rotation pain scale, the significance value is greater than 0.05 so that it can be said that all data are normally distributed except for the NRS scale and Internal Rotation ROM.

After the normality test, the next step is the t-test. T-test to prove the hypothesis is accepted or rejected. The basis for determining the decision on the comparison of  $p$  with the value  $\alpha = 0,05$ . If  $p < 0,05$  then  $H_0$  is rejected and  $H_2$  is accepted. Conversely, if  $p > 0,05$  then  $H_0$  is accepted and  $H_1$  is rejected. The results of the t-test are briefly explained in the table below.

**Table 3. Paired T-test Results**

	Sig.	Conclusion	Description
NRS	0,000	Significant	<i>Wilcoxon test</i>
	Sig.	Conclusion	Description
ROM Flexion	0,000	Significant	<i>Paired T test</i>
Extension ROM	0,000	Significant	<i>Paired T test</i>
Abduction ROM	0,000	Significant	<i>Paired T test</i>
Adduction ROM	0,000	Significant	<i>Paired T test</i>
Internal ROM of Rotation	0,000	Significant	<i>Wilcoxon test</i>
Rotational External ROM	0,000	Significant	<i>Paired T test</i>
	Sig.	Conclusion	Description
Motion Function	0,000	Significant	<i>Paired T test</i>

Based on table 3, the significant value of data using *paired t-test* gets a significance value of 0.000 which is smaller than 0.05. So from this data it can be concluded that  $H_0$  is rejected and  $H_1$  is accepted, thus there is an effectiveness of *Exercise Therapy* on reducing pain and increasing *range of motion* and motion function in chronic pelvic disorders.

**Table 4. Wilcoxon Difference Test Results**

	Sig.	Conclusion	Description
NRS	0,000	Significant	<i>Wilcoxon test</i>
	Sig.	Conclusion	Description
Internal ROM of Rotation	0,000	Significant	<i>Wilcoxon test</i>

Based on table 5 on the pain scale and internal rotation movement with not normally distributed in the normality test, so using the *Wilcoxon* difference test. The results of this t-test have an Asymp.sig (2-tailed) of 0.001 more than 0.05. It is concluded that  $H_0$  is rejected and  $H_1$  is accepted, meaning that there is an effectiveness of *Exercise Therapy* on reducing pain and increasing *range of motion* and motion function in chronic pelvic disorders.

## B. DISCUSSION

This study was conducted to determine the effectiveness of Exercise Therapy on reducing pain, increasing range of motion and motion function in patients with pelvic disorders. The sample in this study amounted to 15 people, with an overall average BMI value of 23.3 and entered normal criteria. This study includes pre-experimental with a one-group pretest-posttest design, where the research subjects become one group according to the researcher's criteria, then data collection and measurement are carried out before and after being given Exercise Therapy treatment that integrates loosening, stretching and strengthening this aims to be able to know whether or not there are changes experienced by research subjects before and after treatment.

A person experiences chronic fascial pelvic disorders due to intensive physical activity, such as running, jumping, and making rapid changes in direction, which can put excessive pressure on the pelvic structure. These repetitive movements have the potential to strain the muscles and ligaments around the pelvis, increasing the risk of chronic injury if not managed properly.



## Effectiveness of Exercise Therapy Based on Loosening, Stretching and Strengthening in the Treatment of Chronic Pelvic Disorders

In addition, the use of inappropriate techniques and the absence of adequate warm-up before training or competition can also increase the likelihood of pelvic injury (Setiawan, 2011: 95).

The results showed that pain perception decreased by 64%, increased *range of motion* in *flexion* 29%, *extension* 76%, *abduction* 53%, *adduction* 79%, *internal rotation* 58%, *external rotation* 33% and *hip joint motion function* measured using *harris hip score* increased by 46%. The results of this study are in line with research conducted by Davit Firmanda Hernowo (2018) entitled "The Effectiveness of Frirage Masage Combination Therapy and PNF Exercise on the Recovery of Pelvic Disorders of Patients of the UNY FIK Therapy Clinic" which showed a significant effect on reducing pain by 51.31%, increasing the *range of motion of flexion* movements by 6.60%, *extension* by 26.85%, *abduction* by 28.23%, *adduction* by 10.74%, *medial rotation* 5.6% and *lateral rotation* 6.77%. In motion function, the effectiveness is 72.10% for walking, 73.3% for sitting standing and 50.53% for standing on one leg. Research conducted by Aditya Septian Nurcahya (2020) entitled "The Effectiveness of a Combination of Massage Therapy and PNF Exercise Therapy for Healing Chronic Pelvic Disorders" experienced a significant effect on reducing pain by 67.24% and experiencing an increase in *range of motion* with an average of 60.93%. Research conducted by Bhirama Noraga Adhyaksa (2020) entitled "The Effectiveness of Tepurak Manipulation Therapy Followed by *Theraband* Exercise for Healing Chronic Pelvic Injuries" obtained significant results in reducing pain by 74.94%, increasing *range of motion* in *flexion* movements by 29.97%, *extension* movements by 56.94%, *adduction* movements by 25.53%, *abduction* movements by 29.01%, *internal rotation* movements by 35.95%, and *external rotation* movements by 33.50%. Thus *exercise therapy* is effective in reducing pain scales, increasing *range of motion*, and joint motion function in patients with chronic pelvic disorders.

### IV. CONCLUSIONS

Sitting and standing for long periods of time can cause discomfort in the pelvic region. The pelvis supports the weight of the upper body when one rests on the legs and this is also affected by the pull of gravity downwards. Add to this carrying weights such as heavy bags or carrying children, and it will cause our pelvis to often feel fatigue and pain. Injuries can lead to discomfort and the perception of pain. Pelvic pain can be caused by prolonged sitting and standing, causing discomfort in the pelvic area and can affect many systems in the body such as endocrine, urinary, reproductive and digestive nerves. Symptoms of pelvic disorders can cause painful sensations, limited range of motion and joint function. Based on the results of the research, it was concluded that the provision of Exercise Therapy integrating loosening, stretching, and strengthening for 6 treatments was effective and significant in reducing pain, increasing range of motion in flexion, extension, abduction, adduction, internal rotation, and external rotation movements. In addition, the function of hip joint motion has also increased. These results indicate that the Exercise Therapy program can be a significant nonpharmacological intervention in reducing pain, increasing range of motion, and improving hip joint motion function in patients with chronic hip disorders. This intervention can be recommended in the management of chronic pelvic disorders.

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## Efforts to Increase the Quantity and Quality of Tejakula Tangerines and Control of Unjuicy Fruit with Different Fertilization Packages



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**ABSTRACT:** The results showed that the fertilization package treatment with Cow Manure Organic Fertilizer + AB MIX Kryptonium + Mycorrhizal Biofertilizer + Probiotic Liquid Organic Fertilizer gave the lowest percentage of the number and weight of unjuicy fruits and gave the highest value on the number and weight of harvested fruits per tree, edible portion, fruit pulp color, fruit water content and fruit pulp moisture content when compared to other treatments. This treatment gave the lowest number and weight of unjuicy fruits which were 1.82% and 4.09% respectively and much lower than the percentage of the number and weight of unjuicy fruits in the control which were 9.11% and 22.08% respectively. In addition, this treatment also gave the highest number and weight of harvested fruits per tree, 259.63 fruits and 32.31 kg respectively, or an increase of 69.19% and 70.97% compared to the control with the number and weight of harvested fruits per tree, 80.00 fruits and 9.38 kg respectively. Fruit moisture content and pulp moisture content in this treatment were significantly higher than the control with values of 89.22% and 91.05%, respectively.

**KEYWORDS:** Fertilization package, Fruit Quality, Fruit Quantity, Tejakula Tangerine, Unjuicy Fruit

### INTRODUCTION

Tejakula tangerines (*Citrus reticulata* cv. Tejakula) are native to Buleleng Regency, Bali Province which has been released as a national superior tangerine. This tangerine has a distinctive flavor in the form of a blend of sweet and slightly sour flavors with an attractive fruit appearance resembling mandarin oranges with a bright orange color when ripe due to  $\beta$  Cryptoxanthin pigment [1]. This advantage causes high public interest in Tejakula tangerines compared to other local citrus varieties [2]. This citrus was very popular in the 1980s but the glory ended because of the endemic Citrus Vein Phloem Degeneration (CVPD) so that widespread plant eradication was carried out. Farmers' longing for the glory days encouraged farmers to re-cultivate Tejakula tangerines on a small scale with a trial and error system. Tejakula tangerine re-cultivation by farmers experienced several obstacles in addition to CVPD such as the presence of unjuicy fruit [3].

Lack of juicy and unjuicy fruit is the low water content in citrus fruits that reduces the quality of citrus fruits because the texture of the pulp is rough, hard and hollow with a bland to slightly bitter taste that is not in demand by consumers. The cause of unjuicy in Tejakula tangerines is thought to be related to the lack of nutrient availability in the soil, affecting physiological processes in the plant body.

Appropriate fertilizer application should be able to meet all the nutrient needs of plants so that they can produce optimally both in terms of quantity and quality of yield [4]. Fertilization strategy is a major factor in addition to environmental factors considering that this will affect plant productivity, size, fruit quality where fruit quality is strongly influenced by the provision and availability of nutrients, especially when the plant is in the fruit filling and enlargement phase [5]. Fertilization can be done by combining several different types of fertilizers. Fertilizers can be in the form of organic fertilizers, inorganic fertilizers, biological fertilizers, probiotic fertilizers or their combinations. Therefore, the purpose of this research is to analyze and find the best fertilization package to increase the quantity, quality and control of unjuicy fruit in Tejakula tangerines.

## Efforts to Increase the Quantity and Quality of Tejakula Tangerines and Control of Unjuicy Fruit with Different Fertilization Packages

### RESEARCH METHODS

The research was conducted in Tejakula tangerine plantation owned by farmers in Tembok Village, Tejakula Subdistrict, Buleleng Regency, Bali Province, Indonesia from December 2023 - August 2024. The study used a 1-factor Randomized Group Design (RAK) with 6 treatment levels, namely Po (10 kg of Cow Manure Organic Fertilizer), Pa (Po + 275 g Urea + 310 g SP 36, + 137.5 g KCl), Pk (Po + 20 ml AB MIX Kryptonium/10 l water), Pm (Pk + Mycorrhizal Biofertilizer), Pp (Pk + Probiotic Liquid Organic Fertilizer (POC)) and Pc (Cow Manure Organic Fertilizer + AB MIX Kryptonium + Mycorrhizal Biofertilizer + Probiotic POC Fertilizer). Each treatment was repeated four times so that there were 24 citrus trees as experimental units. Observation data were analyzed using analysis of variance (anova) followed by the least significant difference test (LSD) at the 5% level.

The implementation of the research includes making probiotic POC, making mycorrhizal biofertilizer, making AB MIX Kryptonium stock solution, fertilization, plant maintenance, fruit sampling and data collection. Probiotic POC was made by combining the necessary ingredients, namely 1 kg of kepok banana peel, 1 kg of goat manure, 2.5 l of green young coconut water, 2.5 l of rice washing water, 0.5 kg of brown sugar, 0.1 l of EM4 starter and distilled water. The preparation of mycorrhizal biofertilizer is carried out by combining the type/genus of mycorrhizal spores with spore carrier media with a composition of 100 g of volcanic sand carrier media sown with 50 spore consortia from the genus *glomus*, *acaulospora* and *scutellospora* obtained from spore propagation from exploration results on citrus plantations in Tejakula District. Preparation of AB MIX Kryptonium stock solution is done by dissolving each nutrient A and nutrient B solids into 5 l of distilled water. The implementation of fertilization begins with cleaning the rhizosphere area and making a run around the tree. Fertilizers were sprinkled and shaken into the furrows around the sample plants according to the treatment level with a fertilizer application interval of 2 times, namely at the beginning of the study and 2 months after the first fertilization. Especially for mycorrhizal biofertilizer, it was sprinkled at the base of the plant and given only once during the first fertilization. Plant maintenance was carried out in the form of weeding, maintenance pruning, and pest and disease control. Fruit harvesting was carried out by picking fruit at three different maturity levels at each fertilization level. After harvesting, fruit samples were brought to the laboratory to be observed and measured for observation variables consisting of the number of harvested fruits per tree, weight of harvested fruits per tree, percentage of the number of unjuicy fruits, percentage of the weight of unjuicy fruits, edible portion, fruit flesh color, fruit moisture content and fruit pulp moisture content.

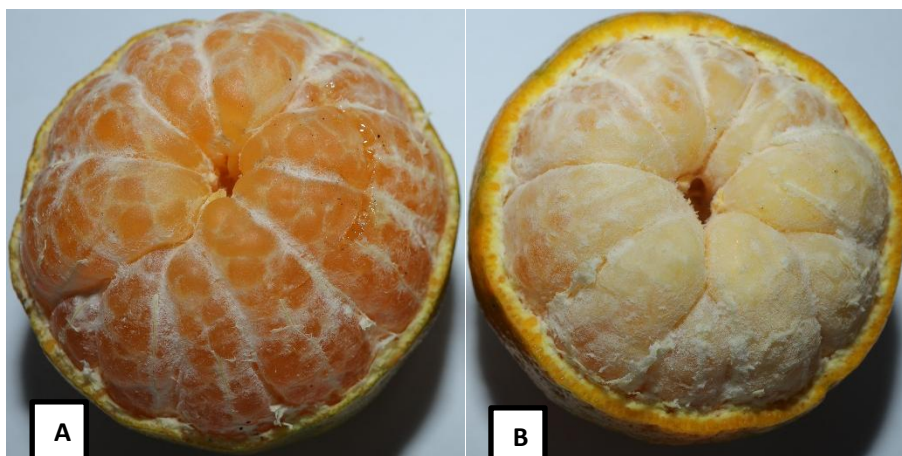


Figure 1. Citrus Fruit Curves that are not unjuicy/ Juicy (A), Fruit Curves that are unjuicy/ Unjuicy (B)

### RESULTS

#### Number of harvested fruits per tree and harvested weight of fruits per tree

The highest number of harvested fruits per tree and weight of harvested fruit per tree were obtained at the Pc level and significantly different from other levels such as Po, Pa, Pk and Pm, but not significantly different from Pp. The number of harvested fruits per tree was Pc (259.63), Pp (193.50), Pm (167.38), Pa (143.88), Pk (138.50) and Po (80.00), respectively. While the weight of harvested fruit per tree is Pc (32.31), Pp (23.65), Pm (18.71), Pa (17.92), Pk (15.57) and Po (9.38), respectively. Application of fertilizer at the Pc level gave 69.19% more fruit harvest per tree compared to the control (Po) while the weight of fruit harvest per tree gave 70.97% higher results compared to the control (Table 1).

## Efforts to Increase the Quantity and Quality of Tejakula Tangerines and Control of Unjuicy Fruit with Different Fertilization Packages

**Table 1. Effect of treatments on number of harvested fruits per tree and weight of harvested fruits per tree**

Treatment	Number of Harvested Fruits per Tree (fruit)	Weight of Harvested Fruit per Tree (kg)
Po	80,00 (8,83) c	9,38 (3,09) c
Pa	143,88 (11,81) b	17,92 (4,22) b
Pk	138.50 (11.43) bc	15.57 (3.90) bc
Pm	167,38 (12,60) b	18,71 (4,29) b
Pp	193.50 (13.41) ab	23.65 (4.72) ab
Pc	259,63 (15,70) a	32,31 (5,56) a
BNT 5%	2,75	0,90

**Note:** The means followed by the same letter at the same column are not significantly different according to LSD (Least Significant Different) test at alpha 5%. The numbers outside the brackets are the original data while the numbers inside the brackets are the data transformed to the normal distribution.  $\sqrt{X + 0,5}$  Because the original data does not spread normally

### Percentage of the number of unjuicy fruits, percentage of the weight of unjuicy fruits and edible portion

The fertilizer package treatment showed that the highest percentage of the number of unjuicy fruit was in the Po treatment (9.11%) followed by Pp (8.51%), Pm (6.77%), Pk (5.99%), Pa (5.47%) and the lowest in Pc (1.82%) and Pc was significantly different from all other treatments. The level of Pc was able to reduce and overcome the breathlessness lower by 80.03% compared to Po (Table 2).

The highest percentage of the weight of unjuicy fruit was obtained in Po (22.08%) followed by Pk (16.65%), Pp (14.73%), Pa (13.82), Pm (12.91%) and the lowest in Pc (4.09%) and Pc was significantly different from all other treatments. The level of Pc was able to reduce and overcome moths lower by 81.48% compared to Po (Table 2).

The highest percentage of edible portion was obtained at the Pc level (70.74%) and the lowest at Pk (50.65%). Between Pc and Pk had a difference of 28.40% and when compared with other treatments, the Pc level was significantly different from Po, Pk, Pm and Pp but not significantly different from Pa (Table 2).

**Table 2. Effect of treatment on percentage of the number of unjuicy fruit (%), percentage of the weight of unjuicy fruit weight (%) and edible portion (%)**

Treatment	Percentage of the number of unjuicy fruits (%)	Percentage of the weight of unjuicy fruit (%)	Edible Portion (%)
Po	9,11 (76,86) a	22,08 (84,80) a	59.64 bc
Pa	5,47 (74,45) b	13,82 (79,76) b	64.32 ab
Pk	5.99 (74.82) ab	16.65 (81.42) ab	50,65 c
Pm	6.77 (75.30) ab	12,91 (79,13) b	57.00 bc
Pp	8.51 (76.44) ab	14.73 (80.30) ab	59.29 bc
Pc	1,82 (71,98) c	4,09 (73,50) c	70,74 a
BNT 5%	2,23	5,00	10,83

**Note:** The means followed by the same letter at the same column are not significantly different according to LSD (Least Significant Different) test at alpha 5%. The numbers outside the brackets are the original data while the numbers inside the brackets are the transformed data.  $\sqrt{X + 0,5}$  Because the original data does not spread normally

### Fruit flesh color, fruit moisture content, and fruit pulp moisture content

The Pc treatment (4.35) had the highest fruit flesh color value and the lowest in Po (3.27) and Pc was significantly different from Po, Pk, Pm, and Pp but not significantly different from Pa. Fruit flesh color value in Pc was 24.83% higher than Po as the control (Table 3).

Fruit moisture content showed the highest value at the Pc level (89.22%) and the lowest at Po (87.32%) and Pc was significantly different from Po, Pa, Pk, and Pm but not significantly different from Pp. Fruit moisture content in Pc was 2.13% higher than Po as the control (Table 3).

Fruit pulp moisture content in the Pc treatment tends to give the highest value compared to other treatments at 91.05% followed by Pm (90.20%), Pk (90.00%), Pp (89.58%), Pa (89.48%) and the lowest in Po (87.61%) and Pc is significantly different



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from Po and Pa but not significantly different from Pk, Pm and Pp. Fruit flesh moisture content in Pc tended to be 3.78% higher than Po as the control (Table 3).

**Table 3. Effect of treatment on fruit flesh color, fruit moisture content (%) and fruit flesh moisture content (%)**

Treatment	Fruit flesh color	Fruit moisture content (%)	Fruit pulp moisture content (%)
Po	3,27 c	87,32 c	87,61 c
Pa	3.96 ab	88.00 bc	89,48 b
Pk	3.67 bc	88.12 bc	90.00 ab
Pm	3,86 b	87.69 bc	90.20 ab
Pp	3.49 bc	88.51 ab	89.58 ab
Pc	4,35 a	89,22 a	91,05 a
BNT 5%	0,47	1,02	1,51

**Note:** The means followed by the same letter at the same column are not significantly different according to LSD (Least Significant Different) test at alpha 5%.

### DISCUSSION

The provision of fertilization packages at the Pc level (Cow manure + AB MIX Kryptonium + Mycorrhizal Biofertilizer + POC Probiotics) tends to be able to control unjuicy in Tejakula tangerines compared to other treatments. This can be seen in the observation variables, especially in the percentage of the number of unjuicy fruits and the percentage of the weight of the lowest unjuicy fruit at the Pc level which is also supported by the variable number of harvested fruit per tree, weight of harvested fruit per tree, edible portion, fruit flesh color, fruit moisture content and the highest fruit flesh moisture content in Pc. This is thought to be because the fertilizer used is more complex and diverse in the form of collaboration between organic and inorganic fertilizers so that it can meet and provide the nutrients needed by plants [6]. Different things can be seen in other fertilization levels which tend not to be able to overcome the unjuicy fruit, especially at the Po fertilizer level. At Po, the percentage of the number and weight of unjuicy fruits showed high results so that the fruit produced was of low quality. The high rate of fruit dropping in Po is thought to be related to the provision of nutrients that are less than optimal due to only using cow manure organic fertilizer whose nutrients are slowly available so that the absorption of nutrients by plants tends not to be optimal [7].

The use of organic fertilizers given to all sample plants besides having disadvantages also has advantages. According to [8] organic fertilizers can effectively improve chemical, biological and improve some soil physical properties such as soil permeability, soil pore space and help form soil granular structure. Appropriate application of organic fertilizers is also able to provide nutrients that can increase plant growth so that it has implications for increasing the quantity and quality of yields [9,10]. The content of organic matter in cow dung organic fertilizer is also considered to be able to increase available organic matter in the soil, nitrogen and phosphorus content although it takes longer when compared to chemical fertilizers [11].

The use of AB MIX Kryptonium at the Pc level is done to fulfill the macro and micro elements needed by citrus plants so as to provide optimum quantity and quality of citrus fruits. This fertilizer contains 17 different nutrients consisting of 6 types of macro elements and 11 types of micro elements. The macro elements contained are nitrogen (N), phosphorus (P), potassium (K), calcium (Ca), magnesium (Mg) and sulfur (S) while the micro nutrients are iron (Fe), copper (Cu), zinc (Zn), boron (B), molybdenum (Mo), chloride (Cl), nickel (Ni), sodium (Na), cobalt (Co) and iodine (I). According to [12] the nutrient solution in the form of AB mix containing complete nutrients if applied at the optimum concentration will show better results than fertilizers containing incomplete nutrients even though they are applied according to plant needs.

The use of mycorrhizal biofertilizer also had a significant impact on the sample plants. Biofertilizers in principle do not contain nutrients directly but contain microorganisms that are able to provide the nutrients needed by plants [13]. According to [14], the association of plants with mycorrhiza through root infection and the formation of intensive external hyphae can facilitate the absorption of water along with other nutrients that have been provided by other fertilizers. In addition, mycorrhiza is also able to help plants access nutrients sourced from organic matter, especially facilitating the absorption of phosphorus in the soil solution [15].

Probiotic POC in synergy with other fertilizers also has a positive impact on plants. Research [16] reported that probiotic microbes have a beneficial impact on plant growth such as absorbing and fixing nitrogen from the rhizosphere, facilitating the absorption of nutrients from the soil solution, producing growth regulator hormones such as auxins and cytokinins, producing antibiotics that function to increase immunity so that the roots are protected from pathogens, dissolving phosphate in the soil which involves acidification, chelation and cation exchange reactions and can increase plant yields by up to 25%. Research by [17]



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suggests that probiotic microbes have 3 roles, namely biofertilizer (nutrient provider), bioprotectant (control and protection against pathogens) and biostimulant (growth stimulator). According to [18] kepok banana peel can increase plant growth and productivity because it contains nutrients such as magnesium, calcium, zinc and sodium. Goat manure has a higher nutrient content compared to other livestock manure such as cows, especially in nitrogen and potassium elements. According to [19], the application of goat manure fertilizer at a dose of 15 tons/ha can have a significant effect on plant height, stem diameter, number of branches, number of flowers and fruit weight of tomatoes. The addition of young green coconut water is done because coconut water contains nutrients such as potassium, calcium, magnesium, sulfur, iron, copper and sodium and contains sugar and protein molecules [20]. According to [21] coconut water also contains growth regulating hormones such as auxin, cytokinin and gibberellin which function to stimulate plant growth. Rice washing water in probiotic fertilizer functions to increase nutrients because it contains nitrogen, phosphorus, magnesium and sulfur and there are also ZPTs that function to regulate root growth and suppress apical dominance [22].

### CONCLUSIONS

The fertilization package at the Pc level in accordance with the research data shows its effectiveness in controlling unjuicy in Tejakula tangerines. The collaboration between cow manure organic fertilizer, AB MIX Kryptonium fertilizer, Mycorrhizal Biofertilizer and Probiotic Fertilizer makes nutrients for plants available while being able to be absorbed directly or indirectly due to the association between plants and mycorrhizal and probiotic microbes. Future research with a more robust methodology can develop these findings to find other alternative technologies in overcoming unjuicy fruit in Tejakula tangerines.

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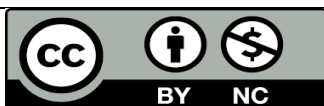
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## Advantages and Disadvantages of Hop, Skip, Jump Race and Running over Hurdle Games in Physical Education



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**ABSTRACT:** This study aims to determine the advantages and disadvantages of the hop, skip, jump race, and running over hurdle games in physical education. The method used in this study is a literature review. This method was chosen because it is to produce a new theory on the research topic by conducting a study of previous research results based on theories that can be accounted for. By understanding the advantages and disadvantages of the hop, skip, and jump race and running over hurdle games in physical education on students' physical fitness, physical education teachers can design programs that are more targeted and effective, and more attractive to both male and female students. This is important to create an inclusive learning environment and support the active involvement of all students. Based on the results of the study, it can be concluded that the advantages and disadvantages of the Hop, skip, and jump race and Running Over Hurdle games, both of these games have a significant role in developing children's physical fitness. Hop, skip, and jump race tends to focus more on developing basic motor skills such as coordination, leg muscle strength, and cardiorespiratory endurance. This game is effective for children who need to improve body balance and coordination between eyes and feet. On the other hand, running over hurdle is more effective in improving agility, reaction speed, and skills in controlling body movements when running and jumping over obstacles. Games involving obstacles, such as running over hurdle, tend to have a positive effect on the coordination and reflex abilities needed in many sports activities. However, both hop, skip, jump race and running over hurdle have the potential to develop a healthy competitive attitude in children, because both are usually carried out in the form of a race or competition. This competitive nature, if properly directed, can help students learn about the values of sportsmanship, cooperation, and the importance of hard work.

**KEYWORDS:** Games, Hop, Skip, Jump Race, Running Over Hurdle, Physical Education

### INTRODUCTION

Differences in the influence of game types on the physical fitness of elementary school students by considering gender are still very limited. Improvement of basic motor skills without considering variations in the types of game activities or differences in responses based on gender (Iwandana et al., 2018). This study attempts to fill this gap by exploring the advantages and disadvantages of the hop, skip, jump race and running over hurdle games in physical education, both for boys and girls. This study also attempts to provide new contributions to the development of game-based physical education by considering the needs and individual characteristics of students, so that each child can get optimal benefits from physical activity carried out at school (Iwandana et al., 2021).

The urgency of this study lies in the importance of compiling a more effective, inclusive, and responsive physical education program to the developmental needs of students. Furthermore, the urgency of this study is very high, considering the importance of physical fitness for child development. With the increasing levels of sedentary and obesity among children, there needs to be more effective interventions to encourage their involvement in physical activity. If it is found that one type of game is more effective for a particular gender, these results can be the basis for designing a more adaptive physical education program (Purnomo Shidiq et al., 2022).

This study is expected to provide insight for physical education teachers in determining learning methods that are not only fun, but also beneficial for improving students' physical fitness evenly and fairly. Amid the increasing phenomenon of sedentary behavior in children due to technological advances, the need to encourage fun and beneficial physical activity is becoming increasingly urgent (Tarigan et al., 2023). Given this, it is important to further examine the effect of different types of hop, skip, jump race and running over hurdle games on improving students' physical fitness, considering gender as a moderating variable.

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This study is expected to contribute to the world of physical education in Indonesia in designing learning methods that are more effective and responsive to individual differences. In addition, this study is expected to provide practical recommendations for physical education teachers in designing physical exercise programs that are not only varied, but also inclusive, to increase the active participation of all students in elementary schools (Rizky Adi Nugroho, Rima Febrianti, 2022).

Playing has a significant role in human life, which can affect psychological, physical, and social aspects. Through playing, several components of the psychological aspect can develop, such as intelligence, motivation, emotion, mental stability, self-confidence, interest, willingness, anxiety, aggressiveness, attention, and concentration (Utama, 2011). In addition, playing can also be used as a means of stimulating children's activities, so that it can improve children's physical fitness (Astini, 2017). Some game models that can be used to improve physical fitness include hop, skip, and jump race and running over hurdle. Hop, skip, and jump race is a series of short and fast jumping movements. Hop, skip, and jump race has benefits in encouraging children to increase the need for high-intensity physical activity in improving children's physical fitness (Driediger et al., 2018). Daily physical activity participation is very important for children's health and well-being. Along with the child's total daily physical activity.

Running over hurdle is a game that is done by sprinting by jumping over obstacles in the form of hurdles until reaching the predetermined finish line. Running over hurdle has benefits in improving children's physical fitness. This is in line with the results of research conducted by Aloui et al. (2021) reported that plyometrics and sprint programs, such as running over hurdles carried out for 8 weeks significantly increased strength, speed, balance, and anaerobic endurance in children. Research conducted by Li et al. (2023) reported that physical education interventions based on functional physical training, such as running over hurdles, can effectively promote several parameters of students' physical fitness, while providing new and alternative ideas for improving students' physical fitness in physical education.

By understanding the advantages and disadvantages of the hop, skip, jump race and running over hurdle games in physical education on students' physical fitness, physical education teachers can design programs that are more targeted and effective, and more attractive to both male and female students. This is important to create an inclusive learning environment and support the active involvement of all students.

### **RESEARCH METHODS**

The method used in this research is literature review research. This method was chosen because it aims to produce a new theory regarding the research topic by reviewing the results of previous research based on a theory that can be accounted for.

Literature review research is carried out to produce new, more up-to-date understanding, thoughts or theories regarding a problem being researched through reviewing the results of previous studies or research based on theories that can be accounted for, so it is not an assumption, argument or idea from the researcher. The purpose of a literature review is to provide an explanation of the reader's choices and reasoning by comparing the strongest research results with other studies (Harris, 2019). This research was conducted by reviewing articles related to the importance of physical literacy in children's physical education. Selecting the population as a sample used inclusion and exclusion criteria and applying Preferred Reporting Items for Systematic Reviews and Meta Analyses (PRISMA). Inclusion criteria are that the articles reviewed are research articles on physical literacy in children's physical education. Data collection was carried out using primary data sources in the form of similar articles with research titles that have been published. Data from similar research is processed through analysis and interpretation to produce conclusions as a new theory.

### **RESULTS AND DISCUSSION**

#### **A. Advantages and disadvantages of the hop, skip, and jump race game in physical education:**

1. Advantages of the Hop, skip, and jump race game
  - a. Increase muscle strength and body balance

The Hop, skip, and jump race game involves jumping and running movements that are effective in increasing leg muscle strength and body balance. According to Lubans et al. (2010), physical activities that involve jumping movements can help strengthen leg muscles and improve balance, which are important in the process of children's physical development. Jumping movements require stability and coordination, which in turn strengthen core muscles and increase endurance. In a recent study, Pitetti and Bone (2018) stated that jumping and stepping repeatedly can help build better bone density, especially during children's growth, thereby reducing the risk of osteoporosis in adulthood.

- b. Improve Coordination and Motor Skills

This game also plays an important role in honing children's motor coordination skills, especially coordination between the eyes and feet. Gallahue and Donnelly (2003) emphasized that basic motor skills, such as stepping and jumping, involve coordination

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between various muscle groups, which is very important in the development of fine and gross motor skills. This game also involves speed and accuracy, which helps students develop reflexes and the ability to respond quickly to various situations.

### **c. Improve Cardiorespiratory Fitness**

As an intense physical activity, Hop, skip, and jump race also improves cardiorespiratory fitness in children. Repetitive running movements require an increase in heart rate, which is good for heart and lung health. According to Tomporowski et al. (2008), high-intensity physical activity can increase children's cardiorespiratory capacity and endurance, which are important in maintaining body health and preventing metabolic diseases such as obesity. Research conducted by Hopkins et al. (2019) also found that activities such as jumping and running regularly help increase children's basal metabolism, which contributes to healthy weight management.

### **B. Develop a Healthy Competitive Attitude**

The Hop, skip, and jump race game is usually carried out in the form of a competition, where children race to reach the finish line. This can develop a healthy competitive attitude in children, which is important in character building. Morgan and Hansen (2008) noted that through competitive activities, students learn to appreciate the results of effort and accept defeat with sportsmanship. This is in line with the goals of physical education which not only focus on the physical aspect, but also the development of social and emotional values.

### **2. Disadvantages of Hop, Skip, and Jump Race Games**

#### **a. Potential for Injury to the Feet and Joints**

The Hop, Skip, and Jump Race game has a risk of injury, especially to the feet and joints, if not properly supervised. According to Pangrazi and Beighle (2010), activities that involve jumping and running are at risk of causing muscle or joint injuries if done without adequate warm-up or if the child does not have adequate basic skills. Ankle or knee injuries often occur in children who lack coordination or have balance disorders.

#### **b. Challenges for Children with Physical Disabilities**

This game may be less suitable for children with physical limitations or certain health conditions. Intense activities such as jumping and running can cause excessive fatigue in children with limited physical conditions, or even cause discomfort for them. Bailey (2006) suggests that physical games need to be adjusted to be inclusive of all students, including those with physical disabilities. In some cases, game adaptations may be needed so that children with special needs can participate.

#### **c. Requires Close Supervision to Reduce the Risk of Injury**

Without proper supervision, this game has the potential to pose a risk of injury due to its competitive and intense nature. Aloui et al. (2021) stated that teachers need to closely monitor any activities that involve intense movements such as jumping or running to ensure the safety of children. In addition, the use of uneven surfaces or inadequate fields can also increase the risk of injury during the game.

The Hop, skip, and jump race game each has advantages and disadvantages in the context of elementary school physical education. Both games are very effective in developing children's basic motor skills, muscle strength, and cardiorespiratory fitness. However, there is a risk of injury and limitations in accessibility, especially for children with special needs or certain physical limitations (Syahputra et al., 2017). Therefore, proper adaptation and supervision are essential in implementing these two games to ensure that all students can participate safely and get optimal benefits from this activity. To achieve the overall goal of physical education, it is important for teachers to consider various aspects related to safety, inclusive participation, and adapting the game according to student abilities. With the right adaptations, the Hop, Skip, and Jump race can be a fun and effective learning tool to improve the health and physical fitness of elementary school students, while building positive social skills and character in them.

### **c. Advantages and disadvantages of the Running Over Hurdle game in physical education:**

#### **1. Advantages of the Running Over Hurdle Game**

##### **a. Trains Agility and Reaction Speed**

The Running Over Hurdle game is very effective in training children's agility and reaction speed. The movement of jumping over obstacles requires the ability to adjust steps and maintain body balance while moving quickly. Lubans et al. (2010) stated that physical activities involving agility and changes in direction can help children improve reflexes and responses to environmental stimuli. This is very useful in improving fine and gross motor skills, which are important for long-term physical development.

##### **b. Increases Leg Muscle Strength and Stability**

Jumping over obstacles repeatedly involves the use of leg muscles and core muscles to maintain body stability. In a study conducted by Pitetti and Bone (2018), the activity of jumping over obstacles showed a significant increase in leg muscle strength and child postural stability. This movement of jumping over obstacles not only strengthens leg muscles, but also helps improve posture, especially in children who are still growing.



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### c. Encourages Healthy Cooperation and Competition

This game is usually played in groups, so that children learn to work together in a team and feel the benefits of healthy competition. According to Morgan and Hansen (2008), physical games played in teams help children develop social skills such as communication and group coordination. In addition, children also learn the importance of team support and cooperation to achieve common goals, which are important values in the formation of social character.

### d. Developing Cognitive Abilities through Quick Decision Making

The Running Over Hurdle game requires children to make quick decisions when facing obstacles. Hopkins et al. (2009) noted that games that require quick decision making can improve critical thinking skills and problem-solving abilities. Children are invited to think about the best way to jump over obstacles without falling, thus training their ability to strategize and consider risks.

## 2. Disadvantages of the Running Over Hurdle Game

### a. Risk of Injury from Obstacles

One of the main disadvantages of this game is the risk of injury if the obstacles are not set up safely. Aloui et al. (2021) emphasize the importance of using obstacles that can be knocked down or dropped safely to reduce the risk of injury to children. Obstacles that are too hard or too high can cause accidents, especially if the child loses balance or is unable to jump over the obstacles properly.

### b. Challenges for Children with Motor or Mobility Limitations

The Running Over Hurdle game requires agility and leg strength, which can be a challenge for children with motor or mobility limitations. According to Pangrazi and Beighle (2010), children who have motor disorders or physical limitations may find it difficult or even vulnerable to injury when they have to run and jump over obstacles. In the context of inclusive physical education, this game needs to be adapted so that it can be followed by all students. Modifications that can be applied, for example, are using lower obstacles or providing extra time for children who need adjustments.

### c. Requires Close Supervision

Like the Hop, skip, and jump race, the Running Over Hurdle game also requires close supervision from teachers or coaches to ensure the safety of children. Hopkins et al. (2009) noted that without proper supervision, children may try to jump over obstacles in an unsafe manner, potentially causing injury. Therefore, it is important for teachers to monitor each participant and provide clear instructions on how to jump over obstacles safely. In addition, it is necessary to ensure that all children run in the same direction to avoid collisions when jumping over obstacles.

### d. Limitations in Facilities and Equipment

The Running Over Hurdle game requires special equipment such as height-adjustable obstacles, as well as sufficient space to run. In some schools, limited facilities or sports equipment can be a barrier to implementing this game optimally. According to Gabbard (2008), limited facilities such as inadequate fields or equipment can affect the quality and safety of the implementation of this game. This also has an impact on student involvement who may be less enthusiastic if the game cannot be run properly.

### e. Causes a Sense of Lack of Confidence in Less Proficient Children

For some children, especially those with underdeveloped motor skills, the Running Over Hurdle game can be a source of anxiety or insecurity. According to Bailey (2006), children who feel left behind or less capable than their peers tend to have low motivation to participate in physical activities. In this game, children who often fail to jump over the hurdles may feel intimidated, thus reducing their motivation to actively participate in physical activities. To overcome this problem, teachers can provide positive reinforcement and adjust the height of the hurdles according to each child's ability.

## CONCLUSION

Based on the results of the study, it can be concluded that the advantages and disadvantages of the hop, skip, jump race and running over hurdle games, both of these games have a significant role in developing children's physical fitness. Hop, skip, and jump race tends to focus more on developing basic motor skills such as coordination, leg muscle strength, and cardiorespiratory endurance. This game is effective for children who need to improve body balance and coordination between the eyes and feet. On the other hand, running over hurdle is more effective in improving agility, reaction speed, and skills in controlling body movements when running and jumping over obstacles. Games that involve obstacles, such as running over hurdle, tend to have a positive effect on the coordination and reflex abilities needed in many sports activities. However, both Hop, skip, jump race and running over hurdle have the potential to develop a healthy competitive attitude in children, because both are usually carried out in the form of races or competitions. This competitive nature, if properly directed, can help students learn about the values of sportsmanship, cooperation, and the importance of hard work.



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## Mapping Research Development in Library Tourism: A Bibliometric Review



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**ABSTRACT:** This study aims to map the development of research in the field of library tourism over the past decade (2014-2024) using bibliometric analysis. Data was collected from Google Scholar using the Publish or Perish application, where metadata was stored in RIS format and analysed using VOS viewer for visualisation. A total of 21 articles were identified, covering key aspects such as publication trends, influential authors, journals, institutions, and thematic patterns. The results showed fluctuations in library tourism research trends, with a significant increase in the number of publications in 2023. The main themes found include library-based tourism destination development, visitor satisfaction, and the role of libraries in community empowerment. Terms such as 'development,' 'destination,' and 'satisfaction' emerged as dominant keywords, reflecting the focus on developing library tourism as a unique cultural and educational experience. The visualisations also revealed areas that could be further explored, including the integration of innovative technologies and more in-depth community-based approaches. This research provides a comprehensive overview of the field, identifies research gaps, and offers insights for the development of library tourism as a multidisciplinary research domain.

**KEYWORDS:** Library, Tourism, Bibliometric, Mapping Research, Library Services

### I. INTRODUCTION

Library tourism is a concept that integrates libraries into the tourism industry, making libraries a tourist destination that offers educational and recreational experiences for visitors (1). Libraries not only serve as repositories of knowledge, but also attract tourists who want to know about their history, design, and cultural values. Over time, libraries have become an important part of cultural tourism, offering a unique experience that combines education, history, and community engagement. This concept not only aims to increase interest in literacy and reading culture, but also to attract tourists by offering unique experiences that cannot be found elsewhere (2). Tourism-integrated libraries are often designed with attractive features, such as cultural exhibition spaces, rare literature collections, creative areas, reading gardens, or interactive digital technologies that can be used by visitors from different backgrounds (3).

Despite increasing attention to libraries as tourist attractions, there is limited research that systematically maps the development of this field. Existing studies generally focus on cases or specific themes, without providing a comprehensive overview of global research in this area. Therefore, a comprehensive bibliometric analysis is needed to understand the progress, challenges, and opportunities in library tourism-related research. Bibliometric studies are important to systematically analyse and understand the research landscape in library tourism. By tracing patterns, trends, and key contributors, it provides an in-depth insight into the development of this multidisciplinary field. The bibliometric review also helps identify influential studies, emerging themes, and gaps in research, which can guide future research.

This study aims to provide a comprehensive understanding of the development of research related to library tourism. One of the main objectives is to identify trends and developments in studies in this field over time, including publication patterns and thematic evolution. It also maps key contributors, such as influential authors, journals, and institutions in the field, to understand who plays a major role in the development of related literature. Moreover, thematic patterns and keyword occurrences in previous studies were analysed to reveal the focus and frequent topics. Furthermore, this research aims to highlight gaps in the existing research, to provide recommendations for future research directions that are more relevant and impactful.

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Previous research using bibliometric analysis has been conducted in various fields, such as hospitality industry (4), archiving (5), Mathematical Communication Ability and Self-Concept (6) and so on. However, a specific exploration to identify research trends related to library tourism has never been done in depth. Most of the previous studies focused more on case studies, qualitative analysis, or theory development without using a systematic quantitative approach such as bibliometrics. Therefore, this study aims to fill the gap by mapping patterns, trends, and relationships in library tourism literature, making a significant new contribution to this field of study.

### II. METHOD

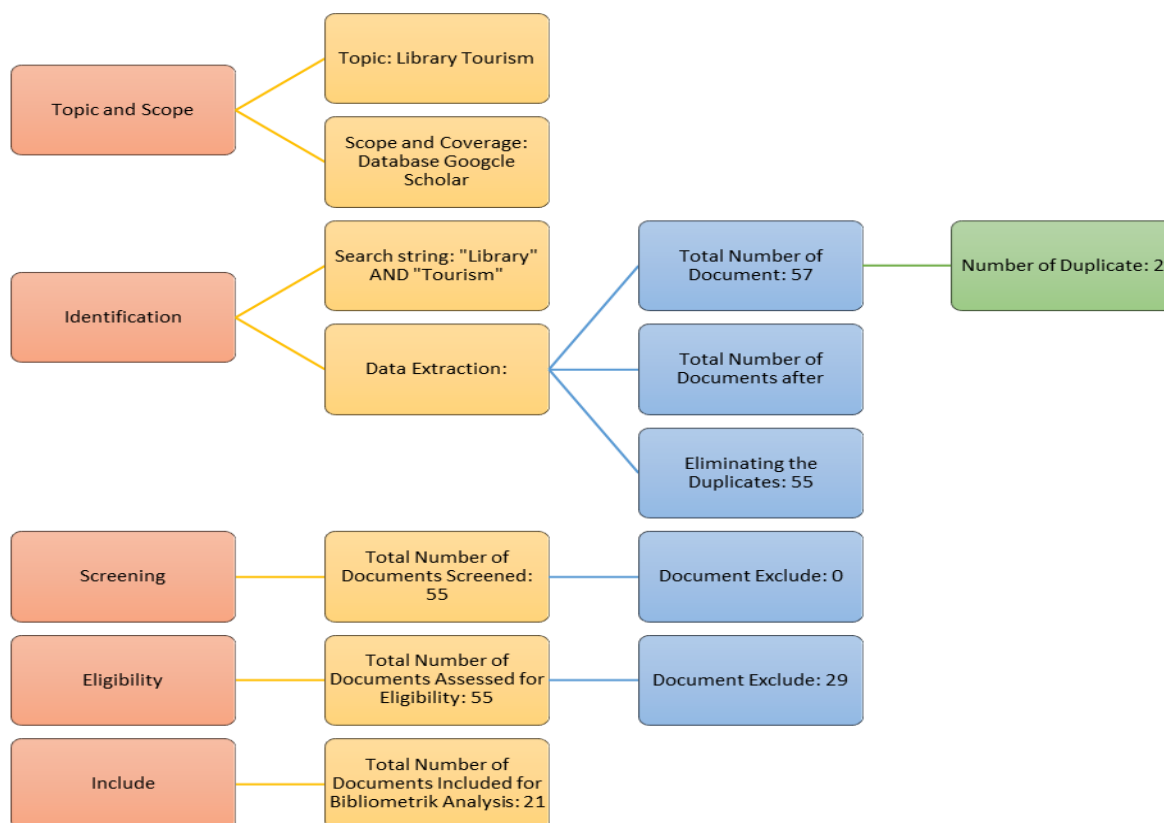
This study used the bibliometric analysis method, which is a quantitative approach to analysing scientific publication data. This analysis aims to identify patterns, trends and relationships in the literature relevant to the research topic (7). By using bibliometrics, this study can provide in-depth insights into the development of research related to library tourism, including thematic trends, collaboration between authors, and the evolution of the field of study. According to Moher et al. (2009), to ensure that the data obtained is more perfect, there are several stages that need to be carried out, namely: identification process, data screening, eligibility assessment, and inclusion stage (8).

Data were identified from the Google Scholar database using the Publish or Perish software. The search process was conducted with the keyword 'library tourism,' covering the research period from 2014 to 2024. The data collected included important metadata such as article title, author name, journal, year of publication, number of citations, and related URLs. This resulted in 21 articles relevant to the research topic.

The identified data was then filtered to ensure only articles that fit the research criteria were used. Filtering was done by sorting the articles by publication year (2014-2024) and ensuring each article was relevant to the topic of library tourism. Articles that did not fulfil the criteria were excluded from the analysis.

Articles that passed the screening were checked for eligibility based on the quality of the downloaded metadata, such as clarity of title, author, and journal information. The data format was then adapted to the RIS (Research Information Systems) standard to facilitate management and analysis.

Articles that met the eligibility criteria were included in the bibliometric analysis stage. The formatted data was visualised using VOS viewer software to map the relationships between keywords, authors, and publications. This visualisation enabled the identification of important patterns, such as thematic trends, inter-author collaboration, and dominant themes in library tourism research.



Gambar 1. Proses Pengumpulan Data

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### III. RESULT AND DISCUSSION

#### A. Publication data about Library Tourism

Based on data collected using the Publish or Perish application with the keyword 'library tourism' for the period 2014-2024, 21 scientific articles were found. The metadata collected includes information such as author name, article title, year of publication, journal name, publisher, number of citations, connections between journals, and related URLs. Overall, these articles have received a total of 42 citations. The average citations received each year was 4.20 citations, while the average citations per article was 2.00 citations. The average number of authors per article was found to be 42.00. In addition, these articles have an average h-index of 3, which indicates that there are at least 3 articles that have received 3 citations each. The higher g-index of 6 indicates that there are 6 articles with more distributed citations.

Once the data was collected, we filtered and processed it using Microsoft Excel. The processed data was then saved in CSV format to facilitate further analysis. Filtering was done by sorting the articles by publication year, starting from the lowest year (2014) to the highest year (2024). The selection of this timeframe was based on the research focus on research developments in the last 10 years (2014-2024). This ensures that the study only covers relevant and current literature.

The results of this bibliometric analysis show that although the number of articles in the field of library tourism is still limited, they have a moderate citation rate, reflecting their relevance in related research. The h-index and g-index provide an overview of the impact of these articles, with consistent contributions from several key articles. This signals the potential for further developments in research in this area.

**Table 1. Trend Penelitian Library Tourism**

No	Year	Author	Title	Sources	Citation
1	2024	Khaydarova, S., Khujamova, Y., Toshbaeva, M., Muhitdinov, D., Mamanazarova, G., Tukhtakulova, O., & Karimov, N.	The Vital Role of Libraries in Enriching Tourism Experiences	Indian Journal of Information Sources and Services, 14(2), 11–16.	17
2	2023	Ying Ke; Hong Yilin; Zhang Yan; Lu Xiaomei;	Library IP construction empowers the path selection of cultural and tourism integration development	Journal of Library and Information Science in Agriculture	1
3	2023	Sinha, R., Batabyal, D., Bagchi, G., & Selem, K. M.	Establishing the Nexus Between Library and Tourism: An Empirical Approach	Journal of Quality Assurance in Hospitality & Tourism, 1–4.	5
4	2023	Lončarić Šubaša, T., & Blažeković, I.	Public libraries of Bjelovar-Bilogora County and cultural tourism	Journal of Croatian Librarians, 66 (3), 205–225.	0
5	2023	Xu, ZhaoPeng., Juyuan, Duan Juanjuan.	Research on the cooperation model between university libraries and social organizations to enable the integrated development of culture and tourism	Journal of Library and Information Science in Agriculture	0
6	2022	Dominique Brégent-Heald	The Canadian Travel Film Library: Non-Theatrical Distribution and Tourism Promotion in the Post-war Period	Canadian Journal of Film Studies Vol. 31, No. 2	0
7	2021	D.Y. Reindrawati	Library as a Survival Effort for a Tourism Village in the Pandemic Era: A Case Study in Kampung Lawas Maspati Surabaya	Library Philosophy and Practice	1

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8	2021	Y. Pan	Towards better library services: an investigation of factors affecting tourists' satisfaction with library + cultural tourism	Electronic Library 39 (5)	3
9	2020	Ma Xiangtao	Analysis on the development of cultural and creative products in libraries under the background of cultural and tourism integration	Journal of Library and Information Science in Agriculture	1
10	2020	Y.Yun	Analysis on cases of public library service innovation under the background of cultural and tourism integration	Journal of Library and Information Science in Agriculture	1
11	2020	Ma Xiangtao	Exploration of cultural and creative products in Libraries under the Background of Cultural and Tourism Integration	Journal of Library and Information Science in Agriculture	1
12	2020	Z. Liang	Reading Strategies in Tourist Attractions Guided by Cultural Tourism Integration: Illustrated by the case of Scenic Spots Community Libraries in Yueyang Tower District and Junshan District	Journal of Library and Information Science in Agriculture	0
13	2019	H. Wee	Eco-tainment digital library and leisure tourism: A practical approach for generation Z	International Journal of Recent technology and engineering 8 (1), pp 183-187	1
14	2019	L. Seifi	The role of Iran public libraries in development and promoting of tourism services	Library Philosophy and Practice	0
15	2018	K. Tokic	Tourism potential of libraries	Tourism 66 (4), pp 443-460	7
16	2018	S. Lallani	Tourism Marketing Collections Duke University's David M. Rubenstein Rare Book Amp; Manuscript Library	Journal of Tourism History 10 (3), pp 266-268	0
18	2017	K. Toxic	The Informational function of libraries in tourism: the case study of Croatia	Vjesnik Bibliotekara Hrvatske 60 (4), pp 125-146	2
19	2016	F. Alaeddinoglu	Erratum to: Nature-Based Tourism in Turkey: The yayla in Turkey's Eastern Black Sea Region	Alternative Tourism in Turkey, GeoJournal Library 121	0
20	2016	A. Montan	The Role of University Libraries in Scientific Communication: Research of the library users at the Faculty of Tourism and Hospitality Management in Opatija	Vjesnik Bibliotekara Hrvatske	0
21	2015	V. Saydam	In the terms of interior and exterior space inquiry of the	Mili Egtim 1 (208), pp 61-75	1

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			public and children libraries affiliated with ministry of culture and tourism in Istanbul
22	2014	K. Toxic	Content analysis of the Croatian tourism library websites in relation to the information literacy

Based on Library Tourism research trend data from 2014 to 2024, there are fluctuations in the number of publications each year. The peak number of publications occurred in 2023 with 4 articles, followed by 2020 and 2018 which each had 3 articles. Meanwhile, the years with the lowest number of publications, namely only 1 article, occurred in 2014, 2015, 2022, and 2024. This pattern shows that research interest in Library Tourism tends to increase in certain periods, especially in the last five years, which may reflect the growing relevance and attention to this topic. However, the decline in 2024 suggests that there is further research potential that could be explored in the future.

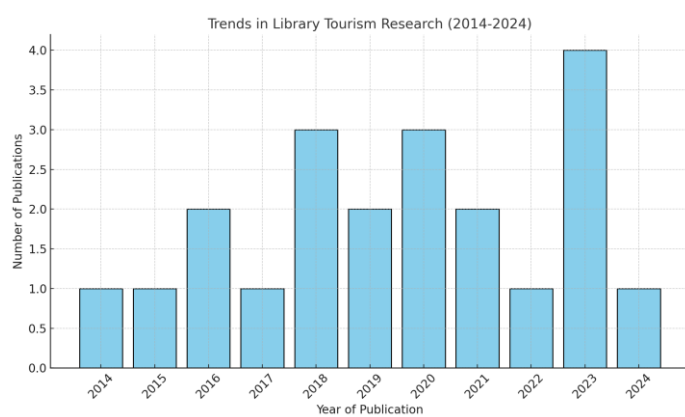


Figure 1. Diagram Trend Library Tourism Research

### B. Visualiation of Tourism Research Library Trends

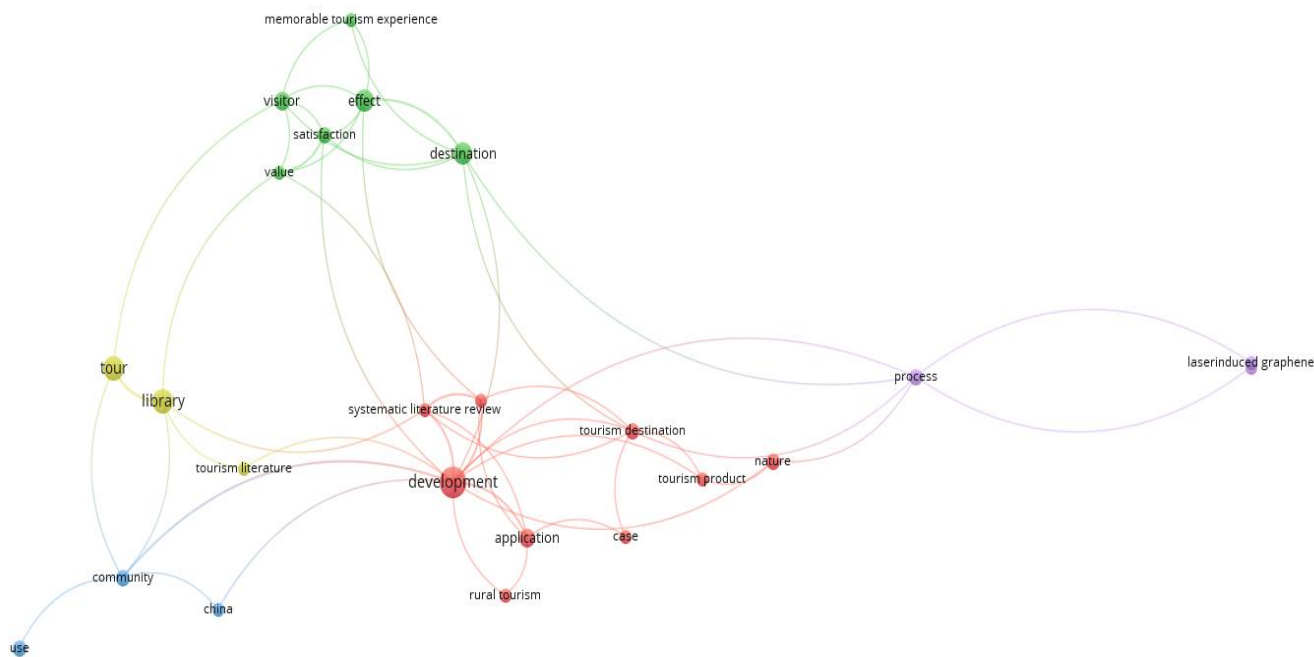


Figure 2. Bibliometric Network Visualisation of Library Tourism Research

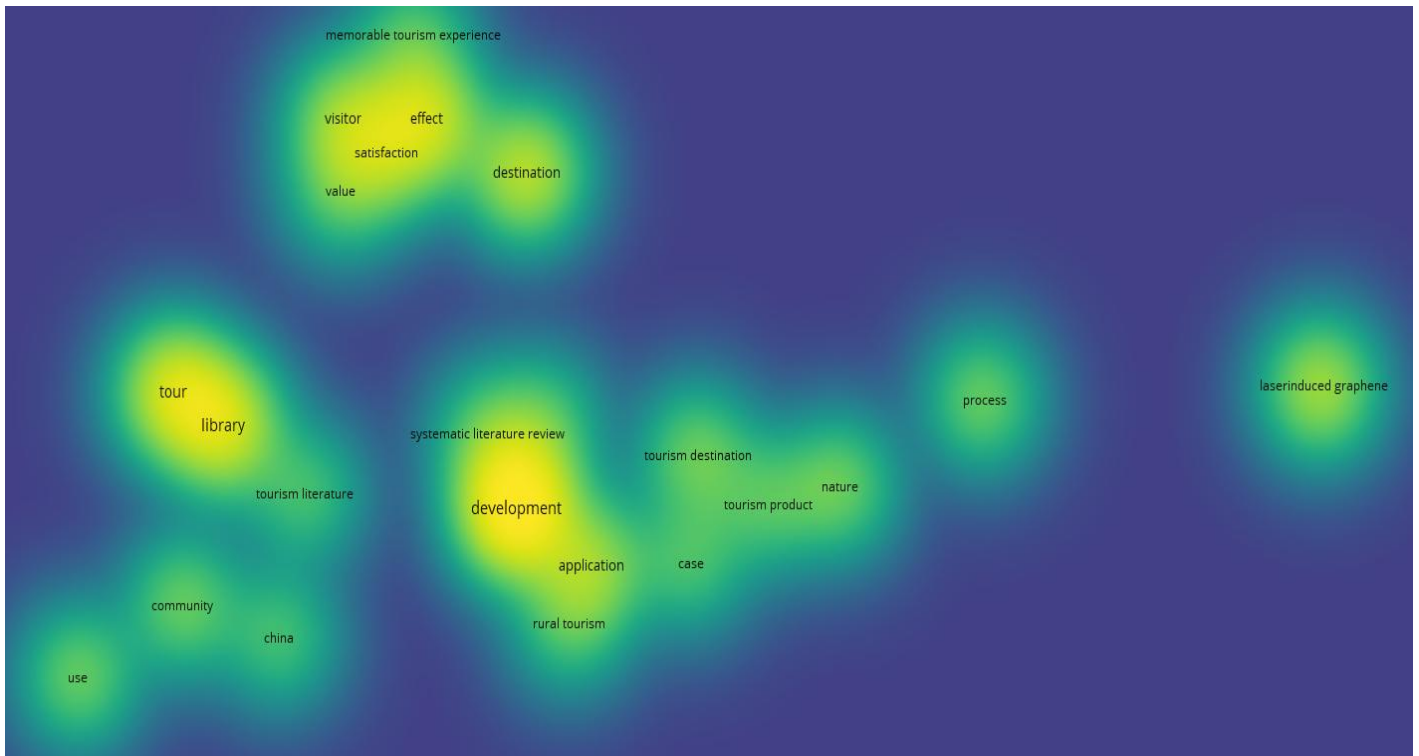
In the Green Cluster (Visitor Experience and Satisfaction), there is a focus on travellers ‘experience, satisfaction, and perceived value when visiting tourist destinations, including libraries. Keywords such as ‘visitor,’ ‘effect,’ and ‘destination’ indicate research





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induced graphene,' although their relevance to library tourism still requires further exploration. Overall, the research continues to evolve with the focus shifting from traditional concepts to strategic and technological innovations.



**Figure 4. Library Tourism Research Bibliometric density visualisation**

Based on the density visualisation, the terms with lighter yellow intensity, such as 'development,' 'library,' and 'destination,' indicate the most frequently discussed research themes in Library Tourism. The term 'development' takes centre stage, reflecting the primary focus on developing library-based tourism destinations. In addition, themes related to the tourist experience, such as 'visitor,' 'satisfaction,' and 'effect,' also show significant attention to the impact of library tourism on visitors. Terms with lower intensity, such as 'process' and 'laser-induced graphene,' indicate relatively new or less explored areas of research. This visualisation illustrates that research in this field is centred on tourism development and experiences, but there is still room to explore new innovations and themes.

### IV. CONCLUSIONS

This research successfully mapped the development of research related to Library Tourism in the period 2014-2024 using a bibliometric approach. The results show that the number of publications in this field fluctuates, with a peak in 2023. The main themes identified include library-based tourism destination development, traveler experience and satisfaction, and the library's contribution to the community. Terms such as 'development' and 'destination' took center stage, reflecting the research focus on strategic innovations to enhance the tourism appeal of libraries. In addition, visualization analysis showed a close relationship between tourist experience and destination development, while some technological themes such as 'laser-induced graphene' still require further exploration. The research also identified key contributors, including authors, journals and institutions that played a role in the development of this literature. As such, it not only provides a comprehensive overview of Library Tourism research trends and patterns, but also highlights research gaps that could be explored in the future, such as more in-depth application of community-based technologies and approaches. The findings can guide researchers and practitioners to develop new studies and strategies in promoting libraries as unique tourism destinations.

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## SWOT Analysis of the Innovative Development of Museums in Weifang, China



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**ABSTRACT:** As an integral facet of urban culture, museums act as guardians to showcase our historical and cultural heritage and embody the profound soft power that enriches urban identity. Weifang, an important prefecture-level city in Shandong Province, has many historical and cultural resources. In light of the rapid expansion of the cultural industry, museum development in Weifang has made remarkable advancements in recent years. Nevertheless, amid intensifying competition within the cultural marketplace, discovering pathways for the museum's innovative development has emerged as an urgent challenge warranting our focused attention. This paper utilizes the SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis framework to delve into the strengths, weaknesses, opportunities, and threats associated with innovative museum development in Weifang while proposing relevant countermeasures and recommendations to foster sustainable growth for museums within this vibrant city.

**KEYWORDS:** Weifang; Museum; Innovative development; SWOT analysis

### I. INTRODUCTION

As an essential palace for protecting and inheriting human civilization, museums bridge the past, present and future [1-3]. In recent years, with the cultural industry's rapid development and the people's growing demand for spiritual culture, museums have ushered in unprecedented development opportunities [4-5]. As an important city in the Shandong Peninsula city cluster, Weifang has rich cultural resources and historical deposits, providing unique conditions for museum development.

By April 30, 2024, Weifang has 62 museums of various types. These museums cover multiple fields, including history, culture, art, and science and technology, showcasing rich local features and cultural depth. Regarding spatial distribution, museums in Weifang exhibit an uneven distribution with multiple concentration centres (Figure 1). For example, some large comprehensive museums in the central city area display local historical relics and regularly hold various temporary exhibitions to attract more tourists and citizens. Additionally, specialized smaller museums tend to cluster around specific industries or themes—such as agriculture and handicrafts—typically situated in regions where these related sectors are well-developed.

However, in the development process, museums in Weifang face challenges and constraints that can hinder their growth and effectiveness [6]. These challenges include limited financial resources, which restrict the ability to invest in new exhibitions, educational programs, and technological advancements. Additionally, there may be a lack of trained personnel with the necessary skills to manage modern museum operations effectively. Furthermore, competition from other cultural institutions and entertainment options can divert public interest from museums. This situation is compounded by insufficient marketing strategies that fail to promote museum offerings to diverse audiences adequately. The physical infrastructure of some museums may also require upgrades or renovations to meet contemporary standards for accessibility and visitor engagement. Moreover, collaboration with local communities and schools might not be fully realized due to varying levels of awareness about the value of museums as educational resources. As a result, these factors collectively pose significant obstacles that need addressing for Weifang's museums to thrive within an increasingly competitive cultural landscape.

Therefore, this work adopts the SWOT analysis model to comprehensively analyze the internal and external conditions of the museum's innovative development in Weifang to put forward scientific development strategies and practical guidance. SWOT analysis is a strategic management tool to assess a project, organization, or individual's strengths, weaknesses, opportunities, and

## SWOT Analysis of the Innovative Development of Museums in Weifang, China

challenges. By evaluating these four aspects, SWOT analysis helps decision-makers better understand the current situation and potential of the project or organization and formulate corresponding strategies and action plans [7-10].

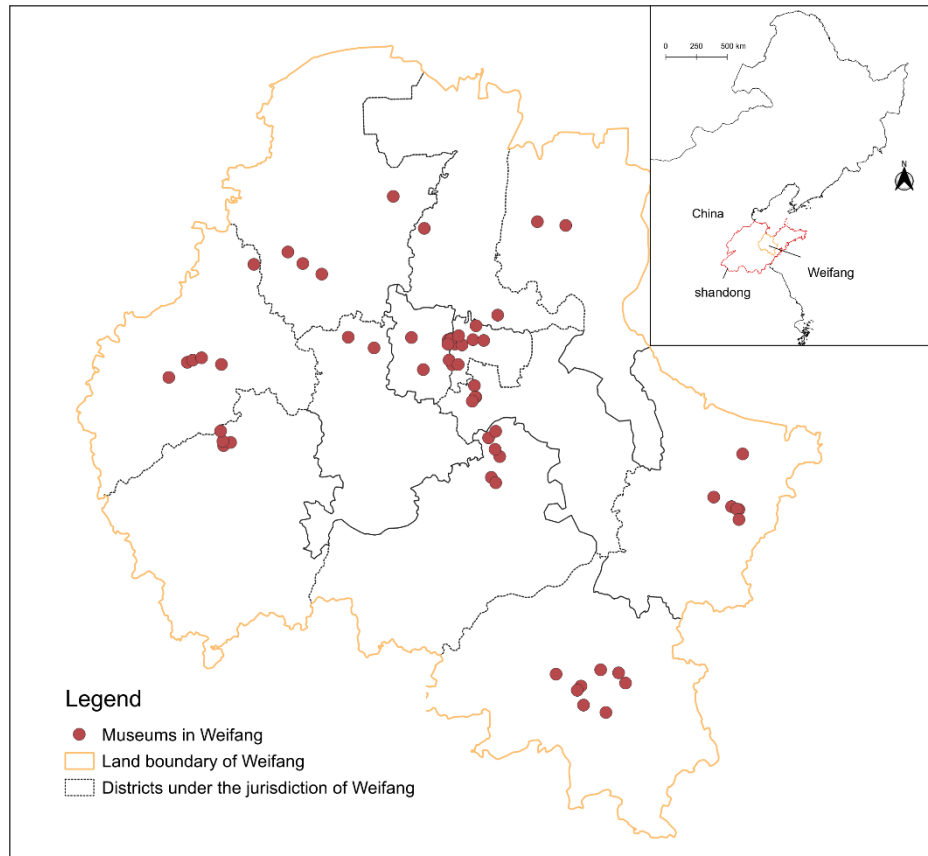


Figure 1: The Distribution of Museums in Weifang, China

## II. INTERNAL AND EXTERNAL FACTORS

### A. Strengths

**1) There Is a Prosperous Cultural Heritage:** Weifang has rich cultural resources and historical deposits, which provide a solid foundation for the development of museums. Weifang has many immovable cultural relics and cultural relics in collections, including national and provincial cultural relics protection units and many historical relics and works of art with local characteristics (Table 1). These cultural resources not only provide rich materials for the exhibition and display of the museum but also provide a strong guarantee for the cultural connotation and attraction of the museums [6, 11].

**2) The Brand Building Has Begun to Bear Fruit:** Weifang has made some achievements in constructing the museum brand. In recent years, Weifang's Museum has continuously enhanced its popularity and influence by strengthening academic research, improving exhibition quality and enriching cultural activities [12-13]. At the same time, Weifang also actively introduces excellent exhibition projects and technical means at home and abroad to enhance the museum's exhibition level and cultural connotation. These efforts have laid a good brand foundation for the museum's innovative development of Weifang (Table 1).

**3) The Substantial Support Provided by a Robust Economic Foundation:** Weifang, an important city in the Shandong Peninsula city cluster, has strong economic strength, providing solid financial support for the museum's innovative development [11-12]. With the rapid growth of Weifang's economy and the acceleration of the urbanization process, the people's demand for spiritual culture is growing daily, providing a broad development space and market potential for museums. At the same time, the Weifang Municipal government also attaches great importance to the development of the cultural industry, increases the investment and support for the museum, and provides a good policy environment and financial guarantee for the innovative development of museums (Table 1).

### B. Weaknesses

**1) The Internal Structure of the Industry Is Unreasonable:** There are unreasonable phenomena in the internal structure of the museum development in Weifang. Currently, the investment of cultural enterprises in Weifang is mainly limited to traditional and low-end cultural industries, and there is a severe homogenization phenomenon. For example, problems such as the similarity of souvenirs in scenic spots and the single service products are more prominent. This unreasonable industrial structure limits the

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overall benefit and competitiveness of the museum's innovative development and fails to meet the people's demand for diversified and high-quality cultural products (Table 1).

**2) The Cultural Connotation Is Not Explored Enough:** The museums in Weifang need to be strengthened regarding cultural connotation excavation. Although Weifang has rich cultural resources and historical deposits, the existing museum projects are not deep enough to excavate the connotation of resources. Some museums lack innovation and features in exhibition and display, making it challenging to attract the attention and interest of the audience [6]. At the same time, some museums have deficiencies in cultural communication and educational functions, making it difficult to fully play their role as an important carrier of cultural inheritance and development (Table 1).

**3) There Is a Shortage of High-End Talent:** There is a shortage of high-end talent in the museum's innovative development of Weifang. With the rapid growth of the museum and the people's growing demand for spiritual culture, the demand for museum professionals is becoming increasingly urgent. However, at present, the cultural industry talent team in Weifang cannot meet the requirements of the rapid development of the industry in terms of quantity, structure and level. In particular, the lack of senior management and innovation talents who understand management can develop and operate well, as well as senior management talents who can integrate cultural resources, industrial capital, and financial capital, restricts the overall level and competitiveness of the museum's innovative development (Table 1).

### C. Opportunities

**1) The Government Prioritizes Cultural Industries:** In recent years, the Weifang Municipal government has attached great importance to developing the cultural sector and regards it as an essential starting point for promoting economic transformation, upgrading, and improving quality and efficiency. The government has issued a series of policies and measures to increase investment and support for the development of the cultural industry, providing a good policy environment and market opportunities for the innovative development of museums. At the same time, the government actively promotes the integrated development of the cultural industry with tourism, education, and other sectors, which provides a broader development space and market potential for the innovative development of museums (Table 1) [6, 11].

**2) The Potential Market Demand Is Enormous:** With people's growing demand for spiritual culture and the acceleration of consumption upgrading, the market demand for cultural industries is constantly expanding (Table 1). As an important city in the Shandong Peninsula city cluster, Weifang has a considerable consumer group and strong market demand. That provides a broad market space and growth potential for the innovative development of museums. At the same time, with the rapid development of tourism and the diversification of people's travel modes, Weifang Museum is also facing more tourists and audience resources, which provides more development opportunities for the innovative development of museums [12].

**3) The Country Opens Up to the Outside World:** With the continuous improvement of the country's opening to the outside world and the deepening of the "Belt and Road" initiative, the museum's innovative development in Weifang faces more opportunities for international cooperation and exchange. Weifang can actively introduce foreign advanced museum management ideas and technical means to improve the museum's exhibition level and cultural connotation. At the same time, it can strengthen cooperation and exchanges with foreign museums, jointly plan and hold cross-border exhibitions and activities, and enhance the international visibility and influence of the museums in Weifang (Table 1).

### D. Threats

**1) Fierce Competition in Surrounding Towns:** The museum's innovative development in Weifang faces fierce competition from the surrounding towns. With the rapid growth of the cultural industry and the growing demand of the people for spiritual culture, the surrounding towns have also increased their investment and support for the museum [6]. Some cities have achieved remarkable results in museum construction, exhibition quality, cultural activities and other aspects, which has put a certain competitive pressure on the museum's innovative development in Weifang (Table 1).

**2) The Impact of Foreign Culture:** With the acceleration of globalization and the popularization and application of the Internet, foreign culture has a specific impact on the museum's innovative development of Weifang. Through advanced management ideas and technical means, some foreign museums have improved their exhibition level and cultural connotation, attracting the attention and participation of many visitors and tourists. At the same time, some foreign cultural products also enter the Chinese market through the Internet and other channels, which impacts explicitly the cultural products and market share of museums in Weifang (Table 1).

**3) The Fund Is Tight, and the Investment Structure Is Low-End:** There is a shortage of funds in the museum's innovative development of Weifang. Due to a lack of funds, it is difficult for some museums to carry out high-quality exhibitions and cultural activities [6]. At the same time, some museums are low-end in terms of investment structure and lack input and support for high-end cultural industry projects. The shortage of funds and the low-end investment structure limit the overall benefits and



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competitiveness of the museum's innovative development and make it challenging to meet the people's demand for diversified and high-quality cultural products (Table 1).

### III. STRATEGIC SUGGESTIONS

#### A. Accelerate the Construction of Characteristic Museum Development Pattern

**1) Promote the Development of Comprehensive State-Owned Museums:** Weifang should enhance the development and management of state-owned comprehensive museums to elevate their exhibition standards and cultural significance. These institutions' overall capacity and competitiveness must be bolstered through increased investment, improved infrastructure, and the integration of advanced technological methodologies. Simultaneously, it is imperative to strengthen these museums' oversight and evaluation processes (Table 1).

**2) Cultivate and Develop Non-State-Owned Museums:** Weifang should cultivate and advance non-state-owned museums while encouraging the engagement of social entities in museum initiatives. By implementing preferential policies and providing financial incentives, it is essential to guide private capital towards investment in museum development and management. Concurrently, enhancing the oversight and regulation of non-state-owned museums is crucial to ensure their adherence to relevant laws and standards (Table 1).

**3) Prioritize the Development of Museum-Like Venues:** Weifang should actively promote the incubation and cultivation of museum-like venues and strengthen the cultivation and support of emerging cultural formats. By maintaining the planning guidance and policy support for the cultural industry, the city should promote the rapid development and expansion of the museum. At the same time, the supervision and evaluation of such museums should also be strengthened to ensure that they meet the relevant regulations and standards (Table 1).

**Table 1. SWOT Matrix Analysis of The Museum Innovative Development in Weifang**

	STRENGTHS	WEAKNESSES
	S1: There is a prosperous cultural heritage. S2: The brand building has begun to bear fruit. S3: The substantial support provided by a robust economic foundation.	W1: The internal structure of the industry is unreasonable. W2: The cultural connotation is not explored enough. W3: There is a shortage of high-end talent.
OPPORTUNITIES	STRENGTHS + OPPORTUNITIES	WEAKNESSES + OPPORTUNITIES
O1: The government prioritizes cultural industries. O2: The potential market demand is enormous. O3: The country opens up to the outside world.	S1.S2.O1.O2.O3: Accelerate the construction of characteristic museum development patterns, such as promoting the development of comprehensive state-owned museums, cultivating and developing non-state-owned museums, and prioritizing the development of museum-like venues.	W1.W2.O1.O2: Make every effort to improve the level of public services, such as planning and launching quality exhibitions, promoting the informatization of museum resource management, and strengthening social education and cultural communication.
THREATS	STRENGTHS + THREATS	WEAKNESSES + THREATS
T1: Fierce competition in surrounding towns. T2: The impact of foreign culture. T3: The fund is tight, and the investment structure is low-end.	S3.T1.T3: Expand financing channels and fund guarantees, such as increasing government input, expanding social financing channels, and exploring diversified profit models.	W2.W3.T3: Strengthen the training and introduction of talents, such as cultivating a contingent of professional personnel, introducing high-end talents, and establishing a talent incentive mechanism.

#### B. Make Every Effort to Improve the Level of Museum Public Services

**1) Plan and Launch Quality Exhibitions:** Museums in Weifang should strengthen the planning and launching of exhibition projects to improve the quality and level of exhibitions. By digging deeply and displaying Weifang's cultural heritage and historical stories, we should create exhibition projects with local characteristics. Simultaneously, it would be beneficial to strengthen

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exchanges and cooperation with domestic and international museums, introduce outstanding exhibition projects and technical resources, and enhance exhibitions' quality and cultural significance (Table 1).

**2) Promote the Informatization of Museum Resource Management:** Museums in Weifang should enhance the management of resources and the development of information systems. We can effectively manage and utilize cultural relics resources by establishing a comprehensive cultural relics resource library and a digital management system. Additionally, it is important to promote the development of digital products for museums, improve their quality and standards, and cater to the community's diverse needs (Table 1).

**3) Strengthen Social Education and Cultural Communication:** Museums should enhance their role in social education and cultural communication. By organizing various social and educational activities and cultural exchange programs, museums can increase their popularity and influence. Additionally, it is essential to strengthen cooperation and collaboration with schools, communities, and other institutions to promote the outreach and expansion of museum resources at the grassroots level (Table 1).

### C. Strengthen the Training and Introduction of Talents

**1) Cultivate a Contingent of Professional Personnel:** Weifang should strengthen the training of museum professionals. Through cooperation with universities, research institutions and other ways to carry out personnel training programs, cultivate a group of museum talents with professional quality and innovative ability. It is imperative to enhance existing talents' training and education to elevate their professional competence and overall capability (Table 1).

**2) Introduce High-end Talents:** Weifang should actively introduce high-end talents at home and abroad to provide a talent guarantee for the innovative development of museums. By introducing preferential policies and providing a good working environment, Weifang should attract more high-end talents to engage in the museum business. At the same time, the assessment and management of introduced talents should be enhanced to ensure they fulfil their expected roles and maximize their potential value (Table 1).

**3) Establish a Talent Incentive Mechanism:** Weifang should establish a perfect museum talent incentive mechanism to stimulate the enthusiasm and creativity of talents. By setting up reward funds and providing promotion opportunities, talents should be encouraged to innovate and develop in the museum career. At the same time, efforts should be intensified to provide care and support for talents, fostering an excellent working atmosphere and cultural environment (Table 1).

### D. Expand Financing Channels and Fund Guarantee

**1) Increase Government Input:** Weifang should increase the investment in the museum cause and improve the government's support for the museum's innovative development. By setting up special funds and providing financial subsidies, the city should give financial guarantees for the construction and management of the museum. Enhancing the supervision and evaluation of fund utilization is imperative to ensure their effective allocation and maximize the resultant benefits (Table 1).

**2) Expand Social Financing Channels:** Weifang should actively introduce high-end talents at home and abroad to provide a talent guarantee for the innovative development of museums. By introducing preferential policies and providing a good working environment, Weifang should attract more high-end talents to engage in the museum business. Simultaneously, the assessment and management of introduced talents should be enhanced to ensure they fulfil their expected roles and maximize their potential contributions (Table 1).

**3) Explored Diversified Profit Models:** Museums in Weifang should actively explore diversified profit models to improve their profitability. It should increase its income sources by developing cultural and creative products, holding cultural activities and providing customized services. Internet technology can be used to carry out new businesses, such as online exhibitions and online education, to expand museums' market space and profit channels (Table 1).

## IV. CONCLUSIONS AND PROSPECTS

Through the SWOT analysis of the innovative development of museums in Weifang, this paper comprehensively analyses its internal and external conditions and development opportunities and challenges. Weifang has rich cultural resources and historical deposits, providing unique conditions for the museum's innovative development. However, it also faces some challenges and constraints in the development process. This paper proposes countermeasures to promote the smooth museum innovative development in Weifang, such as strengthening resource integration and sharing, improving service quality and cultural connotation, and expanding financing channels and fund guarantees.

The innovative development of museums in Weifang will show a more diversified and integrated trend. On the one hand, with the rapid growth of the cultural industry and the increasing demand of the people for spiritual culture, Weifang Museum will pay more attention to improving service quality and cultural connotation, providing more personalized and customized services to

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meet the diversified needs of the audience. On the other hand, museums in Weifang will strengthen the exchanges and cooperation with domestic and foreign museums, promote the effective integration and sharing of resources, and improve overall efficiency and competitiveness. At the same time, with the continuous development and innovation of science and technology, Weifang Museum will actively explore the application and promotion of new technologies and new means in museums to provide visitors with a more convenient, efficient and intelligent cultural experience.

To sum up, the museum's innovative development in Weifang has broad prospects for growth and huge market potential. By implementing strategies such as strengthening resource integration and sharing, improving service quality and cultural connotation, expanding financing channels and fund security, museums in Weifang will continuously enhance their visibility and influence and provide a more colourful cultural experience and spiritual enjoyment for the people.

### ACKNOWLEDGMENT

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## Empowering EFL Students' Reading Comprehension Abilities with Quizwhizzer



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**ABSTRACT:** Proficient reading comprehension is a fundamental ability to acquire language acquisition in English language learning. However, the level of reading comprehension among students in Indonesia remains inadequate because of paper-based learning methods. Integrating game-based media in teaching reading comprehension can hold great potential for enhancing reading comprehension. Thus, the study's objective was to address whether QuizWhizzer, a game-based learning platform, can impact EFL students' reading comprehension skills. The research employed a quasi-experimental approach, utilizing both experimental and control classes. This research recruited 45 seventh-grade students from a private Junior High School in Surabaya, selected using purposive sampling. They were assigned to the control class, which consisted of 23 students, and the experimental class, which consisted of 22 students. Data were collected through a standardized reading comprehension test consisting of 30 questions. The pre-test and post-test data were analyzed using inferential statistics, specifically an independent sample t-test. The findings indicated that QuizWhizzer successfully enhanced students' reading skills. It was demonstrated that the post-test average score of the experimental group was 82.45, whereas the control group was 75.52. The 2-tailed significance value was 0.023, below the threshold of 0.05, meaning there was a notable difference in post-test scores between the two classes. Ultimately, utilizing QuizWhizzer media effectively improved students' reading comprehension abilities significantly. The integrated digital tools that align with learning objectives can positively impact reading comprehension, particularly for students in middle school grades. The interactive and engaging nature of QuizWhizzer could help mitigate some of the challenges associated with digital reading environments. Therefore, it is advised that future researchers pursue this research to examine students' attitudes regarding learning with QuizWhizzer media.

**KEYWORDS:** Education, Reading Comprehension, Descriptive Text, QuizWhizzer, Technology

### I. INTRODUCTION

In the digital era, reading comprehension has taken on a new level of importance as the volume and speed of information exchange have increased exponentially. Reading comprehension is a crucial skill that students need to acquire before progressing in other aspects of language acquisition in English learning environments (Ceylan & Baydik, 2018). Numonjonovna (2023) noted that reading comprehension helps students expand their vocabulary and understand the correct usage of grammar. Unsurprisingly, students who read and engage in frequent reading demonstrate better communication skills compared to those who rarely read. Moreover, Rochimah and Muslim (2021) claimed that students require comprehension to gain meaning from what they read and take advantage of reading. This means that any ideas and information in the reading material that the writer tried to convey are rendered useless without reading comprehension. Additionally, reading comprehension enables students to develop proficiency in reading by requiring them to thoroughly comprehend the content of reading materials. Al-Khamaiseh and Al-Jamal (2022) mentioned that being an effective reader enables students to gain new knowledge, develop new skills, and strengthen lifelong learning.

Moreover, 21st-century readers must be able to distinguish between fact and fake information or hoaxes (OECD, 2021). It means that students must understand the context, the main idea, and the details of what they read in order to gain correct information. Reading comprehension, as defined by Yurko and Protsenko (2021), is the capacity to understand and analyze information obtained from reading sources. In addition to facilitate information acquisition, Gultiano (2022) contended that reading comprehension also affords students the chance to achieve academic and professional success. Thus, reading comprehension becomes an important ability in the process of learning English.

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Nonetheless, the reading comprehension proficiency of students in Indonesia remains insufficient. The latest PISA (Programme for International Student Assessment) results indicate that Indonesian students experienced a 12-point decrease in reading performance, ranking them 11th lowest among 81 countries worldwide (OECD, 2022). Numerous factors contribute to students' reduced reading comprehension. Klimova and Zamborova (2020) argued that students struggle to comprehend reading materials due to insufficient motivation and impaired concentration. Sánchez et al. (2021) added that teachers' tendency to use traditional teaching methods has a detrimental effect on students' reading comprehension abilities and fosters negative attitudes towards reading. Furthermore, preliminary observations at a private junior high school in Surabaya indicated that students struggled to comprehend the contextual meanings of words inside the text. The issue stemmed from the restricted availability of appropriate reading materials and insufficient early exposure to reading habits. Subsequently, students exhibited disinterest in the reading materials produced by the teachers, as they depended on traditional paper-based approaches for teaching reading comprehension. Students exhibit a deficiency in engagement and dedication to reading due to the misalignment of paper-based materials with their particular interests or their perception of relevance to their lives. Additionally, the pervasive use of gadgets and social media has shortened attention spans, further hindering reading development. In fact, the school permitted students to bring smartphones or tablets with the expectation that these devices would support learning activities.

Therefore, integrating media and technology as a means to enhance reading comprehension in Indonesia appears promising. Putri and Susanti (2022) assert that technology can facilitate teaching and learning processes since it offers interactive and visually stimulating educational experiences that can engage students and enhance learning. Moreover, Chen et al. (2020) supported that the application of classroom technology, especially game-based media, can significantly improve student engagement, motivation, and collaboration. Several researchers discovered that online game-based media significantly enhances students' reading processes, reading proficiency, and reading motivation (León et al., 2022; Li & Chu, 2020). Therefore, integrating game-based media in teaching reading comprehension holds great potential to improve learning efficacy.

Research conducted by Oktika et al. (2023) demonstrated that implementing QuizWhizzer as a learning media successfully enhanced students' vocabulary. Bartrum (2019) argued that QuizWhizzer is an educational platform that enabling educators to tailor engaging quiz competitions that foster an engaging educational atmosphere for students. Additional research revealed that using QuizWhizzer can improve students' learning outcomes in subject-verb agreement material (Adawiyah & Yani, 2024). Moreover, using QuizWhizzer as media for evaluation also positively influences students' enthusiasm (Putra et al., 2023). Regarding the advantages and difficulties of using online learning media (i.e. QuizWhizzer, Kahoot!, WhatsApp, and Google Classroom), Dewi et al. (2023) identified several advantages, including enhanced student engagement, increased understanding of the lesson, and improved teacher creativity. At the same time, they also noted challenges such as unstable internet connection, financial issues, and time management difficulties.

Although QuizWhizzer has demonstrated efficacy in enhancing vocabulary mastery, improving subject-verb agreement understanding, and boosting students' engagement, there remains a lack of investigation into its influence on general reading comprehension abilities. This research seeks to examine the influence of QuizWhizzer media on the reading comprehension skills of Junior High School students. This study exclusively examined the effect of QuizWhizzer on the reading comprehension of descriptive texts among Junior High School students, which has not been the primary focus of previous research on QuizWhizzer as game-based learning platforms in EFL contexts. Specifically, it addresses the research question: "Does the use of QuizWhizzer lead to significant improvements in reading comprehension compared to traditional methods?". Hereafter, the results of this study could provide valuable insights for educators seeking to integrate game-based platforms into their curricula, potentially leading to more engaging and effective teaching strategies for improving reading comprehension among EFL students.

## II. LITERATURE REVIEW

Reading comprehension is a critical skill in the digital era, pivotal for academic and professional success (Komilovna, 2023; Rochimah & Muslim, 2021). It involves understanding the main idea, details, and inferences within a text and is essential for effective learning and knowledge acquisition (Brown & Abeywickrama, 2019). In the context of education, teaching reading comprehension is a multi-faceted process that aims to develop proficient readers capable of lifelong learning (Al-Khamaiseh & Al-Jamal, 2022; Ceylan & Baydik, 2018; Gultiano, 2022; Kung, 2019). In this regard, a three-stage approach to teach reading comprehension, consisting of pre-reading, while-reading, and post-reading stages, is advocated to build students' abilities (Nafa, 2022). The pre-reading stage activates prior knowledge and interest, while-reading involves the application of reading strategies, and post-reading includes summarization and reflection activities (Ghafournia, 2023). Additionally, Yurko and Protsenko (2021) proposed two key reading strategies. They are skimming, for grasping the main idea and scanning, for locating specific information.



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Effective teaching of reading comprehension also involves discussion activities, which enhance understanding through collaborative learning and idea exchange (Grabe & Stoller, 2022; Herlinawati et al., 2022; Susanti et al., 2020). Moreover, developing students' reading motivation is crucial, as motivated students are more likely to become skilled readers (Toste et al., 2020). Teachers can foster motivation by offering a variety of reading materials and creating a supportive learning environment (Grabe & Stoller, 2022). One of the reading materials that can be used is descriptive text. Descriptive text is a genre that aims to provide detailed information about objects, places, animals, or people, engaging the reader's senses (Fulwiler, 2002; Sulistyansih & Perdana, 2020). According to Noprianto (2017), descriptive text typically consists of an identification part, introducing the object, and a description part, detailing its characteristics.

Afterwards, assessment is integral to the teaching process, providing insights into students' learning progress and informing future teaching strategies (Alfian et al., 2022; Septia et al., 2022). According to Sufyadi et al. (2021), three types of assessments are highlighted: assessment as learning, for learning, and of learning, each serving different purposes in the learning process. A comprehensive assessment of reading comprehension should include various question types that evaluate different aspects of understanding, such as main ideas, supporting details, vocabulary, inferences, and grammatical features (Adlika, 2023; Brown & Abeywickrama, 2019; Imran, 2023).

Thereafter, the use of learning media like QuizWhizzer is essential in teaching reading comprehension (Puspitarini & Hanif, 2019). QuizWhizzer is an accessible, user-friendly platform compatible with various devices, requiring no account creation for students to participate (Bartrum, 2019). Sari et al. (2021) mentioned that QuizWhizzer falls into the multimedia category, combining text, images, and audio to provide an interactive learning experience. It is categorized into audio, visual, audio-visual, and multimedia, each addressing different learning preferences. QuizWhizzer supports a range of question types and uses gamification to enhance engagement. Students can easily participate in the quiz race by scanning the barcode given by the teacher. They can access QuizWhizzer through any device, whether smartphone, tablet, or laptop (Efendi & Sutiyarti, 2022). Students do not even need to create an account to join a game on the QuizWhizzer platform. Thus, the incorporation of multimedia learning platforms like QuizWhizzer can significantly enhance student engagement and learning outcomes.

### III. METHOD

The research deployed a quantitative approach using a quasi-experimental design. It was conducted during the academic year of 2023/2024 at a private Junior High School in Surabaya. A purposive sampling was used to decide samples by considering the equality of students' capabilities based on the English teacher's recommendation. Two unmodified seventh-grade classes, totalling 45 students, were selected as participants. According to Gall et al. (2003), experimental research requires a minimum of 15 participants in each group being compared. Thus, one class with 22 students served as the experimental group who received a series of treatments, while the other class with 23 students became the control group.

The instrument used a reading comprehension test focused on descriptive text about persons. The test was divided into pre- and post-tests. The instrument consisted of 30 questions. 25 questions were multiple-choice with four answer options, and 5 questions were short-answer. The test questions were adapted from various online sources by referring to the reading comprehension indicators. The indicators encompass identifying the main idea or topic, finding supporting ideas, guessing vocabulary or phrases, identifying inferences or implied details, finding specifically stated details, recognizing unstated details, and identifying grammatical features (Brown & Abeywickrama, 2019).

Subsequently, a validity and reliability test was carried out to ensure the instrument was appropriate for use. This research used content validity to check the compatibility of the instrument by referring to several aspects, including the format, material, construction, and language used. An expert in a relevant field was employed to validate the research instrument. The instrument was considered valid, and it could be used with minor revisions. Internal consistency was then checked to assess the instrument's reliability. The procedure of this reliability test employed the full version of the instrument, and it was administered once (Creswell, 2012). The try-out test was administered to 10 seventh-grade students under the same population but outside the sample. According to Ary et al. (2010), an instrument is acceptable if the reliability coefficient is greater than 0.60. The calculation results showed that the reliability score for multiple-choice questions was 0.672, and the reliability score for short-answer questions was 0.715. In other words, the value of Cronbach's Alpha was higher than 0.60. This can be interpreted as the reading comprehension test had high reliability. Therefore, the instrument was proven reliable and suitable for use in gathering data.

The data analysis involved normality, homogeneity, and hypothesis tests calculated using SPSS 26. First, the Shapiro-Wilk test was executed to check if the data was distributed normally. The significance value must be greater than 0.05 to be considered normally distributed (Creswell & Creswell, 2018). The test results showed a significance value of 0.134 in the experimental



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group's pre-test and 0.071 in the post-test. Meanwhile, the control group's pre-test significance value was 0.104, and the post-test was 0.189. Thus, all collected data were considered normally distributed.

Next, a homogeneity test was carried out to examine if the samples had equal variances. Levene's test was used for this purpose. The results indicated a significance value of 0.599 in the pre-test and 0.168 in the post-test. This means that the significance value in both tests already met the minimum criteria, which was greater than 0.05. Therefore, the data of this research were homogeneous.

Since the data were distributed normally and homogeneous, inferential statistical analysis utilizing the independent sample t-test was held to check whether both groups significantly differed in reading comprehension skills. The test indicators were outlined as follows:

- a. Alternative hypothesis (Ha) accepted: Sig. 2-tailed value < 0.05, indicating successful research with a significant difference in reading comprehension abilities between the two classes.
- b. Null hypothesis (H0) accepted: Sig. 2-tailed value > 0.05, indicating no significant difference between the two classes in reading comprehension abilities.

Additionally, Eta Squared was also utilized to calculate the effect size of QuizWhizzer media implementation on students' reading comprehension skills. The effect size calculation used Cohen's D formula.

### IV. RESULTS

This research indicated a significant improvement in reading comprehension among students who taught using QuizWhizzer compared to those who taught using traditional methods. This showed by the pre-test and post-test scores of both groups that were compared. Firstly, the test mean scores of both groups were calculated. Table 1 shows the mean score calculation results.

**Table 1. Mean score analysis of pre-test results between the experimental and control groups**

Group	N	Mean	Std. Deviation	Std. Error Mean
Experimental	22	68.73	13.836	2.950
Control	23	64.26	13.893	2.897

According to Table 1, the experimental group's average score was 68.73 (SD=13.836) on the reading comprehension pre-test, whereas the other group achieved an average score of 64.26 (SD=13.893). This means the average score of the experimental class was slightly greater than that of the control class. Hereafter, an independent sample t-test was performed to further analyze whether the pre-test results of the experimental and control groups differed significantly. See Table 2 for the test results.

**Table 2. Independent sample t-test on pre-test scores between the experimental and control groups**

		t-test for Equality of Means						
		t	df	Sig. (2-tailed)	Mean Difference	Std. Difference	95% Error Interval Difference	Confidence of the
						Lower	Upper	the
Equal variances assumed		1.080	43	.286	4.466	4.135	-3.872	12.805
Equal variances not assumed		1.080	42.926	.286	4.466	4.135	-3.872	12.805

Based on data served in Table 2, the significance 2-tailed value was 0.286, which exceeded the criteria value of 0.05. Hence, it could be interpreted that there was no significant difference among the two groups in pre-test scores. In other words, it was confirmed that both the experimental and control groups had equal capabilities before the treatment was administered. This result demonstrated that the sampling procedure was effective in creating equivalent groups for comparison. By establishing a baseline of equal capabilities, the research could more accurately measure the impact of the treatment on students' reading comprehension abilities.

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The following process was to examine the post-test results. The average scores of post-test data between both groups were also first evaluated to indicate students' reading comprehension mean score improvement after the series of treatments. The result of the post-test mean scores analysis is in Table 3.

**Table 3. Mean score analysis of post-test results between the experimental and control groups**

Group	N	Mean	Std. Deviation	Std. Error Mean
Experimental	22	82.45	9.334	1.990
Control	23	75.52	10.357	2.160

As depicted in Table 3, the experimental group obtained a greater reading comprehension post-test mean score of 82.45 (SD=9.334) than the control group, which achieved a mean score of 75.52 (SD=10.357). This finding revealed that the experimental group, which received treatments, improved their reading comprehension skills greater than the control group. Moreover, it can be assumed that using QuizWhizzer as a learning media positively affected students' reading comprehension skills. Next, the independent sample t-test was employed to examine further the post-test results of both classes. This statistical approach confirmed whether the observed difference in mean scores was statistically significant, thereby providing strong evidence for the effectiveness of QuizWhizzer media in enhancing reading comprehension. See Table 4 for the independent sample t-test result.

**Table 4. Independent sample t-test on post-test scores between the experimental and control groups**

t-test for Equality of Means							
	t	df	Sig. (2-tailed)	Mean Difference	Std. Difference	95% Error Interval Difference	Confidence of the
						Lower	Upper
Equal variances assumed	2.355	43	.023	6.933	2.943	.997	12.869
Equal variances not assumed	2.361	42.854	.023	6.933	2.937	1.010	12.856

Data in Table 4 indicated a significant difference in post-test scores between the two groups, proven by a 2-tailed significance value of 0.023, which was below 0.05. Shown by this result, it can be inferred that using QuizWhizzer as a learning media significantly improved students' reading comprehension. Thereupon, the alternative hypothesis ( $H_a$ ) can be achieved. Given this result, it can be seen that the use of QuizWhizzer as a learning media has a measurable effect on students' reading comprehension.

Hereafter, to know how far the use of QuizWhizzer media affect students' reading comprehension, the Eta Squared was calculated as follows.

$$\begin{aligned} \text{Eta Squared} &= \frac{t^2}{t^2 + (N_1 + N_2 - 2)} \\ &= \frac{2.355^2}{2.355^2 + (22 + 23 - 2)} = \frac{5.546025}{5.546025 + 43} \\ &= \frac{5.546025}{48.546025} = 0.11 \end{aligned}$$

Based on the above calculation, the Eta Squared value was 0.11, and it belonged to moderate effect classification. Thus, the use of QuizWhizzer media had a moderate effect on the experimental group's reading comprehension skills improvement.

In order to know which aspects of reading comprehension significantly improved, a classification of students' performance in each aspect of reading comprehension ability was carried out. This was used to compare the reading comprehension performance of both groups further. Table 5 presents the percentage of students' achievement in each indicator of reading comprehension ability.

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**Table 5. Achievement on reading comprehension aspects in the post-test between the experimental and control groups**

Aspects	Percentage of Students' Correct Answer	
	Experimental Group	Control Group
Main idea/topic	95%	95%
Supporting ideas	88%	75%
Vocabulary/phrases	77%	65%
Inferences/implied details	61%	58%
Specifically stated details	94%	80%
Unstated details	71%	64%
Grammatical features	68%	63%

As shown by the data in Table 5, students in both groups had similar strengths and weaknesses regarding reading comprehension abilities. Their reading comprehension achievement indicated that students from both groups excelled at identifying the main idea/topic of the text. The experimental and control classes got the same percentage of 95% for answering correctly the questions about the main idea/topic. At the same time, the experimental and control groups showed weak achievement in identifying implied information from the text. In the experimental group, the percentage of students with correct answers for the aspect of inferences/implied details was 61%. Conversely, the control group only achieved the correct answer of 58% for identifying implied information.

Nevertheless, the experimental class surpassed the other class in almost all facets of reading comprehension. In comparison to the control class, the experimental class accomplished higher percentages of correct answers in the aspect of supporting ideas (88%), vocabulary/phrases (77%), inferences/implied details (61%), specifically stated details (94%), unstated details (71%), and grammatical features (68%). Meanwhile, both groups got similar correct answer percentages in the aspect of the main idea/topic (95%). Hereafter, it could be seen that the experimental class significantly enhanced the reading comprehension aspects of specifically stated details, supporting ideas, and vocabulary/phrases. All in all, the implementation of QuizWhizzer as a learning media helped students improve their reading comprehension skills better than conventional learning, especially in the aspects of specifically stated details, supporting ideas, and vocabulary/phrases.

Furthermore, students' reading comprehension test results were also classified according to specific score criteria to provide a clearer picture of their performance level. The success indicator was based on the minimum score at the school where this research was conducted. The classification of post-test results between the two groups is shown in Table 6.

**Table 6. Classification of reading comprehension achievement in the post-test between the experimental and control groups**

Criteria	Range Score	Experimental Group		Control Group	
		Number of Students	Percentage (%)	Number of Students	Percentage (%)
Excellent	90-100	6	27.3	2	8.7
Good	75-89	13	59.1	11	47.8
Fair	61-74	2	9.1	8	34.8
Poor	41-60	1	4.5	2	8.7
Very Poor	≤ 40	0	0	0	0
<b>Total</b>		<b>22</b>	<b>100</b>	<b>23</b>	<b>100</b>

A score of 75 was the minimum criterion for achieving learning objectives at the participants' school. Based on data in Table 6, in the experimental group, there were only 3 students who did not meet the minimum score of 75 in the post-test. Moreover, 6 students (27.3%) in this group were successfully improved as excellent in reading comprehension ability. In contrast, almost half of the control class did not reach the minimum criteria in the post-test. There were 10 students who still achieved the reading comprehension score under the minimum criteria. Besides, there were only 2 students (8.7%) in the control class who succeeded in being excellent in reading comprehension skills. This indicated that students who taught using QuizWhizzer outperformed students who taught conventionally in terms of reading comprehension ability.

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### V. DISCUSSION

The experimental group, which was exposed to the QuizWhizzer medium, showed a significant enhancement in their reading comprehension skills in comparison to the control group, which received conventional teaching methods. It can be said that the use of QuizWhizzer media had a beneficial impact on the improvement of students' reading comprehension skills. The findings corroborate the studies conducted by Li and Chu (2020) and León et al. (2022), which asserted that online game-based platforms have the potential to augment students' reading motivation and improve their reading comprehension abilities. Their findings which incorporated board games and Reading Battle (RB) as online learning media provide additional evidence that incorporating interactive modern media into the learning process can result in significant advantages. In this regard, QuizWhizzer is also an interactive online platform specifically developed for learning through game-based activities. This type of media has the ability to captivate students in learning activities due to the universal appeal of games among students of different educational levels (Chen & Hsu, 2020; Degirmenci, 2021; Wang & Tahir, 2020). Moreover, Ebrahimzadeh and Alavi (2016) mention that QuizWhizzer, as a game-based learning media, can enhance the learning experience by creating a sense of fun, making the process more engaging and less monotonous. The race games on QuizWhizzer stimulate the students' competitive instincts. This competitive atmosphere motivated students to strive for the greatest scores in every reading comprehension practice provided. While their study focus on the effect of game-based platform on students' vocabulary, this research focus on the impact of QuizWhizzer on EFL students' reading comprehension, specifically in descriptive texts.

Then, the inclusion of a leaderboard element, displayed upon the completion of the quiz race, served as an additional incentive for students to strive for the highest score in each reading comprehension practice, with the aim of securing a top position on the podium. The students' aspiration to achieve the highest score motivated them to instinctively enhance their reading comprehension abilities through consistent practice and repetition (Drajati et al., 2021). That was why the findings of this research showed that the experimental class, which used QuizWhizzer for learning, exhibited greater improvement in reading comprehension abilities compared to the control class. This finding can serve as new evidence that online game-based media, particularly QuizWhizzer, can transform learning into a pleasurable and gratifying experience. Specifically, QuizWhizzer media effectively engaged students in the learning process by integrating competition and providing immediate feedback, resulting in improved retention and comprehension of the reading material.

In addition to its incorporation of gamified features, QuizWhizzer became appealing to students because it allows the teacher to integrate diverse multimedia elements into reading practices. The teacher can add images to the practice text, which aids in the visualization of material for students. This, in turn, helps to contextualize the information and make abstract concepts more tangible (David & Sulaiman, 2021). Afterwards, visual aids are especially advantageous for students who learn best through visual means since they help improve comprehension and memory of the reading material (Santi & Reflinda, 2022). Additionally, the QuizWhizzer platform allows for the inclusion of audio and YouTube videos, enhancing the potential for a dynamic and engaging learning environment. Audio components are advantageous for students who learn best through hearing, whereas videos cater to students who benefit from both visual and auditory learning styles. Integrating videos into reading comprehension exercises can provide additional context, illustrate complex ideas, and captivate students through visual narrative (Sari, 2021). On the other hand, kinesthetic learners are more effectively involved in the interactive activities provided by the QuizWhizzer platform. This comprehensive strategy guarantees that a wider array of students can derive advantages from the learning activities, hence maintaining students' engagement with the learning content and improving overall classroom performance.

QuizWhizzer also offers a diverse range of question types, such as multiple-choice, numerical answer, ordering, audio answer, multiple response, short text answer, open-ended, true or false, drag and drop, and random questions. This variant guarantees that the reading comprehension practice is not only beneficial but also demanding and invigorating. Various question kinds necessitate students to employ diverse cognitive abilities, ranging from simple recollection of facts to the more complex tasks of interpreting and synthesizing knowledge (Pakpahan et al., 2021). The inclusion of many question kinds also facilitates the development of a wide array of comprehension abilities among students and prevents the learning activities from getting tedious (Damaris, 2023). These features can be utilized to captivate students' enthusiasm for acquiring knowledge. When students enjoy and enthusiastically participate in the learning processes, they are more inclined to be actively involved, resulting in a greater capacity to assimilate the imparted knowledge readily. Active engagement and genuine delight are essential elements that contribute to the effectiveness of the learning process. When students possess motivation and interest, they exhibit increased diligence and perseverance in surmounting obstacles, resulting in enhanced comprehension and academic achievement (Toste et al., 2020). As a result, students could improve their reading comprehension abilities by utilizing QuizWhizzer media during a number of treatments. This result is consistent with the findings of Putra et al. (2023). It has been observed that the use of QuizWhizzer media has a positive impact on students' enthusiasm in the classroom. Hence,

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QuizWhizzer can be regarded as a good choice for learning media that aids students in improving their reading comprehension skills by boosting their learning motivation and enthusiasm.

Moreover, the user-friendly nature and widespread availability of QuizWhizzer greatly enhance its efficacy as a learning media. Dewi et al. (2023) stated that the utilization of online learning platforms, such as QuizWhizzer, has the potential to enhance teachers' creative abilities in the context of teaching. QuizWhizzer media enables teachers to efficiently generate personalized quiz races and assignments that cater to the specific needs of their students. The user-friendly interface of the QuizWhizzer platform enables teachers to prioritize teaching and minimize technological challenges. Additionally, students can access QuizWhizzer from any device as long as there is an internet connection. This allows for flexibility in terms of how and where they learn.

For further explanation, this research additionally examined students' performance in each specific aspect of reading comprehension for a more comprehensive understanding. The seven components of reading comprehension encompassed the main idea/topic, supporting ideas, vocabulary/phrases, inferences/implied details, specifically stated details, unstated details, and grammatical elements (Brown & Abeywickrama, 2019). The results showed that students who utilized QuizWhizzer as a learning media attained greater rates of correct answers in almost all aspects of reading comprehension compared to those who learned through the conventional method. Nevertheless, a noteworthy anomaly was observed in relation to the main idea/topic aspect. Both the experimental and control groups attained comparable degrees of utmost accomplishment in identifying the main idea/topic. Both groups were taught the skimming technique, which was the cause of this outcome. Skimming, a reading technique characterized by rapidly perusing a text to obtain a broad understanding of its content, proved equally effective for students in both the experimental and control groups. This discovery is consistent with the research conducted by Yurko and Protsenko (2021), which demonstrated that the skimming strategy enables students to easily identify the main idea or topic of a text without having to read it in its entirety. Moreover, the skimming strategy enables students to identify the main idea/topic by concentrating on crucial elements of the text, such as titles, headings, and initial words. In descriptive texts, the main idea/topic can frequently be discerned solely by looking at the title or skimming the identification part of the text. This technique is especially efficient for rapidly comprehending the essence of a text, which was why students in both categories excelled at identifying the main idea/topic. The consistent success of this uniform achievement indicates that QuizWhizzer improved multiple facets of reading comprehension. However, the advantageous impact of specific reading techniques, such as skimming, remained intact.

Subsequently, this research revealed that the experimental group made significant progress in finding specifically stated details, finding supporting ideas, and guessing vocabulary/phrases. This research also presented a scanning technique that enabled students to find specific details and supporting ideas in the text quickly. The scanning technique allows students to disregard extraneous information and concentrate specifically on the specific details they require. This finding corroborated the assertion made by Yurko and Protsenko (2021) that the scanning strategy can augment students' reading comprehension abilities by enabling them to discern particular information inside a text efficiently. The utilization of the scanning technique facilitated students in finding specifically stated details and supporting ideas, while the incorporation of QuizWhizzer media enhanced students' engagement in the reading activity and sustained their motivation to improve their reading abilities. This combination was highly effective in enhancing students' reading comprehension skills, primarily in finding specifically stated details and supporting details.

Next, the experimental group's superior reading comprehension ability in the vocabulary/phrases element aligns with prior research conducted by Oktika et al. (2023). Their research demonstrated that the utilization of QuizWhizzer as a learning media effectively improved students' vocabulary. Due to the engaging and fun nature of the learning activities on QuizWhizzer, students enjoyed acquiring new vocabulary and phrases as they read through the exercises. Apart from that, the primary factor contributing to the enhancement of vocabulary and phrases in the experimental group was the competitive environment nurtured by QuizWhizzer media. This environment fostered greater engagement among students during the reading comprehension exercises. The students' aspiration to attain exceptional scores and secure a prominent rank on the leaderboard drove them to actively seek clarification from the teacher regarding any unfamiliar vocabulary or phrases encountered in the practice text. Active participation and a proactive attitude towards seeking assistance are crucial for enhancing vocabulary skills, as they facilitate a deeper understanding and more meaningful learning. Through questioning and seeking clarification, students can establish connections between new vocabulary or phrases and their preexisting knowledge, facilitating the retention and use of these words in the future. As a result, students who learn using QuizWhizzer enhanced their vocabulary better than students who follow traditional learning methods.

Furthermore, this research finding aligns with the study of Adawiyah and Yani (2024), who demonstrated that the utilization of QuizWhizzer can enhance students' academic achievements in the area of subject-verb agreement. According to the analysis of

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reading comprehension achievement, the class that used QuizWhizzer media achieved higher scores on grammatical features than the control class. In addition, the experimental group demonstrated that 19 out of 22 students succeeded in reaching the Minimum Criteria for Learning Objectives (KKTP). The significant success rate indicated that students who were instructed via QuizWhizzer media not only actively participated in the learning content but also comprehended it more effectively, resulting in good performance in reading comprehension assessments. Hence, this outcome further corroborated the findings of Dewi et al. (2023), suggesting that the utilization of online learning platforms (i.e. QuizWhizzer, Kahoot!, WhatsApp, and Google Classroom) confers benefits to students' comprehension of the learning material.

Additionally, Grabe and Stoller (2022) stated two core principles in teaching reading comprehension. This research demonstrated the practicality of applying such ideas in teaching reading comprehension. The first principle was developing students' reading motivation by incorporating interactive learning technology. This research employed a game-based platform called QuizWhizzer to actively involve students in learning activities. Moreover, this research could conduct collaborative learning, provide various reading materials, create a comfortable and fun learning environment, and show students' reading improvement using QuizWhizzer media in order to raise their reading motivation. Firstly, collaborative learning was organized during the treatment by asking students to do a quiz using QuizWhizzer media in groups. In this activity, one representative student from each group would join the quiz room, but the entire group was responsible for collaboratively finishing the quiz. The interactive and competitive features of QuizWhizzer enhanced the engagement of the reading activities through collaborative learning. Secondly, the versatility of QuizWhizzer media enabled teachers to offer a wide range of reading materials to students. Unlike conventional approaches that may be restricted by tangible resources, QuizWhizzer did not impose any limitations on the text's length. Additionally, this platform offered the capability to incorporate images and audio. These benefits allowed teachers to offer a diverse selection of reading materials that were customized to accommodate various learning styles. Third, as mentioned earlier, the use of QuizWhizzer can make a comfortable and fun learning environment because this platform uses gamified features that students generally like. The engaging learning environment created by QuizWhizzer motivated students to actively and eagerly participate in reading activities. Lastly, one of the notable benefits of utilizing QuizWhizzer was the immediate feedback it provided. Students were able to observe their learning progress as QuizWhizzer provided immediate feedback on their scores following each practice session. This instant feedback enabled students to monitor their learning progress, comprehend their areas of proficiency and areas for improvement, and maintain their motivation to enhance their performance.

The second principle implemented in this research was the promotion of discussion activities. Throughout the treatment, students were encouraged to actively engage in reviewing their answers upon completing each practice session. This activity not only fostered a deeper understanding of the reading material but also facilitated critical thinking and collaborative learning (Herlinawati et al., 2022). The implementation of those two principles in teaching reading comprehension resulted in a noticeable improvement in students' reading comprehension abilities. Overall, the use of QuizWhizzer media, in conjunction with the implementation of supporting teaching principles and techniques, demonstrated more effectiveness in enhancing students' reading comprehension. The findings of this research underscore the importance of combining interactive learning media with effective teaching strategies to enhance students' academic performance and overall learning experience.

## V. CONCLUSION

The research revealed that the utilization of QuizWhizzer as a learning media effectively enhanced EFL students' proficiency in reading comprehension, especially in the context of descriptive texts. This is due to the fact that QuizWhizzer can actively involve students in the process of learning. QuizWhizzer enhanced students' enjoyment of learning by utilizing game-based features. Moreover, utilizing QuizWhizzer to organize engaging quiz races can stimulate students' competitive instincts as they strive to quickly get the correct answers in order to achieve the highest ranking. This condition trained students' reading comprehension skills naturally.

Subsequently, this research demonstrated that incorporating technology in the classroom to facilitate the teaching and learning process can meet the demands of students. Integrating learning technology makes students participate actively in reading activities, making their reading comprehension skills can improve. Utilizing QuizWhizzer as a learning media can help students effectively and engagingly incorporate it into the learning process since it offers flexible time.

The research findings offer several recommendations for educators and future researchers. Firstly, it is advisable to highlight the significance of employing game-based media as it can foster enjoyable learning experiences in English classes. An alternative choice for online game-based media is QuizWhizzer. Therefore, teachers are advised to employ QuizWhizzer as a medium for various English teaching and learning activities, including ice-breaking and assessment. English teachers are suggested to utilize QuizWhizzer as a tool to aid students in enhancing their reading proficiency across different types of text. Subsequently, this



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study discovered that despite the students' overall enhancement in reading comprehension following the intervention, they still lacked in identifying inferences or implied details. Therefore, future researchers are highly recommended to conduct a study regarding this problem. Last, it is also suggested that future researchers continue this research to find out students' perceptions regarding learning reading comprehension using QuizWhizzer media.

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## Amendments to FSA Act in Order to Realize Legal Functions in Economic Activities in Indonesia



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**ABSTRACT:** The problem of law in research is how to change FSA's objectives and duties in the Law on Development and Strengthening of the Financial Sector. In Law No. 4 of 2023 concerning the Development and Strengthening of the Financial Sector. The research results show that there is no change in the objectives of the Authority Service Finance—amendment-shaped changes and additions. Changes and Additions are shaped first. Additional FSA's duties in the FSA Law consist of 3 significant elements, while the PPSK Law consists of the 7 great elements of sector finance. Second, the arrangement of FSA's duties consists of 1 verse in the FSA Law, whereas in the PPSK Law, the FSA's duties consist of 2 verses. Verse 2 states that the Financial Services Authority, in its job, carries out development sector finance and coordinates with ministry/agency and authority-related. Changes and additions to provisions about FSA's duties show function law that looks forward as a social engineering tool. This research is a type of normative research

**KEYWORDS:** Changes, Duties, FSA, Law, Reseach

### I. INTRODUCTION

In Indonesia, the Financial Services Authority (hereinafter referred to as the Financial Services Authority called FSA) is an institution that was formed under Law No. 21 of 2011. Regulation and supervision of sector service finance given to the FSA by the previous institutions have authority. There are Lots of constraints for carrying out mandate regulation and supervision all over sector finance. Progress technology in various aspects, such as finance, is one of the sectors affected by rapid progress technology, specifically technology finance. On the other hand, various Types of financial institutions appear with all the risks the business brings. The condition thus brings up issues and challenges for the FSA, which is given the task Of regulating and supervising all sectors of finance in Indonesia. In 2023, Law No. 4 of 2023 was issued 2023 about the Development and Strengthening of the Financial Sector. So, the problem of law in research is how to change FSA's objectives and duties in the Law on Development and Strengthening of the Financial Sector. The law unites several settings related to institutional activities in the field economy, including FSA. Research was conducted previously by the author or other related parties with the implementation of the PPSK Law, and research was conducted by Theresia Anita et al. (2023, 2023, 2023). Research Another study by other researchers discussed the Central Bank Institution and the Financial Services Authority, which are being reviewed from the perspective of Regulation in other countries. Research including research conducted by Monnet, E (2023), Lars P Feld, Volker Wieland (2021), Thomas F Huertas (2022), Istrefi, K. & Piloiu, A. (2020), Jones, E. and Knaack, P. (2019). Research studies analyze financial services authorities from other country settings.

### II. METHODS OF RESEARCH

This is a normative study, a type of research focusing on regulations and legislation. Type study This prioritizes secondary data over primary data. Secondary data types shared become material primary law and materials law secondary. Study This No using primary data. Source person used For can clarify material primary law as secondary data without clarity. Collection techniques The data use study bibliography. Data analysis using data analysis techniques type ;

### III. RESULT AND DISCUSSION

*Function of Law in Economic Activities*

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In public life, there are several fields: field economy, field law, socio-cultural fields, and field politics. Field economy influences other aspects, as stated by theory cybernetics Talcot Parson. The field economy has also been proven to influence policy in many other fields. On the other hand, party laws function as guidelines for economic behavior in society. The goal is that potential conflict consequence behavior is public in chasing different interests that can be minimized. The Economy has the potential to cause conflict in society. If conflict the no management with okay then will bother sustainability activity economy said. The situation will have an impact on the overall field of society. The law required guidelines for the perpetrator's Economy to achieve an objective activity economy without harming the perpetrator's other Economy. Mixing the state's hand-in-form Regulation becomes required to smoothen the objective perpetrator economy in reaching the purpose. Mixing the state's hand in form regulation is also needed in the financial sector ( Uwe Vollmer (2021); likewise, implementing the PPSK Law will develop and strengthen the financial sector, including financial sector regulation. The formation of the PPSK Law is an umbrella law for financial sector activities that will be stronger in harmony with the improvement protection law for consumers. It shows a mix of the state's hand in forming regulations in the field of Economy, especially in the field of banking ( Matyunina, A., Ongena, ); banking is one of the institutions in sector finance Objective law For give benefit for service sector activities finance and protection consumer implemented with Regulation The purpose of law This by Objective the law stated by Jeremy Bentham ( Cello, L., 2020) In other words, the PPSK Law was formed is embodiment function law in financial sector activities.

Function means (KBBI, 2024) what is done or the usefulness of something. Law seen from its function can be divided into two different views. The first view is that law can only follow the development of society (backward-looking), and law functions as a tool for engineering or changing society. (" *a tool of social engineering* "). Forward-looking law (*Forward-looking*). In this function, the law is at the forefront of the development and dynamics of society. The legislators have far-sighted thoughts outlined in the regulations that will come into force. Legal opinions that exist after the dynamics of societal development are based on two teachings.

The first is the teachings of the Historical School put forward by Von Savigny, who said that law is not made but exists and grows together with society. ( This teaching is based on the fact that in this world, there are many nations, each of which has its own, each has a *Volkgeist* (people's soul) and differs both according to time and place ( Otje Salman, 2009). The two teachings of Ter Haar are known as the Decision theory ( *Beslissingenleer* ), which states that only customs recognized by the rulers (traditional leaders) in those decisions are law. The consequences of the function of law will grow together with societal changes, and then the law, in this case, will change, waiting for societal changes. The law exists after the development and changes in society that occur. The lawmakers are said to be *backward-oriented looking* ). From the perspective of the function of law in economic development, the law will always lag behind the dynamics of very rapid societal development. Law is seen from its function according to Roscou's teachings. Pound said that " *Law is a tool of social engineering* " (law as a tool for social reform). The function of law as a tool for social reform is that law must be a tool or means to change and renew society as desired. The consequence of the function of law as a tool for social reform is that the law that regulates and directs the development of society must exist before societal changes. Lawmakers must always be *forward-oriented looking* ). In today's economic development, facing various changes in society that require legal certainty in regulating these changes, it is more appropriate to say that law, in the sense of statutes, can be used to engineer and change society. Lawmakers must be forward-looking in the sense of being able to predict future developments in society so that the purpose of law to provide certainty, justice, and benefits can be realized.

### *Background Behind the Act Number 4 of 2023 Concerning Development and Strengthening of the Financial Sector*

Regulation This law was formed based on reform in the financial sector, which urgently increases the role of financial sector intermediation and strengthens the resilience system of finance. Financial sector problems between others First, the lack of leveling source funding is still focused on the banking sector. It is still very dominant compared to others in sketcher finance. A portion of assets in the financial industry nonbank, a long-term funding source expected length, can support financing development but is seen as relatively small. Condition the can indicate that fundraising by industry finance is relatively limited whereas potential deepening market finance national each big Enough.

Second, in the banking sector alone, we can see the improvement in flower loans and the inequality in accounts and savings between customers, small and large. Third: The emergence of instruments of complex and risky finances, like crypto, and also related to evaluation order management and enforcement law in the financial sector in various assessments. The latest does not yet show certainty law. Third: The existence of the crisis very global finance high and influential on the financial sector in Indonesia, so This law was formed from efforts government to increase the stability system finance, protect interest customers, and support sustainable economic growth, then renew the system finance and form body supervisor and the regulator, namely on institution Committee Stability system finance, institutions guarantor savings, Authority Service Finance, Bank Indonesia, and other parts Insurance. Through various problems in the financial sector, the government made policy. It formed Regulation Legislation Number 4 of 2023 Concerning Development and Strengthening of the Financial Sector, officially set on January 12, 2023. Formation This



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law aims to improve the financial sector's role in sustainable financing activities that can strengthen quality sources of power in the financial sector.

*Change strengthening about FSA's Objectives and Duties in the Financial Sector Development and Strengthening Law.*

Article 8 of the Law Development And Strengthening the Financial Sector lists Authority Service Finance (FSA). Provisions in Constitution Authority Service Finance There are several amended and deleted articles , as well as united articles and Chapters listed in Constitution Number 21 of 2011 concerning Authority Service Finance (FSA). Articles that have been changed, namely: article 1, article 2, article 5, article 6, article 9, article 10, article 15, article 17, article 42, article 25, article 34, article 35, article 37, and article 38. The articles , namely Article 8 and Article 9, were inserted with 2 (two) articles, Article 8A and Article 8B, Article 36 and Article 37 are inserted into two articles, namely Article 36A and Article 36B. Article 36 explains the design work and budget of the Financial Services Authority (FSA) as listed in Article 34 and Article 35, which will be valid in the upcoming 2025 budget. Meanwhile, Article 36B explains How to design work and budget. The Financial Services Authority (FSA) in question in Articles 34, 35, the regulations government regulates 36A, as well as there is an inserted Chapter between Chapter IX and Chapter X, namely Chapter IXA, which discusses the Supervisory Body Financial Services Authority, as follows in Chapter IXA there is inserted article Article 38 and Article 39 are inserted into 3 ( three ) articles namely article 38A, article 38B and article 38C. Article 48 and Article 49 were inserted into 2 (two) articles, namely Article 48A and Article 48B, as follows the amended article in this chapter, namely Article 49, Article 53, and Article 54. The objectives and duties of the FSA in Law No. 21 of 2011 will outlined Next. The existence of FSA, which is given by Law No. 21 of 2011, has a purpose. Purpose The formation of FSA is regulated. Article 4 of the FSA states that FSA was formed with the aim of the whole activities in sector service finance: organized in a way that is orderly, fair, transparent, and accountable; capable of realizing system finances that grow sustainable and stable, and capable of protecting the interests of Consumers and society. also, The FSA's functions are regulated in Article 5 of the FSA Law, which states that FSA functions to organize system-integrated Regulation and supervision to overall activities

inside sector service finance. Furthermore, FSA functions as stipulated in Articles 4 and 5 in reaching objectives and implementing. Then, the FSA is given a license task task. FSA's tasks are determined in Article 6 of the FSA Law. Article 6 of Law No. 21 of 2011 concerning the FSA states that FSA's duties are " FSA carries out task regulation and supervision against: "Activities service finance in sector Banking, Activities service finance in the capital market sector and activities service finance in the insurance sector, pension funds, institutions financing and institutions service finance other. "

The FSA's duties are as follows: the tasks before the FSA Law emerged were Bank Indonesia's duties, such as those poured out in Law No. 23 of 1999, along with the changes. With the existence of the FSA Law, regulating and supervising institutional banking in micro-prudentials has diverted to FSA matters. It means that Bank Indonesia still has duties and authorities in the task of regulating and supervising institutional banking limited to the field of macro-prudential (Theresia Anita Christiani, 2017)

The explanation of Article 6 of Law No. 21 of 2011 only states that it is clear enough. Former Invite Invite No explanation is given because the felt chapter is already evident. Article 6. It can be reviewed that the FSA's duties are to carry out task regulation and supervision in sector service finance, once again confirming that with this FSA Law, the FSA has both task supervision and task settings. Bank Indonesia previously owned task regulation and supervision in sector banking. When this happens, Bank Indonesia still holds the authority to implement task regulation and supervise Bank Indonesia in the scope of macroprudential. FSA's duties in carrying out task regulation and supervision to activity The capital market sector is a previous task, and the existence of the FSA Law is the duty of the Capital Market Supervisory Agency. FSA's duties in carrying out " regulation and supervision " of activities service finance in the insurance sector, pension funds, institutions financing, and institutions service finance are the tasks given to FSA after the FSA Law was born—financing institutions in chapter the including venture capital, leasing. From room scope sector service existing finances that become realm supervision and Regulation of FSA, FSA's duties are supervising and regulating all over activity sector service finance. The FSA's task is naturally to bring consequences to the weighted responsibility imposed on the FSA so that it can reach the objective establishment of the FSA. FSA supervises and regulates all over activity sector service finance, whether in the form of a bank or not in the form of a bank Provisions provide FSA's duties to do the arrangements and supervision outlined in Article 6 letter c, which states: Activities service finance in the insurance sector, pension funds, institutions financing and institutions service finance others. Article 6, letter c, indeed needs an explanation about the definition of the insurance sector, pension funds, institutions financing, institutions service finance, etc. The word " institution " service finance others "in Article 6 Letter C also provides the interpretation that all institutions' existing finances, or what will be there, are. Then, society will become the realm of Regulation and supervision of FSA in terms of dynamics. FSA's duties are stated in Article 6 given in frame reach FSA's stated objectives in Article 4 of the PPSK Law states several changes and additions that have been made explained previously related to The objectives and duties of the FSA, the PPSK Law stipulates that: First: related with FSA's objectives, then No There is One anyhow in the part The Financial Services Authority regulates about deletion, addition or change from old provisions. This matter means that the provision about the purpose of FSA is that the objectives of FSA are following Law No. 21 of 2011 concerning



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FSA. Second, related to FSA's duties then, there are the provisions stating that Provisions Article 6 amended so that sounds as follows : (1) Financial Services Authority carries out task regulation and supervision regarding activities service finance in the sector Banking; activities service finance in the Capital Market sector, finance Derivatives, and carbon exchanges; activities service finance in the sector Insurance, Guarantees, and Pension Funds; activities service finance in the Financing Institutions sector, venture capital companies, financial institutions finance micro, and other financial institution; activities in the ITSK sector as well asset digital finance and assets crypto; behavior perpetrator business service finance as well as implementation Education and Protection Consumers; and sectors finance in a way integrated as well as do assessment impact systemic Conglomeration Finance. (2 ) Besides the task as meant in paragraph (1), the Financial Services Authority on duty carries out development sector finance and coordinates with the ministry/agency and authority related.

If studied and analyzed with provision duties in the FSA Law, then additional provisions can be analyzed as follows:

- a. The terminology of FSA's duties is Regulation and supervision, still used in the PPSK Law
- b. In addition, FSA's duties in the FSA Law consist of 3 significant elements, while the PPSK Law consists of the seven significant elements of sector finance.
- c. FSA's duties consist of 1 verse in the FSA Law, whereas in the PPSK Law, the FSA's duties consist of 2 verses. Verse 2 states that the Financial Services Authority, in its job, carries out development sector finance and coordinates with ministry/agency and authority related.

## IV. CONCLUSIONS

In Law No. 4 of 2023 concerning the Development and Strengthening of the Financial Sector, there is no change in objective Authority Service Finance—amendment-shaped changes and additions. Changes and Additions are shaped first. Additional FSA's duties in the FSA Law consist of 3 significant elements, while the PPSK Law consists of the 7 great elements of sector finance. Second, the arrangement of FSA's duties consists of 1 verse in the FSA Law, whereas in the PPSK Law, the FSA's duties consist of 2 verses. Verse 2 states that the Financial Services Authority, in its job, carries out development sector finance and coordinates with ministry/agency and authority related. Changes and additions to provisions about FSA's duties show function law that looks forward as a tool of social engineering.

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