

Bridging Expertise: Assessing Skills and Competency Gaps Among Informal Motorcycle Mechanics in Rural Surigao Del Sur for Targeted Training Initiatives

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ABSTRACT: This study delves into the critical assessment of skills and competency gaps among motorcycle mechanics operating in the informal sector. It aims to provide valuable insights into the challenges faced by these mechanics, shedding light on areas where improvements and support are needed to enhance the quality of services they offer. This study employs a quantitative descriptive design and qualitative observational methodology to assess the competencies and skill gaps among motor mechanics in Surigao del Sur, Philippines, and to gain in-depth insights into the mechanics' perspectives and behavior. Twenty motorcycle repair shop owners and labor assistants, hailing from diverse educational backgrounds and years of experience, participated in the survey. It employs a specially designed questionnaire adhering to Technical Education and Skills Development Authority (TESDA) standards, employing both self-assessment checklists and expert evaluations to comprehensively gauge mechanics' skills. Notably, the study uncovers significant gaps in the participants' National Certificates (NCII) certified by TESDA and the necessary training, highlighting an important issue within the industry. The study shows, via both self-evaluation and professional observation, how adeptly the mechanics execute in maintaining various automotive servicing systems. However, it emphasizes the need for enhanced shop maintenance, a critical aspect of ensuring high-quality services in the automotive maintenance industry. Hence, enhanced training on occupational health and safety, operation, and service management is recommended.

KEYWORDS: competency assessment; motorcycle mechanics; skills and competency gaps; informal sector; maintenance; servicing

I. INTRODUCTION

Transportation is an inseparable component of any society in the world. It is closely related to the way of life, the range and location of activities, and the goods and services that will be available for consumption (OSAZE-SSC1205599, O. S., 2015). In relation to this, the automotive industry is also rapidly expanding all around the world (Hartanto et al., 2019; Kushwaha, G. S., & Sharma, N. K., 2016), necessitating creativity and innovation to stay ahead of the competition. Motorcycles are one of the most widely used vehicles by the community, including members of the lower, middle, and upper classes (Tarmizi, 2018). A notable occurrence in the automotive industry has been the emergence of the informal sector as an appealing alternative to the formal sector, notably in the domain of motor vehicle repair. In the midst of the rapid changes occurring in automotive technology, a crucial concern regarding the performance of the informal sector, particularly in terms of work quality, arises. This concern is amplified by the sector's distinct attributes, as discussed by Kipkurui (2004). The informal sector is defined as a collection of businesses that produce things or provide services with the primary goal of providing employment and income to the people involved (OECD, 2003). Outside of regulated economic activities and protected labor relations, the informal sector refers to a diverse and significant reality for producing units and workers. The informal sector has grown in importance not just as a result of its expansion in many nations but also as a result of new expressions that are increasingly recognized as ways to boost growth and poverty reduction (Aguilar and Guerrero, 2020). Every year, motorcycle manufacturers introduce new products that incorporate cutting-edge technology in order to compete and dominate the market. As mentioned in the study by Ziblim et al. (2018), modern vehicle design has undergone tremendous technological advancement in order to be safer, more efficient, and more pleasant to the client. According to Njerul and Mugil (2018), motor vehicle mechanics in the informal sector, or one-person enterprises, have skills and competencies acquired through formal and informal training. However, most mechanics' skills and levels of competency cannot be determined as to whether the artisans can continue to serve their customers competently. Ziblim, et.al. (2018) brought to light a striking observation, revealing that a significant proportion of seasoned auto mechanics, despite their extensive years of

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experience in the field, confront a profound limitation when it comes to inspecting and repairing modern electronic-managed vehicles. This limitation is primarily attributed to their lower educational and technical proficiency levels. The implication here is that these mechanics grapple with a deficiency in their capacity to effectively engage with specialized tools, diagnostic equipment, and the intricacies of advanced electronics and computer systems, as eloquently underscored by Funkhouser (2013).

Furthermore, a study by Opeyemi and Benjamin (2020) unveiled an additional layer of complexity to this issue. It was discovered that roadside mechanics had a considerable lack of computer abilities, which are becoming increasingly important for the proper use of cutting-edge automobile digital diagnostic tools. This shortcoming not only creates significant challenges in the diagnosis, repair, and maintenance of modern vehicles but also underscores the growing chasm between traditional automotive repair practices and the demands of contemporary automotive technology. Motor mechanics work on gasoline engines and other mechanical parts of light-duty vehicles, such as the steering and brakes, as well as the transmission and suspension systems. They detect engine problems, repair, maintain, reassemble, restore, and overhaul vehicle components, and they also speak with vehicle owners about problems they may be having. Njerul and Kinuthia (2018) stressed that motor vehicle mechanics in the informal sector, or one-person enterprises, have skills and competencies acquired through formal and informal training; however, most mechanics' skills and levels of competency cannot be determined as to whether the artisans can continue to serve their customers competently. Njeru and Mugi (2018) added that motor vehicle mechanics in the informal sector have formal and informal training and have acquired skills and competences; only the skills and levels of competency of most mechanics are known. Motorcycle mechanics learn their skills. The application of these hands-on skills pertains primarily to assembling components. However, these practical abilities hold limited relevance when it comes to diagnostic capabilities and information processing.

Training and the acquisition of expertise have long been recognized as pivotal pathways to foster the advancement of individuals, organizations, and entire nations. These endeavors are commonly perceived as effective means to counter poverty, inequality, and unemployment, as elucidated by Magidi and Mahiya (2021). Moreover, Idris, A. M., & Abutu, F. (2019) disclosed that it's not only trade and craft skills acquired through training in the automobile trade but also technical knowledge, manual skills, and high thinking skills required to perform effectively in the automobile workplace or learning environment. Auto mechanics showcase diverse skill sets, with some adopting a comprehensive approach to vehicle maintenance and others specializing in specific components. This versatility highlights the uniqueness of each mechanic's path within the field. Motor Vehicle Mechanic Work, a program falling under the umbrella of Technical Vocational Education (TVE), encompasses the acquisition of profound scientific knowledge in areas such as vehicle design, material selection, construction, operation, and maintenance, as expertly articulated by Audu, et.al. in 2014. This domain's multifaceted nature underscores its distinctiveness. Jalal (2013) reveals a large knowledge gap among Nigerian mechanics, particularly when it comes to the repair of car electrical and electronic components. The rapid technological advancement of the automotive industry, with most vehicles today sporting an array of electronically controlled systems accentuates the need for continuous training and retraining to remain abreast of these advancements, underscoring the dynamic and distinctive nature of this sector. The 2018 study by Ziblim, Nkrumah, and Imoro illustrates an unusual paradox in Tamale Metropolis, where many auto technicians have extensive years of experience in automobile repair. Nonetheless, they struggle with the incapacity to efficiently check and repair modern electronically controlled cars., stemming from limited educational and technical proficiency. This irregularity underscores the distinctive challenges faced by mechanics, particularly in their proficiency with modern diagnostic tools, manufacturer's manuals, computers, and internet-based resources that have come to define contemporary vehicle repair practices. Mariskhana, K., Widiarina, W., and Sintawati, I. D. (2022) found that provided the designated mechanic has experience working on the designated type of motor, all mechanics are capable of servicing any kind of motor.

In the Philippines, urban public transport is dominated by road-based modes such as jeepneys, Asian utility vehicles, taxis, tricycles, and pedicabs, some of which provide door-to-door service. Guillen, M. D. V., & Ishida, H. (2004); Guno, C. S., Collera, A. A., & Agaton, C. B. (2021) Roquel, K. I. D., Abad, R. P., & Fillone, A. (2021). They play an important role in providing services to motor vehicle owners in order to keep their vehicles roadworthy and in promoting socioeconomic development. The expertise of a proficient mechanic extends to grappling with the intricacies of contemporary vehicle designs, demanding the effective and efficient utilization of tools. This proficiency is essential for handling everyday tasks like brake repairs, transmission rebuilding, and similar challenges, as well as for adeptly diagnosing issues pertaining to automotive vehicle repair (Ziblim, Nkrumah, and Imoro, 2018). The TESDA-led Philippine TVET Competency Assessment and Certification System is a one-of-a-kind platform for evaluating and certifying the skills of middle-level skilled workers. Anchored in precise competency standards, the assessment process meticulously gauges whether graduates or workers can perform at the level expected within their respective workplaces. Those who meet these exacting competency standards earn certification, thereby fortifying the productivity, quality, and global

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competitiveness of middle-level workers. This process underscores the exceptional commitment to competence and standards in the Philippine context.

This synthesis highlights the challenges and skill gaps faced by motor mechanics in various regions. Mechanic skills are often a combination of formal and informal training, making it difficult to assess their competency. Research indicates that many mechanics struggle to adapt to modern electronic systems and advanced diagnostic tools due to low educational and technical levels. Training and retraining are crucial to keeping up with the rapid technological advancements in the automotive industry. The need for skilled mechanics is emphasized, particularly in regions heavily reliant on road-based transport, where mechanics play a vital role in keeping vehicles roadworthy and promoting socioeconomic development. The role of certification systems like TESDA in ensuring competency standards is also discussed. To address the aforementioned challenges, this study on assessing mechanics' expertise or ability and the competency gap in completing service and maintenance activities is proposed. This study is significant because it aims to identify common mechanics' knowledge, skills, attitudes, and even the competency gap experienced by mechanics when providing services to their customers.

II. METHODOLOGY

The purpose of this study was to find out the skills and competency gaps of motorcycle mechanics in the informal sectors of Surigao del Sur so that a training program could be proposed. Specifically, it evaluated the services and maintenance practices employed by the motor mechanic in the informal sector; determined if there is a significant relationship between the profile and the service and maintenance practices employed by the motor mechanic; and determine whether the respondents comply with the Standard Operating Procedures (SOP) in the delivery of service and maintenance. This study used a quantitative descriptive design and an observational methodology to evaluate the competencies and skill gaps among motorcycle mechanics in the informal sectors. Data on the demographic backgrounds of the participants and their abilities to execute shop maintenance services were collected quantitatively. Similar to this, the goal of qualitative observation research is to improve comprehension through first-hand knowledge, truthful reporting, and quotes from real conversations. Owners of auto repair shops and labor assistants in the 5 municipalities of Surigao del Sur, Philippines were the study participants. Using a specially designed questionnaire based on the training requirements from the Technical Education and Skills Development Authority (TESDA), pertinent data were gathered to address the study's stated objectives. A self-assessment checklist for the respondents and an expert's checklist for the observer were the two sets of training checklists that were created. The performance as the motor mechanic performs servicing and maintenance was evaluated by knowledgeable and professional observers. Descriptive statistics were applied for the quantitative data analysis.

III. RESULTS

Table 1: Demographic profile of the participants

Degree Earned	No. of	Years as motor	NC	II	Relevant	Trainings
		mechanic	Acquired		Attended	
BTTE	1	1-5 years	7			
BSIT	5	6-10 years	8			
College level	8	11-15 years	3	2	0	
HS Graduate	6	More than 15 years	2			

An overview of the demographic details of the participants is shown in Table 1. Twenty auto mechanics from the 5 municipalities, including shop owners and labor assistants, participated in the survey. Most of them completed their high school education and obtained a college degree; they worked as motor mechanics for 6–10 years and 1–5 years, respectively. The majority lack National Competency Certificates related to small engine servicing, and none of the participants have received the necessary training. The only way to keep up with this innovation is to engage in continually related trainings. Additionally, according to Ziblim, B., Nkrumah, & Imoro, I. (2018), many of the auto-mechanics have substantial years of car repair expertise but are unable to check and fix contemporary electronic-managed vehicles because of their low educational and technical skills.

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Servicing and maintenance practices employed by the motor mechanics

Table 2: Mean performance of the servicing and maintenance practices based on respondents' self-assessment

Maintenance Servicing	Weighted Mean	Description
Performing Engine Tune up	3.6	Very Good
Overhauling small engine	3.5	Very Good
Servicing carburetor and fuel system	4.2	Very Good
Servicing starting system	4.1	Very Good
Servicing lubrication system	4.6	Excellent
Servicing ignition system	3.9	Very Good
Servicing brake system	4.9	Excellent
Servicing wheels and tires	3.9	Very good
Servicing clutch system	4.1	Very Good
Servicing electrical system	4.2	Very Good
Servicing suspension system	4.7	Excellent
Performing shop maintenance	3.8	Very Good

The data reveals that the motorcycle mechanics generally demonstrate strong proficiency in various maintenance servicing tasks. With weighted means ranging from 3.5 to 4.9, most skills were rated as Very Good, and three areas—servicing the lubrication system (4.6), brake system (4.9), and suspension system (4.7)—were rated Excellent. These high scores reflect the mechanics' solid foundation in essential and safety-related tasks, particularly in brake and suspension servicing. However, relatively lower scores in overhauling small engines (3.5), engine tune-ups (3.6), and shop maintenance (3.8) suggest areas where deeper technical understanding and consistent practices may be lacking.

The implications of these results point to the need for targeted skills enhancement training, especially in technical areas that require precision, such as engine overhauling and diagnostics. While the informal mechanics demonstrate practical competence, the evolving demands of motorcycle technology and the need for efficiency and safety in servicing call for continuous capacity-building. Structured training programs should focus on updating knowledge in engine systems, shop maintenance standards, and emerging technologies like electronic ignition and fuel-injection systems. Addressing these gaps will not only improve the quality of service but also contribute to the professionalization and sustainability of the informal mechanical sector in rural communities.

Table 3: Mean performance on the servicing and maintenance practices based on expert's assessment

Maintenance Services	Weighted Mean	Description
Performing Engine Tune up	3.6	Very Good
Overhauling small engine	3.5	Very Good
Servicing carburetor and fuel system	4.2	Very Good
Servicing starting system	4.1	Very Good
Servicing lubrication system	4.2	Very Good
Servicing ignition system	3.9	Very Good
Servicing brake system	4.1	Very Good
Servicing wheels and tires	3.9	Very good
Servicing clutch system	4.2	Very Good
Servicing electrical system	4.2	Very Good
Servicing suspension system	4.2	Very Good
Performing shop maintenance	3.3	Good

The expert assessment presented in Table 3 offers an external and objective evaluation of the maintenance servicing skills of informal motorcycle mechanics in rural Surigao del Sur. Overall, the results show that most competencies were rated as Very Good, with weighted means ranging from 3.5 to 4.2, indicating that the mechanics generally perform well in essential servicing tasks. Notably, areas such as servicing the carburettor and fuel system, clutch system, electrical system, and suspension system all received a weighted mean of 4.2—reflecting consistent, proficient performance across both mechanical and electrical components. In contrast, overhauling small engines (3.5) and performing engine tune-ups (3.6) were rated lower, suggesting

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challenges in more complex or technical servicing activities. The lowest-rated area, performing shop maintenance (3.3), fell under the “Good” category, indicating room for improvement in workplace organization, safety, and upkeep.

These expert-validated results largely confirm the findings from the self-assessment, reinforcing that informal mechanics possess reliable foundational skills but exhibit gaps in more advanced technical areas and maintenance-related routines. The consistency between both assessments strengthens the case for designing targeted training interventions focused on improving competencies in engine overhauling, diagnostic tune-ups, and shop maintenance practices. Integrating these topics into future enhancement programs can help raise the overall quality of service, promote workplace safety, and improve the mechanics' adaptability to evolving motorcycle technologies. Furthermore, expert-led workshops and hands-on demonstrations may serve as effective strategies to address the specific weaknesses observed in this assessment. The abilities of an auto mechanic can vary widely; some learn to operate on every component of a car, while others decide to focus on a single component (Idris, A. M., & Abutu, F., 2019). Consequently, the Standard Operating Procedures set by TESDA are not excellently executed when performing shop maintenance services.

Table 4. Relationship between Servicing Practices and the Demographic Profile of the Motorcycle Mechanics

	Degree Earned	No. of Yrs. As Motor Mechanic	NC II Acquired	Relevant Trainings Attended
Correlation value	0.241	0.447	0.048	* not determined
p-value	0.307	0.048	0.840	* not determined
N	20	20	20	

The results presented in Table 4 highlight the relationship between the servicing practices of informal motorcycle mechanics and their demographic profiles, specifically focusing on degree earned, years of experience, acquisition of NC II certification, and relevant training attended. The correlation analysis shows that among the four variables, only “Number of Years as Motorcycle Mechanic” has a moderate positive correlation ($r = 0.447$) with a statistically significant p-value of 0.048, suggesting that experience has a meaningful influence on the mechanics' servicing performance. This implies that the longer a mechanic has been in practice, the more competent they tend to be in their servicing tasks, likely due to accumulated hands-on learning and exposure.

On the other hand, the variables “Degree Earned” ($r = 0.241$, $p = 0.307$) and “NC II Acquired” ($r = 0.048$, $p = 0.840$) both exhibit weak and statistically insignificant correlations with servicing practices, indicating that formal education and national certification alone do not significantly predict actual performance in maintenance activities within this informal sector. Additionally, the correlation for “Relevant Trainings Attended” was not determined, possibly due to insufficient data or variability in training quality and duration. These findings suggest that practical experience remains the most reliable factor influencing service quality in informal motorcycle repair settings. Therefore, enhancement programs should emphasize hands-on, experience-based learning approaches rather than relying solely on formal credentials.

Table 5. Relationship between Shop Maintenance Practices and the Demographic Profile of the Motorcycle Mechanics

	Degree Earned	No. of Yrs. As Motor Mechanic	NC II Acquired	Relevant Trainings Attended
Correlation value	-0.045	0.027	0.241	* not determined
p-value	0.852	0.910	0.307	* not determined
N	20	20	20	

Table 5 presents the relationship between shop maintenance practices and selected demographic variables of informal motorcycle mechanics, including degree earned, years of experience, NC II certification, and relevant trainings attended. The analysis reveals that none of the variables show a statistically significant relationship with shop maintenance practices. Specifically, degree earned ($r = -0.045$, $p = 0.852$) and years of experience ($r = 0.027$, $p = 0.910$) exhibit extremely weak correlations, indicating that neither formal education nor length of experience meaningfully affects how mechanics maintain their workspaces. Although NC II acquired has a slightly higher correlation value ($r = 0.241$), its p-value (0.307) remains statistically insignificant.

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Additionally, data for relevant trainings attended were not determined, suggesting possible inconsistencies in training content or inadequate data collection. These findings point to a concerning trend: shop maintenance is not strongly influenced by education, experience, or credentials, potentially reflecting a lack of emphasis on workplace standards and organization in both informal practice and formal training. This underscores the need to incorporate structured modules on shop management and safety protocols into training programs. Reinforcing the importance of a clean, organized, and safe workspace may lead to improved service quality, efficiency, and mechanic professionalism.

V. CONCLUSION AND RECOMMENDATIONS

The study revealed that informal motorcycle mechanics in rural Surigao del Sur generally possess strong foundational skills in servicing and maintenance practices, as validated by both self-assessment and expert evaluation. Most competencies were rated as Very Good, with a few areas—such as servicing brake and suspension systems—rated Excellent. However, lower ratings in tasks like overhauling small engines, engine tune-ups, and especially shop maintenance suggest notable skill gaps in technical precision and workplace organization. Expert assessments further emphasized these findings, showing that while practical servicing is relatively strong, shop maintenance practices remain underdeveloped.

Furthermore, the results indicate that years of experience as a motorcycle mechanic have a significant positive correlation with servicing performance, highlighting the value of hands-on practice over formal qualifications. On the contrary, degree earned, NC II certification, and relevant training attendance showed weak or no significant relationships with both servicing and shop maintenance practices. This suggests that formal credentials alone may not adequately reflect practical competency, especially in informal settings where real-world experience plays a dominant role. It is recommended to implement targeted training programs focused on improving low-performing areas such as engine overhauling, tune-ups, and shop maintenance. Training should emphasize hands-on, experience-based learning and integrate modules on workplace organization and safety. Experienced mechanics can serve as peer mentors to enhance practical learning. Additionally, the effectiveness of NC II certification should be reviewed to ensure alignment with industry demands. Regular monitoring and follow-up training are also advised to sustain skill development in the informal sector.

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