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DEVELOPING AL-QIRAD: STAKEHOLDER PERSPECTIVES ON A GIS-ENABLED FUNERAL PRAYER NOTIFICATION SYSTEM

Ts. Dr. Ahmad Sid Hijaz bin Md Saaid[1*]
'Azzatunisa Ahmad Zubir[1]
Ts. Shahrul Che On[1]
Mohd Lutfi Mohd Khidir[1]
Nik Syamsul Baharum Nik Bahari Shah[1]

[1] Politeknik Sultan Abdul Halim Mu'adzam Shah (POLIMAS), Jitra, Kedah, Malaysia
Email: dashijaz@polimas.edu.my, azzatunisa@polimas.edu.my; shahrulcheon@polimas.edu.my; mdlutfi@polimas.edu.my; niksyamsul@polimas.edu.my)
*Corresponding author: dashijaz@polimas.edu.my

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Abstract: *Timely funeral prayer information supports Muslim community participation, yet announcements may be fragmented across mosque networks and messaging groups. AL-QIRAD is a developing Geographic Information System (GIS)-enabled application combining mosque mapping, funeral prayer announcements and location-based notifications. This study explored stakeholder perspectives to guide prototype refinement. An exploratory qualitative case study involved 24 Malay Muslim participants recruited mainly from mosque-related settings through convenience sampling. Semi-structured interview records were examined using deductive thematic analysis across four domains: Perceived Usefulness, Community Relevance, Institutional Acceptance and Implementation Potential. Participants recognised the potential value of centralised announcements, geographically relevant notifications and easier access to mosque information. These benefits were qualified by concerns about information accuracy, accessibility and dependence on authorised administrators. Respondents considered AL-QIRAD relevant to existing communication needs but noted that receiving timely information would not necessarily lead to funeral prayer attendance. Institutional acceptance was conditional on clear responsibilities, verification procedures and appropriate governance. Implementation perspectives favoured phased deployment, practical training and continued conventional announcements. Across the four domains, information trustworthiness, digital inclusivity and religious-ethical appropriateness emerged as interconnected priorities. The findings offer stakeholder-informed directions for AL-QIRAD's ongoing research and development. Future field evaluation is needed to assess actual participation, operational performance and sustained adoption.*

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Keywords: *GIS-enabled notification system; funeral prayer communication; community engagement; stakeholder evaluation; deductive thematic analysis*

Introduction

Geographic Information Systems (GIS) and mobile technologies offer opportunities to improve how communities access location-specific information. However, a notification system's value depends on more than its technical capabilities. Information must be accurate, accessible and relevant to users' needs. Davis (1989) identified perceived usefulness and ease of use as important considerations in technology acceptance, while Venkatesh et al. (2003) highlighted the influence of social and facilitating conditions. Similarly, DeLone and McLean (1992) distinguished information quality from system quality and use, suggesting that a technically functional application does not necessarily deliver meaningful benefits. These considerations are particularly relevant to AL-QIRAD, where timely funeral prayer announcements must be supported by reliable information and trusted mosque administration.

AL-QIRAD is a developing GIS-enabled funeral prayer notification application designed to complement existing mosque communication. The prototype combines mosque mapping, funeral prayer announcements and location-aware alerts. Its purpose is to help prospective participants identify relevant prayers near them and to provide authorised mosque representatives with a more structured announcement channel. It does not replace religious motivation, interpersonal communication or mosque administration.

The prototype has received Gold Medal recognition at iCompEx 2026 and UniSiD 2026. These awards recognise its innovation potential but do not establish actual community impact. Before wider deployment, the development team needs evidence about what stakeholders value, what concerns them and which operating arrangements they consider acceptable.

This paper reports an exploratory qualitative case study based on 24 actual semi-structured interviews. It examines four related domains: Perceived Usefulness, Community Relevance, Institutional Acceptance and Implementation Potential. The study aims to inform AL-QIRAD's research and development (R&D) by identifying stakeholder-informed priorities for prototype refinement and future field evaluation. It does not claim that the application has already increased funeral prayer attendance or achieved sustained adoption.

Research Background

The communication problem

The immediate rationale for AL-QIRAD is the fragmented nature of funeral prayer information. Mosque announcements, community contacts and messaging applications each serve a purpose, but they are not designed to deliver verified information according to a user's proximity to a mosque. Announcements may be delayed, incomplete or difficult to retrieve, particularly when shared in active messaging groups. These are practical concerns identified in the project's development context and explored in the present interviews; their population-wide prevalence has not been established.

The problem is therefore not a complete absence of digital communication. It is the lack of a dedicated, geographically relevant channel that can complement trusted local practices. Any

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proposed solution must also respect the sensitivities of funeral arrangements, including the wishes of bereaved families and the responsibility to prevent inaccurate announcements.

Prototype development and evaluation need

AL-QIRAD was developed to address limitations in the accessibility and geographical relevance of funeral prayer announcements. Its prototype integrates GIS-based mosque mapping, announcement management and location-aware notifications to complement existing community communication channels. The application received Gold Medal recognition at iCompEx 2026 and UniSiD 2026, reflecting its promise as an innovation. Nevertheless, these achievements do not establish its effectiveness in everyday community settings. Design-oriented research emphasises the importance of evaluating technological artefacts against their intended objectives and practical requirements (Peffers et al., 2007). Accordingly, stakeholder evaluation forms an essential part of AL-QIRAD's continuing R&D, providing evidence to guide prototype refinement before wider field implementation.

Research gap

Existing research offers established perspectives on technology acceptance, information system quality and innovation adoption (Davis, 1989; DeLone & McLean, 1992; Rogers, 2003). However, these perspectives do not independently establish the suitability of a GIS-enabled funeral prayer notification system within mosque-centred community communication. AL-QIRAD operates in a context where technological usefulness intersects with religious practices, community expectations, institutional responsibilities and information governance. This study addresses that context-specific gap by examining stakeholder perspectives across four complementary domains. Its contribution lies in translating qualitative evidence into practical priorities for prototype refinement, rather than claiming demonstrated increases in funeral prayer participation.

Literature Review

Community Information and Innovation Adoption

The adoption of digital innovations is influenced not only by their technical capabilities but also by their perceived advantages and compatibility with established social practices. Rogers (2003) identifies relative advantage, compatibility, complexity and trialability as important characteristics shaping innovation adoption within a social system. These considerations are particularly relevant to mosque-centred communication, where information is commonly disseminated through direct announcements, messaging groups and interpersonal networks. Such practices are sustained by familiarity, accessibility and established relationships of trust. Consequently, the relevance of a new digital platform depends on its capacity to address existing communication limitations without unnecessarily disrupting these arrangements.

Funeral prayer announcements present a distinctive communication requirement because their usefulness is closely associated with timeliness, geographical relevance and information reliability. Although centralised notifications may improve awareness of nearby funeral prayers, participation remains influenced by practical circumstances, including personal commitments, mobility and individual motivation. Improved information access should therefore be distinguished from actual behavioural change. From this perspective, the adoption of AL-QIRAD requires consideration of both its functional contribution and its compatibility with community expectations.

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Recent studies reflect growing interest in digital systems supporting mosque administration and religious activities. Mat Jusoh et al. (2023) examined digital management of mosque programmes, while Prawira et al. (2023) explored the application of Progressive Web App technology to mosque information management. More recently, Sa'ari et al. (2025) proposed a smart mosque information framework within the Malaysian context. These studies illustrate the expanding role of digital platforms in mosque-related services. However, their emphasis on information management and broader institutional functions differs from the specific communication requirements associated with funeral prayer notifications. This distinction highlights the need to examine whether a dedicated, location-aware application offers meaningful value within existing community practices.

GIS-Enabled Information and Perceived Usefulness

Geographic Information Systems (GIS) enable information to be organised, interpreted and delivered according to spatial context. Their integration with mobile technologies supports location-based services that connect users with geographically relevant information. Goodchild (2007) demonstrated the significance of geographically referenced information while identifying concerns relating to data accuracy and reliability. For AL-QIRAD, these considerations are important because the relevance of a funeral prayer notification depends on the relationship between mosque location, prayer arrangements and the user's geographical proximity.

The application of location-based technologies to mosque activities has also received recent attention. Zulaikha and Anggara (2026) investigated a mobile attendance application incorporating location-based services for mosque activities, illustrating the potential of geographical functionality in religious community settings. Nevertheless, location-based attendance management and funeral prayer notification address different operational requirements. The latter involves time-sensitive announcements whose usefulness depends not merely on geographical proximity but also on the accuracy, verification and timely updating of information.

The Technology Acceptance Model (TAM) provides a theoretical basis for examining how users evaluate such functions. Davis (1989) identifies perceived usefulness and perceived ease of use as central considerations in technology acceptance. Within AL-QIRAD, perceived usefulness concerns the anticipated benefits of accessing timely funeral prayer information, whereas perceived ease of use relates to the clarity and accessibility of its interface. Venkatesh et al. (2003) extend this perspective by emphasising social influence and facilitating conditions, indicating that technology acceptance is also shaped by the environment in which a system is introduced.

However, positive perceptions of usefulness do not necessarily demonstrate system effectiveness. DeLone and McLean (1992) distinguish information quality, system quality and system use within their information systems success framework. Subsequent contributions by Iivari (2005) and Jeyaraj (2020) further demonstrate the importance of examining these dimensions critically rather than treating technological acceptance as equivalent to successful implementation. This distinction is particularly relevant to AL-QIRAD, where an accessible interface may offer limited practical benefit if announcements are inaccurate, outdated or inconsistently maintained.

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Accordingly, Perceived Usefulness (PU) was established as the first analytical domain, encompassing information usefulness, GIS and notification usefulness, and perceived ease of use. The domain examines stakeholders' assessments of the proposed functions without assuming that favourable perceptions constitute evidence of actual adoption or improved funeral prayer participation.

Community Relevance and Institutional Acceptance

The relevance of a digital service extends beyond individual convenience to its suitability within the social environment in which it operates. In mosque communities, communication practices reflect established routines, interpersonal relationships and varying levels of digital engagement. A dedicated notification application may therefore provide an additional channel for disseminating funeral prayer information, but its value depends on whether it complements existing arrangements and remains accessible to different community members.

Digital inclusion is particularly important in this context. Seifert et al. (2021) examined the relationship between digital and social exclusion among older adults, drawing attention to the consequences of unequal access to digital technologies. Although their investigation addressed a different setting, it provides a relevant perspective on the risks of relying exclusively on digital communication. For AL-QIRAD, these concerns suggest that simplified navigation, readable information displays and continued conventional announcements may be necessary to support inclusive access. Such considerations should be assessed empirically rather than assuming that age alone determines digital capability.

The wider social contribution of digital services also warrants attention. Twizeyimana and Andersson (2019) identify service improvement and broader social benefits among the dimensions of public value associated with e-government. Although AL-QIRAD operates outside the conventional e-government context, this perspective is useful in distinguishing technological functionality from community benefit. A system may introduce efficient information delivery without necessarily addressing the communication needs of its intended users. Community relevance must therefore be assessed through stakeholders' experiences, expectations and perceived opportunities for participation.

Institutional acceptance introduces a related but distinct dimension. Funeral prayer announcements involve sensitive circumstances, personal information and time-critical arrangements. Their credibility depends partly on the authority and accountability of those responsible for publishing and maintaining the information. Dinev and Hart (2006) demonstrate the significance of privacy considerations in digital service decisions, providing a useful basis for examining concerns about information disclosure and trust. In AL-QIRAD, these concerns may involve family consent, authorised publication, data protection and clearly defined responsibilities among mosque administrators.

Institutional suitability should nevertheless be distinguished from formal organisational commitment. Stakeholders may recognise the potential value of a mosque-administered notification system without confirming that the necessary resources, procedures or authorisations are available. Similarly, institutional interest does not automatically establish operational readiness. These distinctions are important because the credibility of a community-facing application depends not only on user acceptance but also on the governance arrangements supporting its continued operation.

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Two analytical domains were therefore developed. Community Relevance (CR) examines existing information practices, the perceived potential to support participation and accessibility across community groups. Institutional Acceptance (IA) addresses organisational suitability, institutional collaboration and the governance requirements associated with responsible implementation. Together, these domains distinguish community-level relevance from the institutional conditions necessary to support trustworthy information delivery.

Implementation Readiness and Prototype Refinement

The development of a functional prototype represents an initial technological achievement rather than evidence of sustainable implementation. Operational readiness depends on the interaction of technical reliability, administrative capacity, user support and organisational resources. Rogers (2003) identifies trialability as an important characteristic of innovation adoption, suggesting that limited implementation may allow users and institutions to assess a system before broader deployment.

Design science research offers a complementary perspective by linking identified problems, solution development and evaluation. Peffers et al. (2007) propose a structured methodology for designing and assessing information systems artefacts, emphasising the importance of evaluation in refining proposed solutions. Although the present investigation does not constitute a complete design science research cycle, its stakeholder evaluation provides formative evidence for subsequent development decisions. This distinction positions the study as an exploratory assessment of a developing prototype rather than a comprehensive technical or operational validation.

Recent developments in digital mosque management further illustrate the importance of considering institutional requirements alongside technological functions. The studies by Mat Jusoh et al. (2023), Prawira et al. (2023) and Sa'ari et al. (2025) provide relevant examples of digital approaches to mosque-related information and services. However, the implementation of a time-sensitive funeral prayer notification system introduces additional considerations concerning announcement verification, administrative responsiveness and the coordination of geographically distributed information.

For AL-QIRAD, these requirements are closely interconnected. A technically reliable notification mechanism may offer limited benefit if information is entered late, while an extensive mosque database does not necessarily indicate active institutional participation. Similarly, additional application functions may increase complexity without addressing the primary need for accurate and timely announcements. Implementation assessment must therefore distinguish the availability of technological features from the organisational capacity required to maintain them.

Implementation Potential (IP) was established as the fourth analytical domain to examine perceived deployment opportunities, implementation barriers and priorities for prototype improvement. Its purpose is to translate stakeholder concerns into practical considerations for subsequent research and development while avoiding premature conclusions about operational feasibility.

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Qualitative Sample Adequacy and Deductive Thematic Analysis

Qualitative inquiry is appropriate for examining stakeholder perspectives on emerging technologies whose perceived value is influenced by social practices, institutional arrangements and implementation contexts. Case study research enables these perspectives to be investigated within their intended setting rather than treating technology acceptance as an isolated individual response (Yin, 2018). Semi-structured interviews support this approach by providing consistency across predefined areas of inquiry while allowing participants to express qualifications, concerns and differing interpretations.

Sample adequacy in qualitative research depends on the relevance and depth of information rather than respondent numbers alone. Guest et al. (2006) examined the recurrence of themes across interviews, while Malterud et al. (2016) introduced information power as a context-sensitive consideration involving study objectives, sample specificity and analytical strategy. Hennink et al. (2017) further distinguish code saturation from meaning saturation, demonstrating that identifying recurrent issues does not necessarily establish sufficient interpretive depth. Hennink and Kaiser (2022) similarly emphasise the influence of research characteristics on sample requirements. Collectively, these studies indicate that sample adequacy should be considered in relation to the study's analytical purpose rather than inferred from a predetermined numerical threshold.

Thematic analysis provides a flexible approach to identifying and interpreting patterns within qualitative data (Braun & Clarke, 2006). A deductive orientation is particularly appropriate when research objectives and analytical domains are established in advance. Nevertheless, predefined categories may constrain interpretation if contrasting or unexpected perspectives are overlooked. Fereday and Muir-Cochrane (2006) demonstrate the value of combining structured coding with sensitivity to emerging interpretations, while Gale et al. (2013) highlight the usefulness of matrix-based organisation for systematic comparison across qualitative cases. These approaches provide methodological guidance for maintaining analytical consistency while preserving divergent stakeholder accounts.

Within this methodological context, AL-QIRAD employs four study-specific analytical domains: Perceived Usefulness (PU), Community Relevance (CR), Institutional Acceptance (IA) and Implementation Potential (IP). The domains collectively address technological value, compatibility with community practices, institutional responsibilities and operational considerations. They provide an exploratory framework for organising stakeholder perspectives rather than a previously validated measurement model or an assumed causal relationship between constructs.

Analytical rigour consequently requires more than the consistent assignment of predefined codes. Transparent coding decisions, systematic comparison and attention to contrasting accounts are essential to maintaining the trustworthiness of qualitative interpretations (Nowell et al., 2017). For AL-QIRAD, these principles support the translation of stakeholder feedback into evidence-informed development priorities while recognising the interpretive limitations of a formative prototype evaluation

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Research Objectives

The study aims to assess stakeholder perspectives on the developing AL-QIRAD prototype and identify priorities for its continued R&D.

RO1 — Perceived Usefulness: Explore the perceived usefulness, accessibility and usability of GIS-enabled mosque mapping and funeral prayer notifications.

RO2 — Community Relevance: Examine the fit between AL-QIRAD and existing funeral prayer communication practices, including its perceived potential to support participation.

RO3 — Institutional Acceptance: Investigate institutional suitability, collaborative support, verification responsibilities and governance requirements.

RO4 — Implementation Potential: Identify deployment opportunities, operational barriers and priorities for prototype refinement.

Research Methodology

Design and research framework

An exploratory qualitative case study was used to evaluate AL-QIRAD in its intended community and institutional context. Figure 1 shows the conceptual relationship between the communication problem, the developing prototype, four stakeholder evaluation domains and R&D outcomes. The framework is interpretive: it does not imply that the domains form a validated causal sequence.

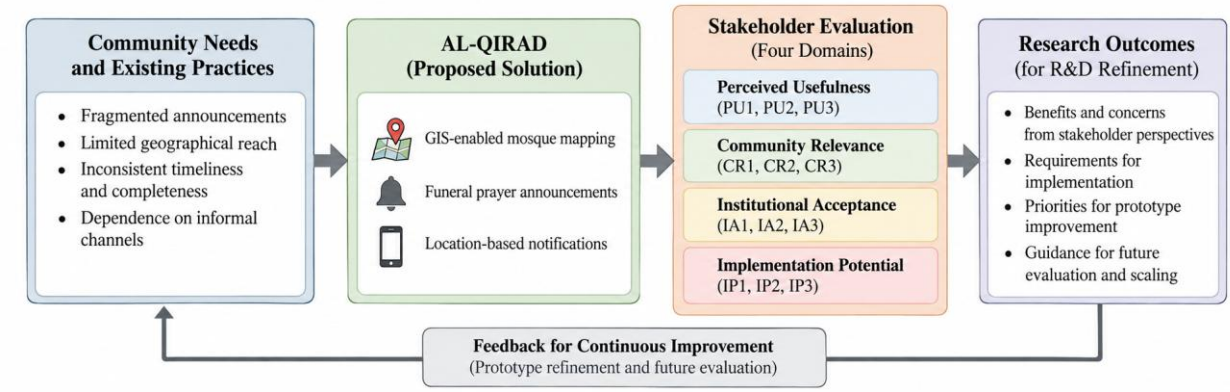


Figure 1. Research framework for stakeholder-informed development and evaluation of AL-QIRAD.

Figure 1: Research framework for stakeholder-informed development and evaluation of AL-QIRAD

Participants and data collection

Twenty-four male Malay Muslim stakeholders (R01–R24) were recruited through convenience sampling from selected mosques in and around Jitra, Kedah, Malaysia, and nearby institutional settings. Participants included mosque officials, academics and community members familiar with local funeral prayer practices. Recruitment prioritised contextual experience and accessibility rather than demographic representativeness.

The evaluation involved AL-QIRAD prototype version 2.0, presented through smartphones and tablets. Researchers demonstrated its core functions, including mosque mapping, funeral

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prayer notifications and related information displays. Some younger participants interacted directly with the application, while most middle-aged and older participants observed the demonstrations. Several respondents were already familiar with AL-QIRAD through earlier innovation activities, including iCompEx 2026. Thus, the evaluation captured perceptions following varying levels of prototype exposure rather than standardised usability testing.
Semi-structured interviews were conducted in Malay between August and September 2026, generally lasting 15–20 minutes per participant. Three male researchers were involved in data collection, with one conducting the interview and another recording responses. Participation was voluntary, with the study purpose explained and informed consent obtained beforehand. Interview notes were anonymised as R01–R24 and organised for deductive thematic analysis.

Coding and analytical rigour

Interview data were analysed using deductive thematic analysis, guided by four predefined domains comprising three codes each. A master coding matrix organised responses from 24 participants (R01–R24) across 12 codes, generating 288 respondent-by-code entries for systematic comparison. These entries represented the analytical structure rather than independent findings or evidence of universal agreement. As the analysis relied on interview notes documented directly by the research team, interpretations were confined to the recorded responses rather than complete verbatim transcripts.

The analytical approach was informed by established principles of thematic analysis and structured qualitative coding (Braun & Clarke, 2006; Fereday & Muir-Cochrane, 2006; Gale et al., 2013). Analytical rigour was supported by systematic comparison of recurring perspectives, qualifying statements and divergent accounts, particularly those concerning usability, administrative responsibilities, information privacy and religious sensitivities. Although recurring patterns were identified, neither code nor meaning saturation was formally established in the absence of a documented assessment of analytical progression. Accordingly, the findings provide formative evidence for prototype refinement rather than verified outcomes relating to funeral prayer attendance or sustained application use.

Results and Analysis

Findings are presented under four predefined domains. Each table summarises the main interpretation, a qualifying concern and the corresponding R&D implication. The illustrative extracts presented in this section were drawn from interview notes documented by the research team. They represent recorded stakeholder feedback rather than word-for-word interview transcripts.

Perceived Usefulness

Stakeholders generally recognised the potential of AL-QIRAD to improve access to funeral prayer information through centralised announcements and location-based notifications. Under information usefulness (PU1), participants valued the possibility of receiving timely announcements without relying exclusively on fragmented messaging groups or personal networks. However, this perceived benefit was conditional upon the accuracy, verification and regular updating of information.

Regarding GIS and notification usefulness (PU2), respondents viewed mosque mapping and geographically relevant alerts as practical features for identifying nearby funeral prayers. Nevertheless, some participants considered additional functions, including certificates and the

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proposed 'Journey' feature, less important than the application's core information services. These responses indicate a preference for reliable announcements, relevant notifications and straightforward navigation over further feature expansion.

Perceived ease of use (PU3) revealed more varied experiences. While some respondents considered the interface accessible, others identified difficulties associated with small text, unfamiliar navigation and multiple interaction steps. These concerns suggest that interface accessibility should be addressed alongside technical functionality, particularly for users who may require additional assistance.

Overall, the PU findings indicate that AL-QIRAD's perceived value depends primarily on the reliability, geographical relevance and accessibility of its core functions. Table 1 summarises the principal findings, concerns and implications for subsequent prototype refinement.

Table 1. Key findings on perceived usefulness

Code	Key finding	Main concern	Implication for AL-QIRAD
PU1 — Information usefulness	Centralised access to timely funeral prayer announcements.	Accuracy, verification and timely updates.	Provide verified announcements with clear timestamps.
PU2 — GIS and notification usefulness	Location-based alerts and mosque mapping improve the perceived relevance of information.	Secondary features may divert attention from essential functions.	Prioritise mosque mapping, relevant notifications and simple navigation.
PU3 — Perceived ease of use	The interface was perceived as accessible by some respondents.	Small text and unfamiliar navigation may limit usability.	Improve readability and simplify navigation.

Illustrative interview extracts

R06 (PU1): Sangat berguna. Maklumat terus sampai kepada jemaah berdekatan.
R22 (PU2): Fungsi geolokasi membolehkan notifikasi lebih relevan.
R11 (PU3): Agak susah sikit bagi pakcik, tulisan kecil.

Community Relevance

Interviewees described an existing communication ecology based on mosque announcements, messaging groups, telephone calls and interpersonal contact. These channels were not universally rejected; rather, their limitations concerned uneven reach, delayed receipt, incomplete details and the difficulty of verifying changes. R13 highlighted messages being buried in active groups, while R17 referred to the absence of an official source for verification. Participants often anticipated that earlier information might facilitate attendance, but this was consistently qualified by non-digital barriers, including working hours, travel distance, health and social motivation (R06, R11, R22). Such statements indicate perceived opportunity, not an observed increase in attendance. Community fit was also conditional. R16 described limited suitability in an older rural community, whereas R20 explicitly favoured retaining conventional announcements. The evidence therefore favours an inclusive hybrid communication model rather than a digital-only replacement.

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Table 2. Key findings on community relevance

Code	Key finding	Main concern	Implication for AL-QIRAD
CR1 — Existing information practices and problems	Mosque announcements and messaging groups remain important channels.	Messages can be missed, delayed or difficult to verify.	Provide a verified channel that complements existing practices.
CR2 — Potential influence on participation	Earlier information may help people plan attendance.	Work, distance and personal circumstances still affect participation.	Test attendance outcomes separately in a future pilot.
CR3 — Community suitability and accessibility	The system may be useful across community groups.	Some older or less digitally confident users need support.	Retain conventional announcements and provide accessible options.

Illustrative interview extracts

R13 (CR1): Mesej tenggelam dalam grup yang terlalu aktif.
R22 (CR2): Berpotensi, tetapi teknologi sahaja tidak cukup tanpa budaya komuniti.
R20 (CR3): Sesuai sebahagian. Golongan tua perlukan pengumuman biasa.

Institutional Acceptance

Participants generally considered the mosque an appropriate institutional setting for AL-QIRAD, provided that responsibility for publishing and verifying announcements was clearly assigned. R20 called for a designated committee member, while R06 identified the need for a formally appointed administrator. Suggestions for collaboration included religious agencies, mosque committees, educational institutions and technical support providers (R09, R12, R17); these are stakeholder recommendations, not evidence of secured agreements. Governance emerged as a substantive condition of acceptability. R10 stressed family consent before displaying the deceased person's name, R13 called for access controls and audit records, and R19 recommended review of religious content by qualified personnel. Accordingly, institutional acceptance is best characterised as conditional endorsement rather than formal authorisation.

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Table 3. Key findings on institutional acceptance

Code	Key finding	Main concern	Implication for AL-QIRAD
IA1 — Institutional suitability	Mosque administrators are plausible announcement managers.	Responsibility and timely verification must be clear.	Appoint authorised administrators and reviewers.
IA2 — Institutional support and collaboration	Respondents identified possible mosque and agency partnerships.	Training and ongoing support would be needed.	Define collaboration roles and technical support.
IA3 — Adoption requirements and governance	Trust depends on accountable information management.	Privacy, family consent and inaccurate announcements are concerns.	Develop permissions, verification procedures and audit records.

Illustrative interview extracts

R20 (IA1): Sesuai, tapi perlu seorang AJK khusus urus sistem.
R17 (IA2): Model kerjasama tiga pihak: akademia, institusi agama & komuniti.
R10 (IA3): Persetujuan waris sebelum nama arwah dipaparkan.

Implementation Potential

Respondents identified plausible opportunities for phased deployment, including mosque-based pilots and expansion through district networks. The mapped mosque inventory was viewed as a potential infrastructure asset (R06, R12), but respondents repeatedly recommended testing before wider adoption (R09, R17, R22). The barriers were practical and interdependent: limited digital literacy among some mosque administrators (R07, R16), weak connectivity (R11, R23), administrative workload (R20), and data security and system resilience (R12, R22). Suggested improvements ranged from two-stage announcement verification (R06) and stronger administrator authentication (R22) to simpler interfaces (R11), community briefings (R23) and reliable background push notifications (R08, R18). R24's caution about religious sincerity also challenges reward-oriented gamification. These findings support a staged R&D agenda, not a claim that operational readiness or community impact has already been established.

Table 4. Key findings on implementation potential

Code	Key finding	Main concern	Implication for AL-QIRAD
IP1 — Deployment opportunities	A mosque-based pilot offers a practical starting point.	A broad launch could obscure operational weaknesses.	Introduce AL-QIRAD in phases and evaluate each stage.
IP2 — Implementation barriers	Respondents identified manageable but substantial risks.	Connectivity, workload, skills and maintenance may limit use.	Provide training, technical support and contingency plans.

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IP3 — Improvement priorities	Core functionality and reliability were recurring priorities.	Complex features and reward mechanisms may be inappropriate.	Prioritise verification, accessibility and ethically sensitive design.

Illustrative interview extracts

R11 (IP1): Elok buat sikit-sikit dulu.
R20 (IP2): Beban kerja tambahan AJK masjid.
R24 (IP3): Jaga keikhlasan, jangan sampai ibadah jadi pertandingan.

Cross-Domain Synthesis

The findings across the four domains indicate that stakeholders perceived AL-QIRAD as a potentially useful platform for improving access to funeral prayer information, although its practical value was subject to several conditions. While location-based notifications could improve the accessibility and geographical relevance of announcements, their usefulness depended on information accuracy, community accessibility and institutional reliability. Positive perceptions of the application did not necessarily imply increased funeral prayer attendance, universal digital accessibility, formal institutional endorsement or readiness for wider implementation.

Three cross-cutting considerations emerged from the analysis: information trustworthiness, digital inclusivity and religious-ethical appropriateness. Information trustworthiness concerned announcement verification, family consent and administrative accountability. Digital inclusivity emphasised accessible interfaces, user assistance and the continued availability of conventional communication channels. Religious-ethical appropriateness highlighted the respectful handling of personal information and the need to ensure that application features remain consistent with the values associated with funeral prayer participation. Collectively, these considerations provide an evidence-informed basis for subsequent prototype refinement and field evaluation.

Discussion

Interpreting the Four-Domain Evidence

The findings demonstrate that AL-QIRAD's potential extends beyond the technical provision of GIS-enabled funeral prayer notifications. Stakeholders recognised the practical benefits of accessing centralised announcements and identifying nearby mosques, but their responses also revealed that these benefits depended on how information was managed, communicated and supported within the community. The application should therefore be understood as a proposed socio-technical solution whose value is shaped by the interaction between technological functionality, community practices, institutional responsibilities and implementation capacity. The four analytical domains offer complementary perspectives on this relationship. Perceived Usefulness (PU) highlighted the anticipated benefits of centralised information, mosque mapping and location-sensitive notifications. Community Relevance (CR) situated these functions within existing communication practices and varying levels of digital accessibility. Institutional Acceptance (IA) identified the importance of trusted information providers, verification procedures and administrative accountability. Implementation Potential (IP) further revealed the operational requirements associated with training, technical support, maintenance and phased deployment. Rather than representing independent outcomes or

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sequential stages, these domains collectively explain the conditions under which AL-QIRAD may become practically relevant to its intended users.

An important finding is the distinction between favourable perceptions of the application's functions and confidence in its implementation. Stakeholders could recognise the convenience of timely notifications while expressing concerns about inaccurate announcements, appreciate GIS-based mosque mapping while requesting simpler interfaces, or support institutional involvement while questioning the administrative capacity required. These responses are not necessarily contradictory. Instead, they suggest that technological usefulness is closely connected to the reliability of information and the arrangements supporting its delivery.
This distinction is particularly significant for the present study. Stakeholder acceptance at the conceptual or prototype stage should not be interpreted as evidence of actual adoption, improved funeral prayer attendance or sustained operational effectiveness. The findings establish perceived opportunities and implementation considerations rather than measurable outcomes. Consequently, AL-QIRAD's next development phase should focus on translating these perspectives into testable system requirements and realistic implementation procedures.

Perceived Usefulness and Community Relevance: From Information Access to Possible Participation

The relationship between PU and CR highlights the distinction between improving information accessibility and encouraging actual community participation. Participants recognised that funeral prayer announcements distributed through existing messaging groups, mosque communication channels and personal networks may not consistently reach individuals beyond their immediate social circles. AL-QIRAD was perceived as a possible means of addressing this limitation by organising announcements according to mosque locations and geographical proximity. Its anticipated contribution therefore lies in improving the accessibility and relevance of information rather than replacing established community relationships.

However, greater access to information does not necessarily translate into higher attendance. Participants acknowledged that work commitments, transport availability, health, distance and personal circumstances could continue to influence participation even when announcements were received promptly. One respondent (R22) emphasised that technology alone would be insufficient without an accompanying culture of community participation. This observation suggests that the application may reduce an informational barrier, but cannot independently overcome the wider circumstances influencing individual decisions.

The findings consequently support a more measured interpretation of AL-QIRAD's potential contribution. Its immediate value lies in enabling individuals to obtain relevant information and make informed decisions about attending funeral prayers. Whether improved awareness subsequently influences participation remains an empirical question requiring evaluation under actual operating conditions. This distinction is important because the present study examined stakeholder perceptions rather than behavioural changes following sustained application use.
Community accessibility represents another important consideration. Although participants generally recognised the convenience of mobile notifications, some expressed concerns about interface complexity, text readability and the ability of less digitally confident individuals to use the application independently. These concerns indicate that a technically functional interface may not be equally accessible to all intended users. Nevertheless, the findings should

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not be interpreted as evidence of systematic differences between age groups without further comparative analysis.

The practical implication is that AL-QIRAD should complement, rather than replace, existing mosque communication practices. Conventional announcements, messaging groups and interpersonal communication remain relevant, particularly for individuals who may not use mobile applications regularly. Future prototype refinement should therefore prioritise simplified navigation, readable information, clear notification content and assisted user onboarding. These improvements would be more directly aligned with the identified community needs than the premature introduction of additional functions.

Taken together, the PU and CR findings indicate that the application's success should initially be assessed through its ability to provide accessible, timely and understandable information. Any subsequent contribution to funeral prayer attendance should be examined separately through field-based evidence.

Institutional Acceptance as the Basis of Information Trustworthiness

Institutional Acceptance provides an important explanation of why technological usefulness alone may be insufficient for AL-QIRAD's implementation. Funeral prayer announcements involve sensitive circumstances in which accuracy, timing and respect for bereaved families are particularly important. Incorrect information, delayed updates or unauthorised disclosure could affect community confidence and undermine the intended benefits of the application. Accordingly, information trustworthiness emerged as a central consideration linking system functionality with institutional responsibility.

Stakeholders identified mosque administrators as potentially appropriate parties to manage funeral prayer announcements, provided that responsibilities and verification procedures were clearly established. R20 highlighted the need for a designated mosque committee member to oversee the system, while R10 emphasised obtaining family consent before displaying the deceased person's name. Other responses raised concerns about access permissions, information verification and administrative accountability. These perspectives indicate that information governance should form an integral part of AL-QIRAD's development rather than being addressed only after technical deployment.

A distinction must nevertheless be maintained between perceived institutional suitability and formal institutional adoption. Participants could regard mosque administration as an appropriate governance mechanism and identify opportunities for collaboration with religious agencies, academic institutions and community organisations. Such views demonstrate perceived institutional relevance and possible pathways for cooperation, but do not establish formal authorisation, organisational commitment or the availability of implementation resources.

The findings also reveal a practical tension between information verification and operational responsiveness. Funeral prayer announcements are time-sensitive, and excessive administrative procedures could delay notification delivery. Conversely, allowing unrestricted publication could increase the risk of inaccurate or unauthorised announcements. The challenge is therefore to establish a verification process that protects information reliability without compromising timely dissemination.

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For the next R&D cycle, a proportionate administrative workflow is recommended. This could include authorised mosque accounts, identifiable announcement administrators, verification status indicators and procedures for updating or cancelling announcements. Family consent and appropriate handling of personal information should also be incorporated into the proposed governance arrangements. These measures represent development priorities derived from stakeholder concerns; their operational effectiveness remains to be evaluated.

Overall, the IA findings suggest that AL-QIRAD's credibility will depend not only on the accuracy of its software functions but also on the accountability of the institutions responsible for managing information. Establishing clear governance arrangements is therefore a necessary consideration before wider deployment can be responsibly pursued.

Implementation Potential: Converting Perceptions into R&D Priorities

Implementation Potential offers the most direct translation of the qualitative findings into development decisions. Participants identified opportunities for mosque-based pilots and subsequent expansion through existing networks, but repeatedly qualified these possibilities with concerns about digital literacy, connectivity, administrator workload, data protection and system maintenance. The mapped mosque inventory may provide an initial spatial resource, yet map coverage does not demonstrate that all participating institutions can produce timely, verified announcements or maintain the service over time.

A phased deployment strategy is therefore more defensible than an immediate large-scale rollout. A limited pilot could assess the full information lifecycle: an authorised administrator submits an announcement; its details are verified; relevant users receive a notification; changes are communicated; and the system records operational errors or delays. This would permit the research team to observe not only technical delivery but also the organisational work required to sustain it. It would additionally distinguish prototype functionality from implementation readiness, a distinction that the present interview-based evaluation cannot resolve on its own.
The responses suggest a hierarchy of refinement priorities. Core information accuracy and timely notification should take precedence over peripheral engagement features. Usability improvements and administrator support should follow closely, since technical functionality has little value if intended users cannot navigate the application or mosque personnel cannot maintain announcements. Finally, optional features should be evaluated for religious and ethical appropriateness. R24's concern that worship should not become a competition is particularly important: features that display participation histories or reward-like indicators may create unintended social meanings. The study cannot determine whether such effects would occur, but it establishes a legitimate reason to review these functions before wider release.

These findings favour a minimum viable operational model centred on accurate announcements, transparent status indicators, accessible mosque mapping, dependable push notifications and a manageable administrator interface. Subsequent enhancements should be justified by observed user needs rather than feature accumulation. In this sense, the interviews contribute directly to formative R&D: they help prioritise what must work reliably before the research team tests whether the application changes community information access or participation.

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Cross-Domain Continuity and an Emerging Socio-Technical Interpretation

Viewed collectively, the findings support three cross-cutting interpretive conditions: information trustworthiness, digital inclusivity and religious-ethical appropriateness. Information trustworthiness links PU to IA and IP: a notification is useful only when its content is accurate and its provenance credible. Digital inclusivity connects PU and CR to IP: the proposed service must remain accessible to intended users and feasible for administrators with different levels of technical confidence. Religious-ethical appropriateness cuts across CR, IA and IP: the application must respect established community practices, family privacy and the meaning attached to worship.

These conditions help explain the continuity of the four-domain evidence without requiring an unsupported causal model. The analytical direction is from a proposed technological capability towards the social and institutional arrangements that would make it meaningful and sustainable. A conceptual statement of the relationship is therefore: perceived technological value requires contextual relevance; contextual relevance requires trustworthy institutional practices; and these practices must be supported by workable implementation arrangements. This is a synthesis of stakeholder accounts, not a demonstrated temporal pathway or a statistical relationship.

The interpretation also illustrates why favourable and critical responses should be considered together. Positive comments indicate possible benefits; reservations identify the conditions under which those benefits might fail to materialise. The presence of critical cases therefore strengthens the usefulness of the findings for design decisions. The study is better positioned to contribute a context-sensitive set of implementation requirements than to make an unqualified claim of broad acceptance. The four domains are useful precisely because they prevent the evaluation from being reduced to whether respondents liked the prototype.

Methodological Significance, Boundaries and Future Evaluation

The 24 semi-structured interviews provided a basis for examining stakeholder perspectives across the four predefined domains. The methodological value of this dataset lies in the diversity of perspectives captured and the transparency of their interpretation rather than sample size alone. Qualitative sample adequacy depends on the research focus, information quality and analytical objectives (Guest et al., 2006; Malterud et al., 2016; Hennink & Kaiser, 2022). Furthermore, the recurrence of similar responses does not necessarily indicate sufficient understanding of their underlying meanings (Hennink et al., 2017). Accordingly, the present study does not claim data saturation solely on the basis of its 24 interviews. Such a claim would require documented evidence of how new codes and interpretive insights developed throughout the analytical process.

The deductive analytical framework enabled systematic examination of the four research objectives through a respondent-by-code matrix. However, predefined codes may also direct attention towards anticipated issues while overlooking unexpected perspectives. To address this limitation, the analysis retained contrasting responses and identified cross-domain considerations extending beyond the initial coding categories. This approach draws on established principles of thematic analysis and structured qualitative interpretation (Braun & Clarke, 2006; Fereday & Muir-Cochrane, 2006; Gale et al., 2013). Nevertheless, methodological consistency does not independently establish the validity of the interpretations, which remain dependent on their alignment with the interview evidence.

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Several limitations warrant consideration. Convenience sampling within mosque-related settings yielded a contextually relevant but demographically homogeneous sample comprising exclusively male Malay Muslim participants. Consequently, the perspectives of women, individuals less connected to mosque activities and communities beyond the recruitment settings may be insufficiently represented. Variations in interview response detail also limited the depth of interpretation for certain issues. More importantly, the study examined stakeholder perceptions of a developing prototype rather than actual system use, sustained institutional adoption or measurable changes in funeral prayer attendance. The project's innovation recognition therefore should not be interpreted as evidence of operational effectiveness.

Future research should adopt a phased evaluation strategy. Initial usability testing should examine realistic user and administrator tasks, interface accessibility and error recovery. A subsequent institutionally supported pilot should assess announcement accuracy, verification time, notification delivery, administrative workload and user-reported information access. Finally, any proposed relationship between AL-QIRAD and funeral prayer participation should be investigated through clearly defined and ethically collected attendance measures, while accounting for relevant non-technological influences. This progression would enable the R&D programme to move systematically from perceived usefulness towards demonstrated operational feasibility and, ultimately, an evidence-based assessment of community outcomes.

Conclusion

This study explored stakeholder perspectives on AL-QIRAD, a developing GIS-enabled funeral prayer notification application, through 24 semi-structured interviews and deductive thematic analysis. The findings indicate that stakeholders recognised the potential value of centralised announcements, mosque mapping and location-based notifications. However, they also emphasised that technological usefulness alone would not ensure community participation or institutional adoption.

Across the four analytical domains, three priorities emerged: information trustworthiness, digital inclusivity and religious-ethical appropriateness. These considerations highlight the need for verified announcements, accessible interfaces, clear administrative responsibilities and careful alignment with existing mosque practices.

The study contributes a stakeholder-informed basis for refining AL-QIRAD and planning its next R&D phase. Its findings support phased implementation and further field evaluation rather than claims of demonstrated effectiveness.

Ultimately, AL-QIRAD's potential rests not merely on delivering information faster, but on delivering information that communities can trust, access and act upon. By placing stakeholder needs alongside technological development, the project offers a promising direction for strengthening mosque-centred communication while preserving the community values that give funeral prayer participation its meaning.

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