Department of Digital Business
Journal of Artificial Intelligence and Digital Business (RIGGS)
Homepage: https://journal.ilmudata.co.id/index.php/RIGGS
Vol. 4 No. 4 (2025) pp: 2069-2077
P-ISSN: 2963-9298, e-ISSN: 2963-914X

AHP-Based Platform Selection For Zakat Management System At Rumah Amal ULM

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Abstract

The improvement of information technology and the COVID-19 pandemic have triggered digitalization across all industry sectors, including zakat institutions. However, various constraints including resource considerations remain a decisive aspect impeding digital adoption in zakat management processes. While several studies on zakat management information system design have been conducted, none specifically elaborate on systematic decision-making framework for platform selection in zakat management digitalization. This research seeks to fill this gap by investigating the use of Analytical Hierarchy Process (AHP) to identify dominant criteria in platform selection decision-making for zakat digitalization at Rumah Amal ULM (RAUL) and to retrospectively analyze their platform choice against five alternative platforms using seven evaluation criteria. RAUL was selected as a case study because it is a newly established zakat institution that had already implemented a low-code platform using Google Sheets with Apps Script prior to systematic evaluation. Data were collected through interviews with RAUL leadership. The analysis results show that the low-code platform emerged as the most suitable choice, confirming RAUL's original platform selection decision. The study also reveals that cost and accessibility emerge as nearly equally dominant criteria, contributing 27.5% and 27.3% respectively to the decision-making process, while technical considerations such as IT infrastructure and technical skill serve as secondary factors. These findings validate RAUL's initial decision while offering a structured decision-making framework that provides practical guidance for similar newly established institutions to decide which platform is more suitable to support their digital transformation processes.

Keywords: *AHP, Platform Selection, Zakat Management System, Digital Transformation, MCDM*

1. Introduction

The development of information technology and the COVID-19 pandemic have become digitalization triggers for industry stakeholders in every sector, including the zakat institutions. However, in practice there is a mismatch between people's donation patterns toward online methods that show increasing trends in every age category with majority of zakat institutions that have not fully implemented digitalization in their zakat management processes [1]. The resource constraint whether in terms of procurement or management of technology becomes one of the crucial factors that hinders the digitalization process at zakat institutions. [2] mentioned that the challenge in the digitalization process is the lack of accessibility and digital literacy, because not everyone gets the same chance to access digital technology. This condition is strengthened [3] who mentioned that the presence of technology experts who follow the technology trends is important for ensuring digital adoption effectivity in zakat management. Another factor that arises during the digitalization process is the lack of IT Infrastructure [4]. Lastly, the most contributing factor that hinders the digitalization process is cost. [5] stated that zakat institutions often face inefficiencies like higher operational costs and unintegrated data in zakat management.

In order to answer these challenges, there exist several studies that discuss system designs for zakat management using various types of platforms. Among them are studies on zakat management systems using Microsoft Excel with macros [6], Microsoft Excel and Visual Basic [7], desktop-based platforms using Microsoft Access [8], web-based platforms [9], [10], [11], [12], mobile-based platforms using Android [13], [14], and low-code platforms using Google Sheets with Apps Script [15].

The studies mentioned above have generally shown that their designed systems are able to fulfil user requirements in terms of functionality. However, there is a fundamental similarity that is important to investigate further. This concerns the lack of explicit explanation regarding the rationale for using the proposed platform compared to other

alternative platforms. Many studies only justify their platform selection based on limited aspects, such as the availability of human resources who understand and are able to operate the platform, without further assessing why the proposed platform is more suitable or more appropriate for the conditions that users or institutions face compared to other alternatives. This may make the adoption of their work by other studies more difficult to implement, as researchers may be forced to rely on personal justifications or assumptions when selecting platforms for different case study conditions, rather than evidence-based decision-making frameworks.

Despite the growing body of research on zakat management systems, most studies emphasize technical implementation rather than the rationale behind platform selection. This creates a critical gap, as decision making without systematic evaluation may result in inefficiency, unsustainability, and difficulties in replication across different institutions. Therefore, this study contributes by addressing the gap through a structured multi-criteria decision-making framework using the AHP method. AHP is a method for multi-criteria decision making introduced by Saaty in the 1990s that employs a hierarchical structure to decompose complex problems, using paired comparisons based on expert judgment to assign weights to criteria and rank alternatives [16]. Several existing studies have discovered that AHP is able to identify important criteria for decision making, along with choosing the best alternative given the criteria. [17] used AHP for selecting payment gateways in e-commerce using six criteria and five alternatives, and discovered that transaction cost of e-wallets was the main criterion while Doku was selected as the best alternative payment gateway. Likewise, [18] applied AHP to discover priority of students online buying behavior in the pandemic era using five criteria, and found that the most important criterion was the ease of comparing goods and prices, and

This research was conducted at Rumah Amal ULM (RAUL), a higher education zakat institution located in Banjarmasin, South Kalimantan, which was recently inaugurated in March 2025. Prior to the inauguration, they needed an information system that would be operational for their zakat management processes. Due to being newly established and experiencing limited resources, they selected what appeared to be the most suitable platform for their circumstances – a low-code platform using Google Sheets with Apps Script [15] as an initial solution before potentially migrating to a more sophisticated system. However, this platform selection was made without a systematic evaluation of decision-making criteria. This research retrospectively analyses their platform selection decision using the AHP method to evaluate five potential platform alternatives: Excel-based platform, desktop-based platform, web-based platform, mobile-based platform and low-code platform. Seven criteria are used in this analysis: cost, technical skill, accessibility, IT infrastructure, maintenance, scalability, and security. This research attempts to identify the most dominant criterion in platform selection decision-making for zakat management digitalization and to determine whether RAUL's chosen platform aligns with systematic multi-criteria evaluation results. The findings are also expected to assist other researchers and practitioners in making informed decisions for selecting suitable platforms across various organizational contexts, especially for digitalizing zakat management processes with relevant criteria.

2. Research Methods

To retrospectively examine RAUL platform selection decision, this study uses AHP approach as main instrument and analysis method. AHP was selected due to its ability to systematically handle both quantitative and qualitative criteria through structured pairwise comparisons, making it particularly suitable for complex platform selection decisions involving multiple stakeholders. As for the research steps we adopted from [19] with some adjustment to match our case. The research flowchart is defined in Figure 1. Starting with defining the problem, criteria and alternative with some literature study to strengthen the theorical basis.

DOI: https://doi.org/10.31004/riggs.v4i4.3657

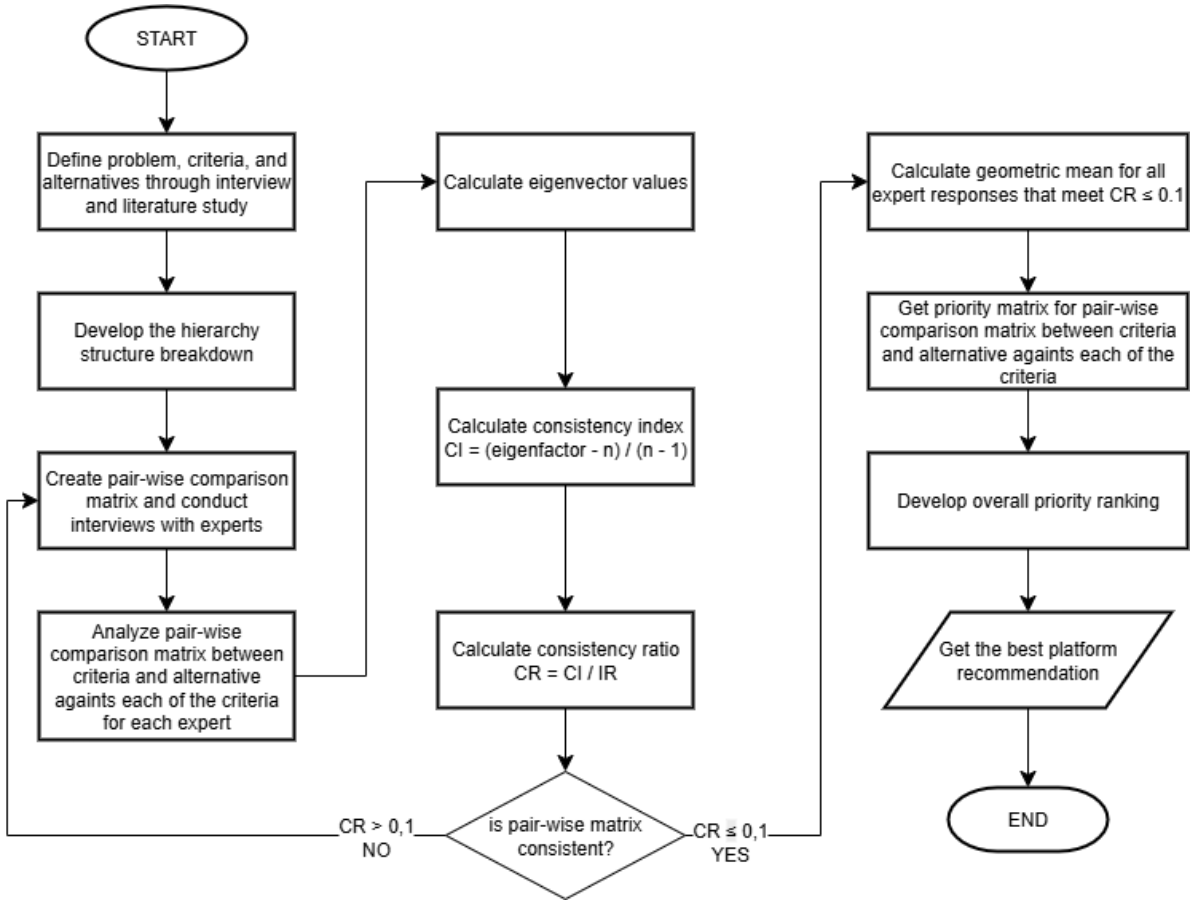

Figure 1. Research Flowchart

After the problem, criteria, and alternatives are defined, then we continue to develop the hierarchy structure breakdown. Then the next step is to create pair-wise comparison matrix and conduct interviews with experts. For pair-wise comparison matrix we must build comparison matrix priority of the seven criteria and for each alternative against each of the criteria. After that we conduct interviews with experts. Due to RAUL's recently established status and relatively small organizational structure at that time, we selected two key experts to fill the questionnaires: the head of RAUL and the advisor. Although this study only involved two experts due to RAUL's organizational size, the decision-making authority of these individuals provides a valid basis for analysis. While the sample size is limited, the selection follows established expert selection criteria emphasizing that expertise relevance and quality are more critical than sample size for eliciting valid expert knowledge [20]. Both experts possess deep knowledge of platform requirements and organizational needs, while representing different perspectives - strategic leadership and advisory roles - ensuring diversity in expertise. The experts choose one of the two options they think is most important using Saaty's fundamental scale as shown in Table 1.

Table 1. Saaty's Fundamental Scale

Intensity of importance on an absolute scale	Definition	Explanation
1	Equal importance	Two activities contribute equally to the objective
3	Moderate importance of one over another	Experience and judgment strongly favour one activity over another
5	Essential or strong importance	Experience and judgment strongly favour one activity over another
7	Very strong importance	Activity is strongly favoured, and its dominance demonstrated in practice
9	Extreme importance	The evidence favouring one activity over another is of the highest possible order of affirmation
2, 4, 6, 8	Intermediate values between the two adjacent judgments	When compromise is needed

The step continues by analyzing pair-wise comparison matrices for criteria and alternatives against each of the criteria for each expert individually. Next, we calculate the eigenvector values, consistency index (CI) and

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consistency ratio (CR) for consistency testing for each expert's judgment. If any CR value exceeds 0.1, we ask the respective experts to reevaluate their assessments. We proceed to calculate the geometric mean for all expert responses only if both individual expert judgments meet the CR ≤ 0.1 threshold. After obtaining the combined matrices through geometric mean, we then get the priority matrix for pair-wise comparison matrix between criteria and alternatives against each of the criteria. At this point, we discover the main criteria that will contribute most to overall decision-making process. However, we continue to develop overall priority ranking to determine which platform alternative is the best recommendation.

3. Results and Discussions

To digitalize the zakat management process, zakat institutions must first assess which platform is suitable for their specific conditions. The most suitable platform for one institution may not be optimal for another due to differing organizational contexts. Therefore, institutions must conduct a systematic assessment using relevant criteria to select the appropriate platform. In this paper, criteria have been determined through interviews and brainstorming references with the head of Rumah Amal ULM and its advisor. Based on the discussion result, criteria were obtained, namely: cost (C1), technical skill (C2), accessibility (C3), IT Infrastructure (C4), maintenance (C5), scalability (C6), and security (C7), with their detail explanation shown in Table 2.

Table 2. Criteria Description

Code	Criteria	Explanation
C1	Cost	Total financial investment for implementation and operation, considering licensing, development, and training costs relative to institutional budget constraints.
C2	Technical Skill	Required level of programming expertise and technical knowledge from staff to implement, customize, and operate the platform.
C3	Accessibility	User-friendliness and ease of access for administrators and beneficiaries across different devices and technical backgrounds.
C4	IT Infrastructure	Hardware and network requirements needed to support platform operation, including servers, bandwidth, and system integration needs.
C5	Maintenance	Ongoing support requirements including updates, bug fixes, technical support, and long-term sustainability considerations.
C6	Scalability	Platform's capacity to accommodate institutional growth in users, transactions, data volume, and functional requirements.
C7	Security	Data protection capabilities including encryption, access controls, and compliance with privacy regulations for sensitive information.

Source: Data processing (2025)

In addition to the evaluation criteria, five platform alternatives were identified for assessment: excel-based platform (P1), desktop-based platform (P2), web-based platform (P3), mobile-based platform (P4), and low-code platform (P5). The detailed explanation of these alternatives is presented in Table 3.

Table 3. Alternative Description

Code	Alternative	Explanation
P1	Excel-based platform	Platform built on spreadsheet applications (e.g., MS Excel, LibreOffice Calc) for local data management and calculations.
P2	Desktop-based platform	Platform built using database software (e.g., MS Access) or standalone applications installed on local computers.
P3	Web-based platform	Platform built as browser-accessible applications requiring web development technologies and hosting infrastructure.
P4	Mobile-based platform	Platform built as native mobile applications (e.g., Android APK, iOS apps) for smartphone and tablet devices.
P5	Low-code platform	Platform built using simplified development tools (e.g., Google Sheets with Apps Script) with minimal programming requirements.

Based on the identified criteria and alternatives, a hierarchical structure was developed for the AHP analysis. The hierarchy structure used in this study is presented in Figure 2.

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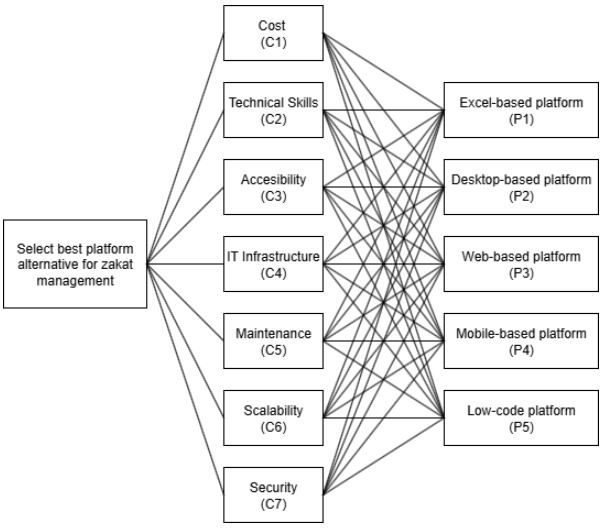

Figure 2. AHP Hierarchy

This hierarchy structure, together with Saaty's fundamental scale model, was used to build a structured questionnaire for expert interviews. Each expert response was subsequently tested for consistency and required to fulfill the Consistency Ratio (CR) ≤ 0.1 requirement. The data was calculated and synthesized using Microsoft Excel version 2021. Table 4 presents the priority weights for each expert's responses, while Table 5 shows the consistency check results for each expert. As for experts, we use code E1 for Head of Rumah Amal ULM and E2 for Advisor of Rumah Amal ULM

Table 4. Priority Weight for Each Expert Responses

Criterion	Weight		Alternative	Weight	
	E1	E2		E1	E2
C1	0.277	0.266	P1	0.209	0.246
			P2	0.112	0.148
			P3	0.047	0.042
			P4	0.047	0.042
			P5	0.586	0.521
C2	0.098	0.110	P1	0.307	0.238
			P2	0.199	0.148
			P3	0.043	0.053
			P4	0.043	0.037
			P5	0.409	0.524
C3	0.231	0.312	P1	0.031	0.038
			P2	0.041	0.041
			P3	0.309	0.410
			P4	0.309	0.215
			P5	0.309	0.296
C4	0.121	0.112	P1	0.399	0.349
			P2	0.300	0.349
			P3	0.035	0.040
			P4	0.037	0.040
			P5	0.228	0.223
C5	0.095	0.097	P1	0.256	0.359
			P2	0.256	0.225
			P3	0.051	0.057
			P4	0.037	0.039
			P5	0.401	0.320
C6	0.089	0.046	P1	0.041	0.041
			P2	0.058	0.046
			P3	0.409	0.467
			P4	0.390	0.321
			P5	0.103	0.126
C7	0.089	0.057	P1	0.036	0.040
			P2	0.062	0.055
			P3	0.403	0.390
			P4	0.392	0.390
			P5	0.107	0.126

DOI: https://doi.org/10.31004/riggs.v4i4.3657

Table 5. Consistency Result for Each Expert Responses

Pairwise Comparison	E1			E2		
	λmax	CI	CR	λmax	CI	CR
Criterion	7.203	0.034	0.026	7.374	0.062	0.047
Alternatives against C1	5.241	0.060	0.054	5.270	0.067	0.060
Alternatives against C2	5.262	0.065	0.058	5.302	0.075	0.067
Alternatives against C3	5.060	0.015	0.013	5.087	0.022	0.020
Alternatives against C4	5.125	0.031	0.028	5.051	0.013	0.012
Alternatives against C5	5.118	0.030	0.027	5.323	0.081	0.072
Alternatives against C6	5.070	0.018	0.016	5.155	0.039	0.035
Alternatives against C7	5.291	0.073	0.065	5.267	0.067	0.060

Having confirmed that all individual expert judgments met the consistency requirement (CR ≤ 0.1), the next step involved aggregating these responses to obtain a single group judgment. The responses were aggregated using the geometric mean method, an approach employed based on Saaty (2008) who demonstrates that the geometric mean is the only method that preserves the reciprocal property when combining individual judgments into a single group judgment. As shown in Table 5, all consistency ratio values are well below the maximum threshold of 0.1, confirming the logical consistency of expert assessments. This validation is important, as inconsistent judgments would undermine the reliability of AHP results. CR ≤ 0.1 is widely adopted as a standard to ensure the logical coherence of pairwise comparisons. After the consistency requirement was satisfied, the next step is to calculate the priority weight after aggregation. The calculation results are shown in Table 6.

Table 6. Priority Weight After Aggregation

Pair-wise comparison	C1	C2	C3	C4	C5	C6	C7
Each of Criterion	0.275	0.104	0.273	0.115	0.096	0.064	0.073
Priority Ranking	1	4	2	3	5	7	6
P1	0.226	0.271	0.034	0.374	0.306	0.040	0.038
P2	0.128	0.173	0.041	0.324	0.240	0.051	0.058
P3	0.045	0.048	0.360	0.037	0.055	0.440	0.397
P4	0.045	0.040	0.259	0.039	0.038	0.356	0.392
P5	0.556	0.468	0.305	0.226	0.361	0.114	0.115

The priority weights from Table 6 were then used to compute the overall priority ranking for each platform alternative. The final ranking results, which determine the most suitable platform, are shown in Table 7.

Table 7. Overall Priority Ranking

Alternatives	C1	C2	C3	C4	C5	C6	C7	Weight	Ranking
P1	0.062	0.028	0.009	0.043	0.029	0.003	0.003	0.178	3
P2	0.035	0.018	0.011	0.037	0.023	0.003	0.004	0.132	5
P3	0.012	0.005	0.098	0.004	0.005	0.028	0.029	0.182	2
P4	0.012	0.004	0.071	0.004	0.004	0.023	0.029	0.147	4
P5	0.153	0.049	0.083	0.026	0.035	0.007	0.008	0.361	1

Based on Table 6, the result clearly shows that C1 (cost) and C3 (accessibility) emerge as the dominant criteria to determine platform selection for zakat management digitalization at Rumah Amal ULM, with weights of 27.5% and 27.3% respectively. The dominance of cost and accessibility reflects the reality faced by newly established zakat institutions, where financial sustainability and user reach are more urgent than advanced technical features. It indicates that institutions in early stages of digital transformation tend to adopt compromise solutions, such as low-code platforms, before migrating to more sophisticated systems. Technical aspects including C4 (IT infrastructure) and C2 (technical skill) constitute the next tier of criteria contributing to the decision-making process with weights of 11.5% and 10.4% respectively. It reflects the technical readiness that must still be taken into account, though not as strongly as cost and accessibility. Finally, C7 (security) and C6 (scalability) represent the least influential criteria in the overall decision-making process with weights of 7.3% and 6.4% respectively. Regarding platform alternative, P5 (low-code platform) emerged as the optimal choice with a priority weight of 36.1%, followed by P3 (web-based platform) at 18.2%, P1 (excel-based platform) at 17.8%, P4 (mobile-based platform) at 14.7% and P2 (desktop-based platform) at 13.2%.

The AHP calculation result validate the work by [15], confirming that a low-code platform based on Google Sheet and App Scripts is indeed the most suitable platform for Rumah Amal ULM. This distribution also suggests that newly established institutions such as RAUL tend to focus on short-term practicality and ease of access rather than long-term technical aspects like scalability or security, which usually require more resources and expertise. Interestingly, maintenance received a lower weight than expected, even though it is important for long-term

DOI: https://doi.org/10.31004/riggs.v4i4.3657

sustainability. This implies that RAUL currently focuses more on operational viability and immediate usability, postponing concerns about long-term system upkeep. Such prioritization aligns with studies of early-stage organizations that often emphasize cost minimization and ease of adoption when adopting new technology. Furthermore, the result of Table 6 also validates the prominence of cost as the most critical factor, aligning with [5] who found that that zakat institutions often face cost-related inefficiencies. For Rumah Amal ULM, as a newly established institution, prioritizing cost as the primary platform selection factor is rational and necessary. The emergence of web-based platform as the second choice indicates that Rumah Amal ULM recognizes the superior performance capabilities of web-based platform compared to low-code platforms and other. However, due to the high investment to develop proper websites with comprehensive zakat management capabilities, they chose the low-code platform as a more viable solution. This finding also validates research by [22] and [23] regarding the significance of technical aspect (C2 and C4) in decision making of platform selection. They become secondary consideration in our finding; this might happen due to their close relationship with cost implication.

Several noteworthy findings emerge from the AHP results. C3 (accessibility) rank nearly equal to C1 (cost), suggesting that Rumah Amal and probably similar institution in general generally desire systems with enhanced accessibility for both internal operations and stakeholder engagement. However, not all institutions possess sufficient resource leverage to prioritize accessibility over cost consideration. This might happen especially when the institution is newly established like Rumah Amal ULM or relatively small-scale. This dynamic is reflected in the alternative ranking where P3 (web-based system) surprisingly emerged as second choice, surpassing P1 (excel-based platform) despite its higher implementation costs. If cost was not the primary constraint, P3 would likely emerge as the top choice. This assertion is reflected by the practices of prominent zakat institutions such as BAZNAS, LAZISMU, Dompet Dhuafa, and Rumah Zakat which have a sophisticated website for their zakat management and additionally employ mobile-based platform to extend their engagements to muzakki, especially younger generation that have better digital literacy and prefer flexibility. Thus, P5 (low-code platform) emerges as the optimal choice because it offers similar flexibility to web-based platform with downgraded features and significantly lower implementation costs [24]. This positioning enables either newly established nor resource-constrained zakat institutions to achieve web-like capabilities while maintaining cost efficiency, explaining P5's dominant priority weight of 36.1% in the analysis.

These findings contribute to the broader understanding of technology adoption in zakat institutions, particularly demonstrating how newly established zakat institutions navigate the trade-off between functionality and resource constraints. The prominence of cost and accessibility as dominant criteria validates existing theories on technology adoption in newly established and resource-constrained zakat institution, while the emergence of low-code platforms as the optimal solution reflects the growing importance of compromise technologies that bridge capability gaps without proportional cost increases. The research extends AHP methodology application to zakat digitalization contexts, providing empirical evidence that systematic multi-criteria evaluation can effectively guide platform selection decisions even when institutions initially rely on intuitive choices. Furthermore, the validation of RAUL's decisions through retrospective analysis suggests that institutional leaders may intuitively prioritize appropriate criteria even without formal evaluation frameworks, indicating the potential value of combining experiential knowledge with systematic analytical approaches in technology adoption decisions.

4. Conclusion

This research successfully implemented the Analytical Hierarchy Process (AHP) method to retrospectively analyze platform selection decisions for zakat management digitalization at Rumah Amal ULM. The analysis identified cost (27.5%) and accessibility (27.3%) as the dominant criteria influencing platform selection decisions, followed by IT infrastructure (11.5%) and technical skill (10.4%) as secondary considerations. Among the five platform alternatives evaluated, the low-code platform emerged as the optimal choice with a priority weight of 36.1%, followed by web-based platform (18.2%), Excel-based platform (17.8%), mobile-based platform (14.7%), and desktop-based platform (13.2%). These findings highlight the role of low code platforms as practical solutions for newly established institution with limited resources and validate RAUL's original decision to implement a low-code platform using Google Sheets with Apps Script, confirming that their intuitive platform selection aligned with systematic multi-criteria evaluation results. The research demonstrates that newly established zakat institutions prioritize cost-effectiveness while maintaining accessibility requirements, with low-code platforms serving as an optimal compromise solution that provides web-like capabilities at significantly lower implementation costs. This study contributes to the zakat digitalization literature by providing the first systematic decision-making framework for platform selection, offering evidence-based guidance for similar institutions facing platform selection decisions under resource and organizational constraints.

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This study acknowledges several limitations that present opportunities for future research enhancement. First, the research focused on a single case study, specifically a newly established zakat institution affiliated with a higher education institution, which may limit generalizability across different zakat institutional contexts with similar conditions to the case study. Second, the simplified criteria framework, while practical for decision-making purposes, may not be able to capture more nuanced decision factors. Thus, we encourage the future research to investigate more detailed criteria framework by defining sub-criteria that relevant and provide better distinction for each existing criterion or adding another relevant criterion that currently not being captured yet. Third, the focus on a newly established institution may not be representative of the broader spectrum of zakat institutions either operating in similar nor different developmental stages and resource conditions. Fourth, this study involved only two experts due to RAUL's organizational constraints, which may limit the diversity of perspectives in the decision-making process. Future studies could expand the number of experts or stakeholders to enhance the robustness and generalizability of the findings, potentially including additional organizational levels, external advisors, or beneficiary representatives to provide more comprehensive evaluation perspectives.

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