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Integrating Standard Operating Procedures and Website Content Governance in Academic Services

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ABSTRACT: Information channels for academic services in higher education are commonly managed separately from the procedural documents that underpin them, so procedural updates are not automatically reflected in public content. This study maps the completeness and currency of standard operating procedures (SOPs) for academic services, designs a mechanism linking SOP updates to website content updates, and evaluates the resulting quality of the information channel. One action research cycle was carried out at the academic affairs directorate of a state university in Indonesia, from June to October 2026, through a documentary review of SOPs, a WebQual questionnaire administered to 74 respondents comprising graduates, active students, administrative staff, and lecturers, task-based information-retrieval testing with 30 participants, and a WCAG 2.2 accessibility audit. The review covered 32 SOPs, of which 23 (71.9%) were aligned with current regulations and 9 (28.1%) were newly developed for services previously operating without any formal procedural document, all of them services created by new policies. The designed mechanism treats the issuance of a new SOP version as a formal trigger for content review. The overall WebQual score reached 4.071 on a five-point scale; after correcting standard errors for heteroscedasticity, only information quality and service interaction quality remained significantly associated with user satisfaction. Information-retrieval testing yielded a success rate of 83.3%, with two tasks lowest on all three indicators, while the accessibility audit recorded an increase in criteria met from 78.4% to 97.4% after seven of eight findings were closed. The study's novelty lies in binding procedural document control to content governance as a single chain: content for both problematic tasks was published, current, and sourced from the latest SOPs, yet some users still failed to find it. The study proposes a three-layer governance framework of controlled procedures, synchronised content, and findable content.

KEYWORDS: content governance; standard operating procedure; WebQual; web accessibility; information findability

I. INTRODUCTION

Academic administrative services are an essential component supporting the delivery of higher education. Registration, study-plan submission, programme transfer, changes in enrolment status, and the issuance of graduation documents are administrative processes that every student must complete, and they bear directly on the continuity of their studies. Clarity of procedure and consistency of information therefore determine whether students can complete their academic milestones without administrative obstacles. Within the framework of bureaucratic reform, procedural clarity is realised through documented and accountable standard operating procedures (SOPs) (Regulation of the Minister of Administrative and Bureaucratic Reform No. 35 of 2012, 2012) while Law No. 25 of 2009 on Public Services requires service providers to establish and publish service standards for the public.

Meeting both requirements involves two activities of different character. Managing procedural documents covers the drafting, review, and updating of SOPs, triggered by changes in regulation, policy, or organisational structure. Managing

information on public channels proceeds more dynamically, following the need to communicate with service users. This difference allows the two activities to run separately, even though information on public channels should refer to the procedures in force. The literature on content strategy and governance identifies clear roles, approval workflows, and review mechanisms and schedules as essential elements for keeping content accurate after publication (Sternad Zabukovšek et al., 2023). That approach addresses content governance in the context of website management, but has not connected content updating to the control of the procedural documents on which the information is based.

This situation is evident in the management of academic services at a state university in Indonesia. A preliminary review showed that some academic service SOPs had not been aligned with three rector regulations issued in 2024, which changed both the substance of programme delivery and the units responsible for service provision, while the information on the academic website had not been fully adjusted. Discrepancies between procedural documents and published information create a risk of misunderstanding, and that risk grows for services with large user numbers. Graduation ceremonies at the institution, for instance, are held about twelve times a year with between 678 and 1,473 graduates per period, so inaccurate information on a single procedure can affect a large number of users within a short time. The risk is also unevenly distributed, because not all students have equal access to informal information sources or to direct assistance from service staff. Within the framework of the fourth Sustainable Development Goal on quality education, the findability of service information is therefore not merely a matter of administrative efficiency but part of the effort to ensure equal access for all service users.

Studies of higher education website quality have generally taken two approaches. The first measures user perception, among others through the WebQual instrument covering usability, information quality, and service interaction quality (Pakpahan et al., 2026). The second evaluates technical compliance with accessibility guidelines, particularly the Web Content Accessibility Guidelines (WCAG), on educational and governmental websites (Akram et al., 2023; Amaliah et al., 2023; Ogbuju et al., 2023; Paul, 2023). Both treat the website as the object of evaluation, while the relationship between information quality on the website and the procedural documents that supply it has received little attention. Yet the accuracy of the information users receive is determined not only by the quality of presentation but also by the completeness, currency, and control of the underlying documents.

On that basis, this study treats procedural documents and website content as a single chain of academic service information governance, and poses three research questions. First, what is the state of completeness, currency, and publication status of academic service SOPs at the academic affairs directorate? Second, what governance design can connect SOP updates to website content updates? Third, to what extent is the resulting information channel of good quality in terms of user perception, information-retrieval performance, and accessibility?.

This study offers two contributions. Practically, it produces a governance framework that treats SOP changes as a formal trigger for reviewing website content, together with criteria for classifying which procedures are suitable for publication. Conceptually, it shows that alignment between procedural documents and website content is a necessary but insufficient condition for ensuring that information reaches and can be used by users, so that information-retrieval mechanisms and accessibility need to be treated as a distinct layer of academic service information governance.

II. LITERATURE REVIEW

A. Control of Procedural Documents

A SOP standardises the sequence of activities, the actors, and the outputs of a service process. Guidelines for preparing SOPs in government administration identify dynamism as one of the principles of an SOP, so that standardised procedures must be adjusted when needs or regulations change (Regulation of the Minister of Administrative and Bureaucratic Reform No. 35 of 2012, 2012). Managing SOPs therefore does not end with drafting; it extends to ensuring that the document in use is the version currently in force.

The concept of controlling documented information in quality management systems covers identification, review, approval, version control, distribution, and the withdrawal of obsolete documents (International Organization for Standardization, 2015). This control focuses on the document as its object. When the content of an SOP is translated into another form of information, such as a page on a public website, an additional mechanism is required to ensure consistency between the source document and the derived information. The need for such a linking mechanism underpins the framework developed in this study.

B. Content Governance and Information Architecture

Content strategy treats content as an asset with a life cycle that requires continuous management. Sternad Zabukovšek et al., 2023 position governance as one of the pillars of content strategy, while Getto et al. (2023) emphasise the assignment of roles,

approval workflows, and review mechanisms to sustain content over time. Content governance therefore regulates not only the publication process but also the assignment of responsibility for maintaining and updating content.

Beyond governance, the structure of information determines how easily users can find the content available to them. Information architecture covers organisation, labelling, navigation, and search as mutually supporting components (Santana-Mancilla et al., 2025). Complete and current content is therefore not necessarily effective if users have difficulty locating it. Findability and accessibility often prove to be problems that appear together: an evaluation of open-access journal websites found that weaknesses in findability and weaknesses in accessibility were generally present on the same sites (Mehroof & Rai, 2026). This study links the two aspects by testing both content governance and information-retrieval performance.

C. Web Accessibility

The Web Content Accessibility Guidelines (WCAG) 2.2 set out accessibility criteria based on four principles, namely perceivable, operable, understandable, and robust, with three conformance levels, namely A, AA, and AAA (World Wide Web Consortium, 2023). The guidelines serve as a reference for ensuring that web content can be accessed by users with diverse conditions and abilities.

Several studies show that higher education websites still face accessibility problems in the form of missing alternative text, inadequate colour contrast, and improper heading structure (Akram et al., 2023; Batista & Baluz, 2026; Ogbuju et al., 2023). The same pattern persists when the assessment uses the most recent version of the guidelines: a WCAG 2.2-based evaluation of top-ranked world and Indian university websites still recorded violations at every conformance level (Krittika & Shimray, 2025). Comparable problems have been found on government websites, both in India (Paul, 2023) and across 34 Indonesian provincial government websites, which recorded 2,088 violations across 24 error types (Amaliah et al., 2023). Automated checking can identify some violations, but not all WCAG criteria can be assessed automatically, so this study combines automated checking with manual testing.

D. Measuring Website Quality and Information-Retrieval Performance

WebQual measures website quality from the perspective of end users through three dimensions, namely usability, information quality, and service interaction (Barnes & Vidgen, 2001), and these dimensions remain the basis of current website quality instruments (Morales-Vargas et al., 2023; Suryani et al., 2024). All three are relevant to academic service websites because they cover ease of use, information quality, and the perceived quality of service interaction; its application to academic service websites in Indonesia has been reported, among others, by Pakpahan et al., 2026. In Indonesian higher education, the quality of academic services has also been shown to relate to student satisfaction and loyalty (Supriyanto et al., 2025). Another approach draws on user feedback as a source for assessing digital service quality, as demonstrated through text mining of citizen complaints on a government service portal (Ye et al., 2023). The DeLone and McLean information systems success model positions information quality, system quality, and service quality as factors associated with user satisfaction (Rahmatullah et al., 2025), and a recent review of that model reports a consistent relationship between system and information quality and satisfaction (Kofahi et al., 2025). In this study the framework is used as a basis for interpretation rather than as a structural model to be tested.

User perception does not always reflect the ability to find the information required. Task-based testing permits evaluation of task success, completion time, and perceived ease during the process (Aksu, 2026; Yesmin & Atikuzzaman, 2024) and can identify more specific failure points than general perception measures. Combining the two yields a fuller picture: perception describes the overall experience, while task testing shows whether the available information can actually be found.

E. Positioning of This Study

Table I compares the coverage of five prior studies against the three layers of service information governance that form the framework of this study. The comparison reveals two things. First, studies measuring website quality and studies of accessibility both stop at the findability layer, and each reaches only one aspect of that layer, namely perceived ease in WebQual-based studies and technical accessibility compliance in WCAG-based studies. Second, content governance research reaches the synchronised content layer but does not connect it to the control of the procedural documents that supply the content. No study was found that treats all three layers as a single chain and tests them on the same object. The novelty of this study lies in testing that chain as a whole, rather than in measuring website quality or in the concept of findability, both of which are well established.

Table I. Coverage of Prior Studies Across the Three Layers of Service Information Governance

Study	Focus of the Study	Controlled Procedures	Synchronised Content	Findable Content
Halvorson & Rach (2012)	Content governance practice: roles, approval workflow, review schedule	No	Yes	No
Sternad Zabukovšek et al. (2023)	Document management life cycle and organisational maturity	Yes	Partly	No
Amaliah et al. (2023)	Accessibility audit of 34 provincial government websites	No	No	Partly
Yesmin & Atikuzzaman (2024)	Task-based usability testing of a public university website	No	No	Yes
Santana-Mancilla et al. (2025)	Semantic gaps in the information architecture of a university portal	No	No	Yes
Krittika & Shimray (2025)	WCAG 2.2-based accessibility audit of university websites	No	No	Partly
Pakpahan et al. (2026)	WebQual 4.0 measurement of an academic service website	No	No	Partly
This study	**The procedure–content–findability chain in academic services**	**Yes**	**Yes**	**Yes**

F. Conceptual Framework

Building on this review, the study develops a conceptual framework for academic service information governance consisting of three layers. The first layer is controlled procedures, namely SOPs with adequate service coverage, aligned with the regulations in force, and managed through a document control mechanism; this layer draws on the provisions for controlling documented information in quality management systems (International Organization for Standardization, 2015) and on the principle of dynamism in the guidelines for preparing government administration SOPs (Regulation of the Minister of Administrative and Bureaucratic Reform No. 35 of 2012, 2012). The second layer is synchronised content, namely website information sourced from SOPs and supported by an updating mechanism triggered when the source document changes; this layer draws on the content governance literature, which identifies the assignment of roles, approval workflows, and review schedules as conditions for sustaining content (Getto et al., 2023; Sternad Zabukovšek et al., 2023). The third layer is findable content, namely information that can be located through navigation and search facilities and accessed in line with web accessibility principles; this layer draws on information architecture(Santana-Mancilla et al., 2025) and on the web content accessibility guidelines (World Wide Web Consortium, 2023).

The three layers form a tiered relationship: satisfying the preceding layer is a prerequisite for the next, but does not guarantee it. Controlled SOPs do not by themselves produce synchronised content, just as synchronised content does not by itself guarantee that information can be found and accessed. This framework and the instrument measuring each layer are presented in Figure 1.

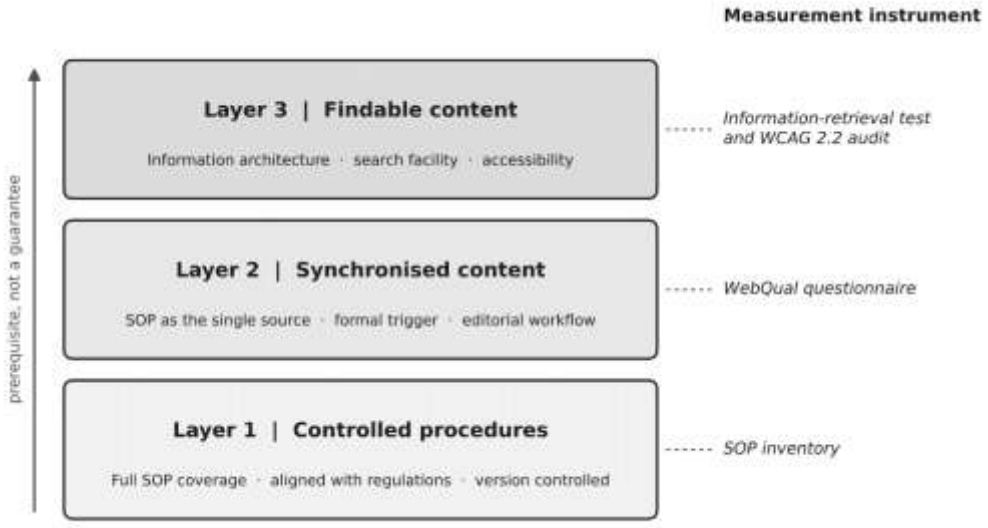


Figure 1. Three-layer conceptual framework of academic service information governance and its measurement instruments

III. RESEARCH METHOD

A. Design and Research Setting

This study uses an action research design because its aim extends beyond mapping current conditions to intervening in work processes and evaluating the results (Haqq et al., 2025). One full cycle was carried out, covering diagnosis, planning, action, and evaluation (Susman & Evered, 1978). The study did not run a second cycle, and the findings at the evaluation stage are positioned as input for a subsequent cycle beyond the scope of this report. Some of the researchers are part of the unit under study, a design identified in the literature as insider action research (Haqq et al., 2025); this position provides access to day-to-day work processes but also requires care to keep the assessment objective (Coghlan & Brannick, 2019). The remaining authors are from outside that unit and contributed to the methodological design and interpretation of results, so the assessment does not rest entirely with the party being evaluated.

The study was conducted at the academic affairs directorate from June to October 2026. The objects of study were the academic service SOP documents together with the service content on the website, while the unit of analysis was the academic service process and the information artefacts students use. The scope was limited to the main academic service domain; the graduation portal was excluded from the evaluation even though it is managed by the same unit, because it is a standalone transaction system.

B. Instruments and Data Collection Procedures

Data were collected through a focus group discussion, a document inventory, a WebQual questionnaire, an information-retrieval test, and an accessibility audit, yielding a picture from the perspectives of internal processes, user perception, actual user performance, and information findability.

1) Focus Group Discussion: At the diagnosis stage, a focus group discussion was held with 10 participants from the Directorate of Academic Affairs, comprising sub-directorate heads, section heads, and service staff. The discussion covered the mapping of service processes, the actors and documents involved, service obstacles, and questions frequently raised by students. The results were used to set priorities for SOP updating, content requirements for the website, and the formulation of tasks for the information-retrieval test.

2) SOP Inventory and Classification: A document study was conducted on the SOPs used by the academic affairs directorate, the unit's scope of work, and the menu structure of the academic service website as of 25 September 2026. Each SOP was classified by procedure name, service group, document status, publication status, presentation format, and page link. Documents were distinguished between SOPs requiring alignment with the three rector regulations issued in 2024 and newly developed SOPs that had not previously existed. Suitability for publication was determined by the characteristics of service users, the actions required of students, the presence of personal data or serially numbered documents, lines of authority and approval, and the need for physical attendance. Procedures that are internal in nature or contain information not intended for the public were not published as procedural documents on the website.

3) WebQual Questionnaire: Website quality was measured using 20 WebQual items comprising seven usability items, nine information quality items, and four service interaction quality items, together with four user satisfaction items as the dependent variable. All items used a five-point Likert scale. The instrument was adapted from WebQual 4.0 (Barnes & Vidgen, 2002), which comprises 22 items across three dimensions, namely eight usability items, seven information quality items, and seven service interaction quality items. The Indonesian wording of the items follows Ariestya et al., (2024) and was then adjusted to the characteristics of the object of study, namely the academic service website under evaluation as a medium for service information. The adjustment proceeded in two directions. Five items from the original instrument were not used. Three service interaction items, namely transaction security, personalisation, and sense of community, are not relevant to an object that is informational in nature and does not handle transactions. Two usability items, namely ease of learning and positive experience, were omitted because their meaning is already covered by the items on ease of use and clarity of navigation, and because they lie close to the user satisfaction variable measured separately. Conversely, three items were added with reference to the conceptual framework of the study, namely readability on mobile devices, completeness of the service workflow, and the consistency of website information with the procedures in force. The last item was necessary because alignment between procedural documents and website content is a layer tested in this study and is not represented in the original instrument. The final composition comprises 20 items, namely seven usability items, nine information quality items, and four service interaction quality items. All adjusted items were reviewed by an expert to check content appropriateness and clarity of wording before the instrument was used, while measurement quality was tested through corrected item-total correlation and reliability coefficients as reported in the results. The questionnaire was distributed online from 31 August to 18 September 2026 to students, graduates, lecturers, and administrative staff of the institution who had previously accessed the website under evaluation, using purposive sampling with the criterion of prior access. Of the 76 responses received, two respondents who stated that they had never accessed the website were excluded, leaving 74 respondents. The questionnaire also contained two open-ended questions on information that was difficult to find and on suggestions for improvement.

4) Information-Retrieval Test: The information-retrieval test used a task-based approach with 30 participants selected purposively on the criteria of being active students or graduates of the institution and willing to complete the full test. Participants came from a range of faculties and study programmes. Each participant completed six information-seeking tasks representing different service groups, producing 180 task attempts. The six tasks are presented in Table II. Testing was conducted online and unmoderated: participants accessed the website from their own devices and recorded their answers and their experience of the task through an online form. The order of the six tasks was randomised across participants to reduce order and learning effects. Each task was assessed on success, completion time, and perceived ease. Success was scored in binary form against an answer key. Completion time was not measured with an automatic timer but was self-reported by participants through graded time ranges on the form, which were then converted to the midpoint of the range in seconds; the time measure in this study is therefore coarse and is used to compare tasks in relative terms rather than as a precise estimate of duration. Perceived ease was rated on a scale of 1 to 5. Tasks with a success rate below 78% and an ease score below 4.00 were designated problematic and prioritised for navigation improvement; the 78% threshold refers to the average success rate derived from an analysis of 1,189 usability test tasks (Aksu, 2026).

Table II. Information-Retrieval Test Tasks

Code	Information Sought	Service Group	Target Page
T1	Number of stages required to transfer to another study programme	Academic transfer	Programme transfer page
T2	First step to be taken in submitting a study plan	Instruction	Study-plan submission page
T3	Purpose of applying for re-registration outside the schedule	Registration	Re-registration page
T4	Documents required to replace a lost diploma	Academic services	Diploma replacement page
T5	Maximum duration of study leave	Enrolment status	Study leave page
T6	Location of the graduation registration schedule	Graduation	Graduation page

5) Accessibility Audit: The accessibility audit covered 55 WCAG 2.2 Level A and AA success criteria on eight pages chosen to represent different content types, namely the homepage, the re-registration page, the study-plan submission page, the study

programme page, the academic calendar page, the news listing page, a single news article page, and the English-language version of the site. The figure of 55 criteria is derived from the 50 Level A and AA criteria in WCAG 2.1, plus six new criteria in WCAG 2.2, minus criterion 4.1.1 Parsing, which has been removed. Testing combined automated checking using axe DevTools and WAVE with manual checking through keyboard-only navigation, zooming to 200%, testing at a screen width of 320 pixels, and testing through a mobile browser. Each criterion was classified as pass, fail, not applicable, or not tested, with a criterion recorded as failing if a violation was found on at least one sample page. The conformance level was calculated as the proportion of criteria passed among the criteria that were applicable and tested. It should be emphasised that this proportion is an internal descriptive indicator for monitoring improvement, not a conformance claim under the W3C definition, which is binary at a given conformance level.

C. Data Analysis Techniques

The SOP inventory data were analysed descriptively using frequencies and percentages by document status, publication status, presentation format, and service group.

The quality of the WebQual instrument was tested through corrected item-total correlation with a threshold of 0.30 and reliability using Cronbach's alpha with a threshold of 0.70 (Cronbach, 1951a; Hair Jr. et al., 2019). Scores for each dimension are presented as means, standard deviations, and respondent achievement levels, with categories of very good (4.21–5.00), good (3.41–4.20), and adequate (2.61–3.40).

The relationship between the WebQual dimensions and user satisfaction was analysed using multiple linear regression with ordinary least squares. Model testing covered residual normality, heteroscedasticity, and multicollinearity based on the variance inflation factor and tolerance (Hair Jr. et al., 2019). Because heteroscedasticity was found, the significance of coefficients was tested using HC3 heteroscedasticity-consistent standard errors, which are recommended for sample sizes below 250 (Long & Ervin, 2000) and remain the standard correction in current practice (Rajh-Weber et al., 2026). A sensitivity check was performed on influential cases based on studentised residuals and Cook's distance (Cook, 1977). Detailed results of the assumption checks are presented in Table VIII.

The information-retrieval data were analysed by success rate, completion time, and ease score for each task. The 95% confidence interval for the success rate was calculated using the Wilson method, which is better suited to proportions in small samples. The accessibility audit results are presented by conformance level and severity of findings. Responses to the open-ended questions were analysed thematically by grouping statements into patterns and were used to strengthen the interpretation of the quantitative results.

D. Research Ethics

Participation in the questionnaire and the information-retrieval test was voluntary. All respondents received an explanation of the purpose of the study and the use of the data before completing the instruments. Respondent identities were not recorded and the data are presented in aggregate form, while information-retrieval test participants were identified only by respondent code. This study did not seek and did not obtain approval from an ethics committee. The research involved no intervention on human subjects, collected no personal data that could identify respondents, and did not involve vulnerable groups; participant consent was obtained in the form of expressed willingness before completing the instruments.

IV. RESULTS

A. Completeness and Publication Status of Academic Service SOPs

The inventory of procedural documents at the Directorate of Academic Affairs, identified 32 academic service SOPs. Their distribution by service group and document status is presented in Table III.

TABLE III. DISTRIBUTION OF ACADEMIC SERVICE SOPS BY SERVICE GROUP AND DOCUMENT STATUS

No	Service Group	Existing SOPs	New SOPs	Total	Percentage
1	Directorate internal	7	0	7	21.9%
2	Academic development	0	5	5	15.6%
3	Enrolment status	3	1	4	12.5%
4	Academic services	4	0	4	12.5%
5	Registration	2	1	3	9.4%
6	Academic transfer	3	0	3	9.4%
7	Tuition and financing	1	1	2	6.3%

No	Service Group	Existing SOPs	New SOPs	Total	Percentage
8	Instruction	2	0	2	6.3%
9	Graduation	1	1	2	6.3%
	Total	**23**	**9**	**32**	**100.0%**

A total of 23 SOPs (71.9%) were existing SOPs requiring alignment with Rector Regulations No. 19, 21, and 22 of 2024, chiefly in terms of procedural substance and the adjustment of implementing units to the new organisational structure. The remaining 9 SOPs (28.1%) were newly developed for services that previously had no formal procedural document. New SOPs were concentrated in the Academic Development group, which consists entirely of five new SOPs, so the need for procedural standardisation appears to increase in services that grow as a consequence of new policies and programmes.

Of all the SOPs, 24 documents (75.0%) were classified as public SOPs and 8 documents (25.0%) as internal SOPs. Internal SOPs are back-office procedures whose execution does not directly involve students, among them the management of diploma blanks, the issuance of rector's decrees, the preparation of the academic calendar, and reporting to the higher education database. Of the 24 public SOPs, 19 documents (79.2%) had been published on website, while 5 documents (20.8%) were still being uploaded at the time of data collection.

Information from public SOPs is not copied directly onto website pages but is translated into a user-oriented format covering requirements, workflow, processing time, and the documents to be prepared. Of the 24 public SOPs, 16 documents (66.7%) are presented as narrative text with a flowchart, 7 documents (29.2%) as narrative text only, and 1 document (4.2%) is accompanied by a downloadable document or form. This composition shows that the presentation format is not yet uniform, particularly in the use of flowcharts.

Overall, the SOP inventory identified two conditions that had to be addressed together: updating procedural documents whenever regulations or the organisational structure change, and synchronising publication so that website content reflects the procedures currently in force. These findings became the basis for designing the governance mechanism presented in the following section.

B. Design of the SOP–Content Synchronisation Mechanism

On the basis of these conditions, a governance mechanism was designed to connect procedural updates to updates of service information on the website. The underlying principle is to treat the SOP as the single reference source for all service content, so that any change to an SOP becomes a formal trigger for reviewing the related content. Content updating therefore no longer depends on the knowledge or initiative of individual website managers. The resulting framework is presented in Table IV and its workflow in Figure 2.

Table IV. Governance Framework for Synchronising SOPs and Website Content

Stage	Trigger	Actors and Authority	Output
Regulatory monitoring	Issuance of a new rector regulation, decree, or policy	Academic development sub-directorate monitors; the relevant section assesses the impact	List of affected SOPs
SOP update	An SOP enters the affected list, or a service is found to have no SOP	The implementing section drafts; the section head reviews; the director approves	New SOP version, numbered and dated
Content translation	Issuance of a new SOP version	The implementing section prepares the material; the content manager translates it into page format	Draft user-oriented page
Review and publication	Page draft completed	The section head checks conformity with the SOP; the content manager publishes	Published page with an update date
Periodic review	Review schedule per service group	The implementing section checks; the content manager updates	Completed conformity checklist
Audit	End of the service cycle or per the audit schedule	Internal directorate audit team	Summary of findings and follow-up

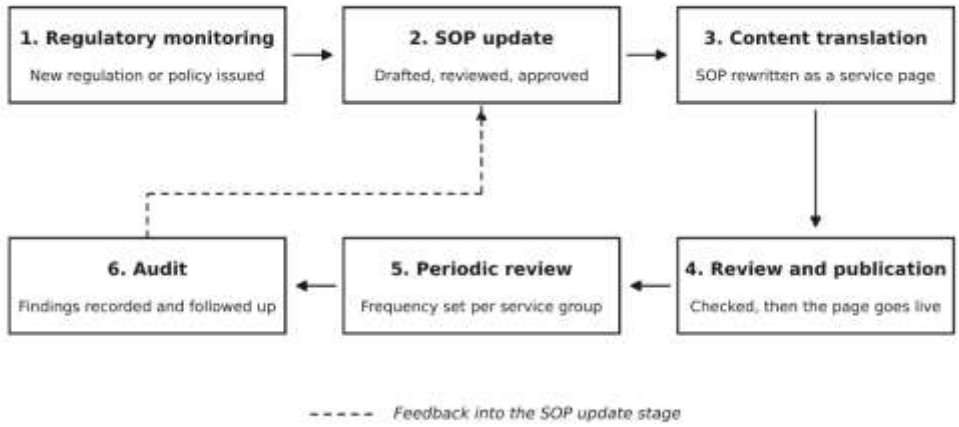


Figure 2. Workflow for synchronising SOP updates and website content

This design extends the scope of control over documented information in quality management systems, which governs identification, review, approval, version control, and document withdrawal (International Organization for Standardization, 2015) but stops at the document as its object. What is added here is a further stage: when a new SOP version is approved, the content translation stage is attached to the procedure itself rather than treated as separate work scheduled later. That addition changes content updating from work dependent on individual initiative into a defined stage with its own actors and outputs.

The operation of the mechanism can be illustrated through the case that prompted this study. At the regulatory monitoring stage, the issuance of Rector Regulations No. 19, 21, and 22 of 2024 produced a list of affected SOPs covering 23 of the 32 SOPs inventoried. At the SOP updating stage, the affected documents were redrafted with version numbering and dating, and at the content translation stage each new SOP version generated a draft user-oriented page, checked by the section head against its source document before publication. Without that third stage, updating stops at the document, which is precisely the condition found in the preliminary review.

The frequency of periodic review is differentiated by the characteristics of each service group. Services tied to the academic calendar, such as registration, study-plan submission, and graduation, are reviewed before the service period begins, because errors in information about these services reach a large number of users within a short time. Services not tied to the academic calendar, such as document replacement or changes in enrolment status, are reviewed at least once per semester. This differentiation keeps the review workload proportionate to the level of risk.

The results of review and audit at the final stage can feed back into SOP updating, so that information management proceeds as a cycle. Under this mechanism, updating information on the website does not depend on a standalone content check but is triggered by changes in the procedures that supply the information.

C. Website Quality from the Users' Perspective

Website quality was evaluated using responses from 74 respondents who had previously accessed the academic services website. Respondent characteristics are presented in Table V.

Table V. Respondent Characteristics

Characteristic	Category	Frequency	Percentage
Respondent status	Graduate	38	51.4%
	Active student	27	36.5%
	Administrative staff	7	9.5%
	Lecturer	2	2.7%
Gender	Female	47	63.5%
	Male	27	36.5%
Access frequency	1–2 times	31	41.9%

Characteristic	Category	Frequency	Percentage
	3–5 times	16	21.6%
	More than 5 times	27	36.5%

All items showed corrected item-total correlations ranging from 0.517 to 0.796, thereby meeting the validity criterion (Hair et al., 2019). Reliability results and dimension scores are presented in Table VI.

Table VI. Reliability and Mean Scores by Dimension

Dimension	Items	Cronbach α	Mean	SD	RAL	Category
Usability	7	0.877	4.071	0.590	81.4%	Good
Information quality	9	0.926	4.084	0.596	81.7%	Good
Service interaction quality	4	0.819	4.057	0.606	81.1%	Good
WebQual total	**20**	**0.957**	**4.071**	**0.563**	**81.4%**	**Good**
User satisfaction	**4**	**0.895**	**4.169**	**0.630**	**83.4%**	**Good**

All dimensions recorded Cronbach's alpha values above 0.70, so the instrument is deemed reliable (Cronbach, 1951b). The three WebQual dimensions obtained relatively close means, ranging from 4.057 to 4.084 with differences between dimensions of less than 0.03 points, so those differences cannot be interpreted as meaningful. The user satisfaction score of 4.169 also falls in the good category.

Item-level analysis offers a more actionable picture. Table VII presents the five lowest-scoring items.

TABLE VII. LOWEST-SCORING ITEMS AS IMPROVEMENT PRIORITIES

Code	Dimension	Item Statement	Mean	RAL
US5	Usability	Searching for information can be completed smoothly without notable obstacles	3.919	78.4%
SI4	Service interaction	A means is available to ask questions or contact the Directorate of Academic Affairs	3.919	78.4%
IQ3	Information quality	The information presented is up to date	3.986	79.7%
US2	Usability	The appearance or design of the website is appealing	4.000	80.0%
IQ8	Information quality	There is no discrepancy between the website and the SOPs or policies in force	4.041	80.8%

All items in Table VII remain in the good category but recorded relatively lower achievement than the other items. The two lowest items, on the smoothness of information search and the availability of a means of enquiry, both scored 3.919, while the highest-scoring item was the statement that the website is useful in helping users obtain the service information they need, at 4.230.

The open-ended responses reinforce these findings and yielded four patterns. First, important announcements are often buried by more recent news posts, while search and filtering by category or year are not available. Second, information on programmes outside the regular curriculum, particularly internships and the independent learning scheme, was judged harder to find and not consistently updated. Third, respondents expected a responsive contact point and a help centre containing frequently asked questions. Fourth, some respondents reported slower page loading during periods of heavy access.

D. Relationship Between Quality Dimensions and User Satisfaction

Linear regression was used to test the relationship between usability, information quality, and service interaction quality on the one hand and user satisfaction on the other. At the level of simple correlation, all three dimensions correlate strongly with user satisfaction, at r = 0.842 for usability, r = 0.861 for information quality, and r = 0.864 for service interaction quality, while correlations between dimensions range from 0.830 to 0.838. The model yielded an R^2 of 0.825 and an adjusted R^2 of 0.817, and is significant overall ($F = 109.856$; $p < 0.001$).

Assumption checks showed no indication of serious multicollinearity, with VIF values of 4.049 to 4.231 and tolerance values of 0.236 to 0.247 (Hair Jr. et al., 2019). Residuals were not normally distributed, however, and heteroscedasticity was present. Full results of the assumption checks are presented in Table VIII, including the Kolmogorov–Smirnov test, which yields a different conclusion from the other two normality tests. The departure from normality stems from two cases with studentised residuals exceeding an absolute value of 3. The Durbin–Watson test is not reported because the data are cross-sectional and therefore have no meaningful time ordering. Primary inference accordingly uses heteroscedasticity-consistent (HC3) standard errors as presented in Table IX.

Table VIII. Results of the Classical Assumption Checks for the Regression Model

Assumption	Test	Statistic	Decision
Multicollinearity	VIF and tolerance	VIF 4.049–4.231; tolerance 0.236–0.247	Met
Residual normality	Shapiro–Wilk	W = 0.915; p < 0.001	Not met
Residual normality	Kolmogorov–Smirnov	D = 0.148; p = 0.071	Marginally met
Residual normality	Jarque–Bera	JB = 65.812; p < 0.001; excess kurtosis = 4.580	Not met
Homoscedasticity	Breusch–Pagan	LM = 12.675; p = 0.005	Not met
Homoscedasticity	Glejser	F = 3.828; p = 0.013	Not met

Table IX. Regression Coefficients with Conventional and HC3-Corrected Standard Errors

Variable	B	Conventional SE	Conventional p	HC3 SE	HC3 p	VIF
Constant	0.043	0.230	0.854	0.385	0.912	–
Usability	0.265	0.108	0.016	0.162	0.106	4.049
Information quality	0.366	0.109	0.001	0.158	0.024	4.231
Service interaction quality	0.382	0.106	0.001	0.171	0.028	4.145

Under HC3 estimation, information quality (B = 0.366; p = 0.024) and service interaction quality (B = 0.382; p = 0.028) show a significant relationship with user satisfaction, whereas usability does not (B = 0.265; p = 0.106). The model remains significant overall (F HC3 = 88.900; p < 0.001). A direct test of the difference between the service interaction quality and information quality coefficients yielded a difference of 0.016 with p = 0.958, providing no statistical basis for claiming that either dimension is more influential.

As a sensitivity check, the model was re-estimated without nine influential cases identified through studentised residuals and Cook's distance (Cook, 1977). With the remaining 65 cases all assumptions were met, R^2 rose to 0.925, and all three dimensions were again significant. Because removing nine cases amounts to 12.2% of the data, that result is reported as supplementary information and is not used as a basis for interpretation; the HC3 estimates in Table IX remain the primary reference.

E. Information-Retrieval Performance

The information-retrieval test with 30 participants produced 180 task attempts, of which 150 were completed successfully, equivalent to an overall success rate of 83.3% (95% Wilson CI: 77.2%–88.1%). The mean completion time was 46.6 seconds, calculated only from successfully completed tasks, with a mean ease score of 3.69 on a five-point scale. Confidence intervals for individual tasks were calculated from 30 participants, while the interval at the overall level was calculated from 180 attempts. Results by task are presented in Table X.

Table X. Information-Retrieval Test Results by Task (n = 30)

Code	Information Sought	Success	95% Wilson CI	Time (Seconds)	Ease
T2	First step in submitting a study plan	93.3%	78.7–98.2%	33.2	4.10
T1	Number of stages to transfer study programme	90.0%	74.4–96.5%	33.7	4.03
T6	Location of the graduation registration schedule	90.0%	74.4–96.5%	23.7	4.50

Code	Information Sought	Success	95% Wilson CI	Time (Seconds)	Ease
T3	Purpose of re-registration outside the schedule	83.3%	66.4–92.7%	32.8	3.93
T5	Maximum duration of study leave	73.3%	55.6–85.8%	82.9	2.80
T4	Documents for replacing a lost diploma	70.0%	52.1–83.3%	73.1	2.77
	Mean across all tasks	**83.3%**	**77.2–88.1%**	**46.6**	**3.69**

Source: processed research data, 2026

T4 and T5 recorded the weakest performance on all three indicators. T4 had a success rate of 70.0%, a completion time of 73.1 seconds, and an ease score of 2.77, while T5 had a success rate of 73.3%, a completion time of 82.9 seconds, and an ease score of 2.80. Completion times for both tasks were roughly twice the average of the other tasks, and their ease scores were more than a full point below those of the others.

It should be noted that with a sample of 30 participants the confidence intervals for the success rates of T4 and T5 still include the 78% threshold, so neither task can be declared statistically different from that threshold if the success rate is read on its own. The basis for designating them problematic is therefore not a single figure but the consistency of all three indicators, which place T4 and T5 lowest by a clear margin. It should also be noted that the 180 attempts are nested within 30 participants, so the attempts are not fully independent.

Information for both tasks was in fact available on the website, presented as narrative text with a flowchart and referring to SOPs that had been aligned with current regulations. The obstacle identified therefore relates to users' ability to find the information available rather than to its absence. By contrast, T6 recorded the highest ease score, at 4.50, with the shortest completion time of 23.7 seconds; the information for that task is placed in a more visible area of the navigation. This pattern is consistent with the WebQual results, particularly the low score on the item concerning the smoothness of information search.

F. Website Accessibility

The accessibility audit covered 55 WCAG 2.2 Level A and AA success criteria across eight sample pages, using a combination of axe DevTools and WAVE together with manual checking. The initial audit recorded 29 criteria met (52.7%), 8 criteria not met (14.5%), 16 criteria not applicable (29.1%), and 2 criteria not testable (3.6%). Excluding criteria that were not applicable or not tested, the conformance level among assessable criteria reached 78.4% (29 of 37 criteria). The two criteria that could not be tested, namely 2.5.3 on label in name and 4.1.3 on status messages, were constrained by the availability of screen reader tools.

The distribution of severity shows six high-severity findings and two medium-severity findings, with no critical findings. Details of the eight findings and their follow-up are presented in Table XI.

Table XI. WCAG 2.2 Criteria Failures and Their Follow-Up

Criterion	Summary of the Finding	Remedial Action	Re-Audit Result
1.1.1 Non-text content	Linked images in the template footer without meaningful alternative text, present on every sample page	Meaningful alternative text added to 7 linked partner logos in the footer and 3 image-role elements on the homepage	Pass
1.3.1 Info and relationships	The homepage has no first-level heading; other pages contain skipped heading levels	The homepage title set as H1, the footer copyright line changed from H5 to body text, and skipped heading levels corrected	Pass
1.4.3 Contrast (minimum)	Low-contrast text elements on every sample page, ranging from 1 to 31 elements per page	Text colour in the main menu and news boxes darkened to a minimum ratio of 4.5:1 (3:1 for large text)	Pass
2.4.1 Bypass blocks	The skip-to-content link on the English version points to an unavailable target	The skip-to-content link on the English version redirected to an existing main-content element ID	Pass
2.4.4 Link purpose (in context)	Empty links without text on every page; repeated links to the same destination	Empty links given names, "Read more" links given hidden descriptions, and news images and headlines merged into a single link	Pass

Criterion	Summary of the Finding	Remedial Action	Re-Audit Result
2.4.5 Multiple ways	The search facility is non-functional across the site, leaving menu navigation as the only route	The search facility was repaired; it now functions on 6 of the 8 sample pages	Fail (still non-functional on the homepage and news listing)
3.1.2 Language of parts	English-language pages retain Indonesian navigation menus without a language marker	The English-version navigation menu translated or marked lang="id"; page titles corrected	Pass
4.1.2 Name, role, value	Icon-based controls and links have no names recognisable to screen readers	Submenu triggers changed to buttons with aria-expanded; 10 icon links and 1 ARIA control given aria-label	Pass

All findings were addressed on 5 October 2026 and re-audited on 10 October 2026 using the same tools and the same eight sample pages as the initial audit. Seven of the eight findings were closed, raising the number of criteria met from 29 to 36 of the 37 applicable and tested criteria, or from 78.4% to 97.3%. In this re-audit the two criteria previously untestable, 2.5.3 and 4.1.3, were successfully tested using the NVDA screen reader and both were met. All 39 applicable criteria have therefore been assessed and the final conformance level reached 38 of 39 criteria, or 97.4%, so the conformance figure is no longer provisional.

One finding remains open. Criterion 2.4.5 on the availability of more than one way to locate a page is still recorded as failing because the search facility, although partially repaired, remains non-functional on 2 of the 8 sample pages, namely the homepage and the news listing page. Because a criterion is recorded as failing if a violation is found on at least one sample page, the partial repair has not changed the status of the criterion. Content filtering by category and year on the announcement listing page, proposed by respondents in the open-ended responses, is also not yet available. Both items form the principal agenda for the next cycle, with the provision of a site map as a second way to locate pages under consideration as an alternative.

The findings that were successfully closed share a common characteristic. Six of the eight findings concern template elements or components used repeatedly across the site, so addressing them required coordination with the technical website managers, and all seven findings that were closed involve corrections to attributes and markup structure, namely the provision of alternative text, the tidying of heading levels, the darkening of text colour, the naming of links, the correction of language markers, and the addition of accessible names to controls. By contrast, the one finding that remains open concerns website functionality rather than markup attributes, so addressing it depends on repairing the search system and cannot be resolved through template editing.

Overall, the results show that the problems with the website relate not primarily to the absence of information but to the connection between procedures, content management, navigation structure, and the presentation of information to users. The inventory shows that some SOPs remain unpublished and that presentation formats are not yet uniform. The user evaluation shows relatively low scores on ease of search, currency of information, and help facilities, while the retrieval testing shows that some information already available is still hard to find. The accessibility audit identified obstacles in the structure and technical components of the site.

V. DISCUSSION

A. Absent Procedures as the Source of Absent Information

The findings in Section IV-A show that the problem of academic service information governance lies not only in the currency of documents but also in the completeness of their coverage. A total of 28.1% of services operated without a formal procedural document, all of them concentrated in services created by new policies. The pattern is understandable in organisational terms: when a new program is launched, the implementing unit is required to provide services immediately, while standardising procedures takes time and coordination. This affects the provision of public information, because a service without an SOP has no fixed reference from which to draft website content. Part of the absence of information on public channels therefore originates in the absence of procedural documents.

The principle of dynamism in the guidelines for preparing government administration SOPs (Regulation of the Minister of Administrative and Bureaucratic Reform No. 35 of 2012, 2012) and the provisions on controlling documented information in quality management standards (International Organization for Standardization, 2015) both govern document maintenance, but neither reaches what happens when document content is translated into another channel. The design in Section IV-B extends the scope of that control by treating the issuance of a new SOP version as a formal trigger for content review. It must be stressed that

this study has no comparative data from before the intervention, so the effectiveness of the mechanism cannot yet be tested, and the design is positioned as a design output still requiring testing over time.

B. Publication Does Not Equal Findability

A comprehensive reading of all four evaluation instruments reveals a single consistent pattern. The accessibility audit recorded that the search facility was not functioning, leaving menu navigation as the only way to locate pages. The perception measure placed the item on the smoothness of information search among the lowest-scoring items. The information-retrieval test showed two tasks with the weakest performance on all three indicators, with completion times roughly twice those of the other tasks. The open-ended responses noted that older announcements are buried by newer posts and cannot be filtered. Four different data sources point to the same problem.

The finding matters because the content for both problematic tasks was in fact available and current. The pages on study leave and on diploma replacement had both been published, contained narrative text and a flowchart, and drew on SOPs aligned with current regulations. Even so, 30.0% and 26.7% of participants failed to find that information. The failure was not captured by the perception measure, because the overall WebQual score remained in the good category and the user satisfaction score reached 4.169. Users rated the website as satisfactory overall, while on the same website some tasks could not be completed.

The first implication is methodological. Perception measures alone are not adequate for evaluating a service information channel, because respondents rate their overall impression and tend to attribute failure to find information to themselves rather than to the website. Combining perception measures with performance measures, as recommended in the usability testing literature(Yesmin & Atikuzzaman, 2024), yields a different and more actionable picture.

The second implication is conceptual. A two-layer framework that treats controlled procedures as the basis for synchronised content does not guarantee that information reaches users. A third layer is required, namely findable content, covering information architecture, search and filtering facilities, and accessibility. That layer operates on a different logic: whereas the first two layers are triggered by regulatory change, the third is triggered by user behaviour and can therefore only be monitored through periodic user testing rather than document inspection.

Comparison across tasks offers practical indications of what determines findability. The best-performing tasks concerned services with a prominent position in the main menu and a dedicated block on the homepage, while the two problematic tasks concerned services located deeper in the menu. Both problematic services also share the same characteristics: they are individual in nature, not tied to the academic calendar, and accessed only when a student faces a particular circumstance. Services of this kind have no routine moment that prompts students to learn about them in advance, so searching is done under pressure and without prior knowledge of where the information is located. A search facility is most needed for services with these characteristics, yet it was precisely that facility that was not functioning at the time of the audit.

C. Quality Dimensions That Are Not Separable

The results show that information quality and service interaction quality are significantly related to user satisfaction, while usability is not. The direction of this finding is consistent with the information systems success framework, which positions information quality and service quality as antecedents of user satisfaction (Kofahi et al., 2025; Rahmatullah et al., 2025), and also aligns with findings in Indonesian higher education that the quality of academic services is closely related to user satisfaction (Supriyanto et al., 2025).

Interpretation at the level of partial coefficients requires considerable caution. Correlations between dimensions range from 0.830 to 0.838, almost matching the correlations of each dimension with user satisfaction, which range from 0.842 to 0.864, while the alpha for all 20 items reaches 0.957. This pattern indicates that the three dimensions are not adequately differentiated in these data, so the partial contribution of each is difficult to separate and the loss of significance for usability cannot be read as evidence that usability is unimportant. This study did not conduct tests of discriminant validity or common method bias, so the defensible conclusion is that user satisfaction is strongly related to the quality of the information channel as a whole rather than that one dimension is more decisive than another.

More actionable is the comparison between item achievement and the pattern of open-ended responses. The item measuring the availability of a means to ask questions or contact the Directorate of Academic Affairs is among the lowest-scoring items, at 3.919, while the open-ended responses reinforce the same point through expectations of a responsive contact point and a help centre. The pattern is understandable given the transactional and administratively consequential character of academic administrative services: students need not only accurate information but also a way to confirm matters that remain unclear. That need for confirmation increases when information-retrieval facilities are weak, so weakness in the findability layer raises demand on an interaction channel whose own achievement is also low.

D. Technical Accessibility as Part of Findability

The eight criteria failures found in this study centre on alternative text, colour contrast, heading structure, and link clarity. The pattern resembles that reported in accessibility studies of university websites in other countries, including 33 university sites in the Arab region (Akram et al., 2023), 42 public university sites in Nigeria (Ogbuju et al., 2023), and federal and state university sites in Brazil (Batista & Baluz, 2026), and also resembles findings across 34 Indonesian provincial government sites (Amaliah et al., 2023). The similarity holds even at well-resourced institutions, since a WCAG 2.2-based evaluation of top-ranked world universities still found violations of the same kinds of criteria (Krittika & Shimray, 2025). This consistency suggests that accessibility problems on public institution websites tend to be structural rather than specific to any one institution.

The finding that six of the eight failures lie at the level of the site template carries an important governance implication. Failures of that kind cannot be corrected by content managers because they fall outside their authority, so a content governance framework needs to include coordination with technical website managers as part of the workflow rather than as ad hoc handling. Without that, accessibility findings will recur each time the template is updated.

In relation to the provision of inclusive educational services, accessibility should not be treated as a technical matter separate from service quality. When links lack names recognisable to screen readers or text lacks adequate contrast, some students lose the ability to complete administrative procedures independently and must rely on help from others. That dependence is an additional barrier not experienced by other students.

The failure of criterion 2.4.5 illustrates this on a broader scale. A non-functioning search facility closes off the alternative route for everyone, so the failure of a single accessibility criterion affects all users, not only those with disabilities. That criterion is also the only finding left open at the end of the cycle, which is consistent with the distinction that emerged in the repair results: findings concerning attributes and markup structure can be resolved through template editing, whereas findings concerning website functionality require system repair and therefore take longer. This connects the accessibility audit findings to the quality education target of the fourth Sustainable Development Goal, because ensuring that service information can be reached by users with the most limited capabilities simultaneously improves findability for all users.

E. Practical Implications

For the academic service unit, this study yields five improvement priorities, all derived from the findings. First, completing the repair of the search facility on the homepage and the news listing page, and adding filtering by category and year on the announcement listing page. This priority is placed first because the problem is identified by four data sources at once and is the only accessibility finding left open at the end of the cycle. If a full repair cannot be carried out in the near term, providing a site map can first satisfy the requirement for a second way to locate pages under criterion 2.4.5. Second, providing a clear contact point on every service page together with a help centre containing frequently asked questions, since the item on means of enquiry is among the lowest achievements and is reinforced by the open-ended responses. Third, completing the publication of the five public SOPs not yet published. Fourth, standardising the presentation format by adding flowcharts to the seven pages still in narrative form. Fifth, reviewing menu depth for individual services not tied to the academic calendar, which proved the hardest to find.

For higher education institutions more broadly, the finding on the absence of SOPs in services created by new policies indicates the need to treat procedure development as part of a programme launch rather than as follow-up work. In addition, content governance needs cross-unit authority so that improvements at the level of the site template can be carried out without depending on ad hoc initiative.

For policy formulation, this study offers the observation that the obligation to publish service standards for the public (Law No. 25/2009) should not be read solely as an obligation to issue documents. A document that has been published but cannot be found does not yet fulfil the intent of that provision, and compliance indicators that merely count the number of documents uploaded risk obscuring the very problem that users experience.

F. Limitations of the Study

This study is subject to three methodological limitations. First, the design was confined to a single institution and a single point of measurement, and no baseline was available except for the accessibility audit; the findings therefore describe the condition observed after the intervention and cannot be claimed as evidence of improvement in information quality. Second, respondents were obtained non-probabilistically through voluntary participation and graduates predominate in the resulting composition, so the perception scores cannot be generalised to the population of website users. Third, the regression model violated the assumptions of residual normality and homoscedasticity, and although corrected standard errors were applied, the estimated contribution of each dimension must be read as indicative rather than conclusive; completion times in the information-retrieval test were self-reported, which restricts the time measure to relative comparison between tasks.

These limitations set the direction for further research: periodic measurement so that change in information quality can be observed over time, broader coverage of information-retrieval tasks, and replication of the governance framework across several higher education institutions in order to test its transferability.

VI. CONCLUSIONS

This study concludes that the gap between procedural management and website content management can be closed by a defined trigger rather than by individual initiative. Aligning 23 existing SOPs and developing 9 new ones established the documentary basis for such a mechanism, and the concentration of all newly developed SOPs in services created by recent policies indicates that procedural gaps arise where services are launched ahead of their documentation. The governance design therefore treats the issuance of a new SOP version as a formal trigger for content review, with review frequency differentiated by service group. Where a before-and-after comparison was possible, the mechanism demonstrably worked: accessibility conformance rose from 78.4% to 97.4% once seven of eight findings were closed.

The principal conclusion of the study, however, is that alignment between procedures and content does not by itself ensure that information reaches its users. Perception-based measurement did not reveal this gap. The website was rated within the good category, with an overall WebQual score of 4.071 and user satisfaction of 4.169, yet on the same website 30.0% and 26.7% of participants failed to complete two of the six retrieval tasks, both concerning services whose content had been published, was current, and drew on aligned SOPs. The study therefore proposes a three-layer governance framework of controlled procedures, synchronised content, and findable content, in which the third layer is driven by user behaviour and consequently cannot be monitored through document inspection alone but requires periodic user testing. The search facility that remains only partly functional is the single finding in this layer left open at the end of the cycle, and it defines the agenda for the next.

These conclusions rest on a single institution, a single action research cycle, and a single point of measurement. Testing the transferability of the framework at other institutions and observing changes in information quality over time therefore remain necessary.

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