

CEMETERY MANAGEMENT AND FUNERAL SERVICES: CHALLENGES FOR CITY GOVERNMENT AND WAY FORWARD

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ABSTRACT

Rapid urbanization and increasing population has severely strained public infrastructure in Rawalpindi, with most government cemeteries nearing full capacity. This physical scarcity is aggravated by poor infrastructure, inadequate maintenance and organization, and frequent security lapses. This situation is misused by informal actors, resulting in inflated prices and grave robber mafias. The research aims to methodically examine these challenges within Rawalpindi city's cemetery and funeral management sector. Further, the research seeks to determine the acceptability and feasibility of alternative graveyard models to address the shortage of burial space, along with e-governance models for the digitalization of funeral-related services. The research adopted a multi-faceted methodology, including a scoping review of international case studies, structured questionnaires, and interviews with key stakeholders. The findings reveal a stark contrast in the experiences of different communities. Muslim families face severe land shortages and a lack of transparency, while Christian families encounter smoother but significantly delayed burial processes. Further, concerns about grave robbing and security for graveyards were highlighted as major issues. A key finding of this analysis is the acceptance for reuse of graves by HHs and UCs as an alternative graveyard model, conditional on religious compliance and land scarcity arguments. On the digital front, the level of acceptance of technology varied among stakeholders, where end users and formal institutions highly favored digitalization of cemetery management, while informal institutions and service providers demonstrated considerable resistance. The Muslim scholars predominantly favored state-led digitalization. The primary barriers to digitalization identified were public awareness gaps, a lack of technical capacity within municipal bodies, and concerns over unreliable infrastructure, such as electricity and internet connectivity. The study proposes a dual-pronged solution, combining structural graveyard models and digital governance. The findings of this study provide a foundational framework for the systemic reform of cemetery management and funeral service delivery in rapidly urbanizing contexts like Rawalpindi.

PREFACE

This study investigates the pressing challenges of cemetery management and funeral services in Rawalpindi, with a focus on the financial, logistical, and emotional difficulties faced by bereaved families, the inefficiencies in governance and service delivery, and the feasibility of integrating digital and alternative models of cemetery management. The research also explores culturally and religiously acceptable approaches to addressing land scarcity, while ensuring transparency, inclusivity, and sustainability in funeral services.

The purpose of this work is to provide evidence-based insights and policy recommendations to city governments, religious institutions, and community stakeholders for the dignified and equitable management of cemeteries, positioning cemetery planning as an integral part of urban governance and sustainable development.

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EXECUTIVE SUMMARY

The research explores a critical but often overlooked urban service of cemetery and funeral management in Rawalpindi, Pakistan. Rapid urbanization and increasing population have created a serious crisis in the city. The increasing population has severely strained public infrastructure in Rawalpindi, with most government cemeteries nearing full capacity. This physical scarcity is exacerbated by administrative failures that include neglect by local government, resulting in inadequate infrastructure, poor maintenance and organization, and security lapses exacerbated by a lack of digital records, weak municipal oversight, and poor coordination among different departments. This situation is exploited by informal actors, resulting in an unregulated funeral service in the grave market, leading to inflated prices and grave robber mafias. This mismanagement causes profound logistical and financial distress for bereaved families at a vulnerable time and raises concerns about the dignity of the deceased, public health, and environmental contamination.

The research aims to methodically examine these challenges within Rawalpindi city's cemetery and funeral management sector. Its key objectives are to assess the logistical and financial difficulties faced by bereaved families, analyze the existing inefficiencies in service provision in the city, and evaluate stakeholder perspectives regarding potential solutions. Specifically, the research seeks to ascertain the acceptability and viability of alternative graveyard models to address the critical shortage of burial space, along with e-governance models for the digitalization of funeral-related services.

The research adopted a multi-faceted methodology, including a scoping review of international case studies, structured questionnaires, and interviews with key stakeholders. The stakeholders included bereaved families (end users), Union councils (service providers/formal institutions), gravediggers (service providers/frontline workers), graveyard committees (service providers/informal institutions), Muslim scholars (moral advocates), technology experts (facilitators), and city government (formal institution). The findings reveal a stark contrast in the experiences of different communities. Muslim families face severe land shortages and a lack of transparency, while Christian families encounter smoother but significantly delayed burial processes. Further, concerns about grave robbing and security for graveyards were highlighted as major issues.

To tackle the physical challenge of land scarcity as reported by bereaved families, the study evaluated the feasibility of alternative graveyard models. Among Muslim respondents and scholars, the repurposing of old graves was deemed more religiously and culturally acceptable than multilevel or vertical graves. For Christian respondents, there was greater general acceptability for various grave types. A key recommendation from Muslim scholars was the promotion of community-based graveyards established through land donations (Sadqa Jariyah) from affluent community members. There was also a preference for traditional, community-based, and private graveyards among GDs, UCs, and GCs, while reuse and multilevel grave systems are not favored by any stakeholders. A key finding of this analysis is the acceptance of reuse graves by HHs and UCs as an alternative graveyard model, conditional on religious compliance and land scarcity arguments. This high level of acceptance may be largely attributed to the ongoing burial practices involving reuse of existing graves among families and communities, albeit informally.

On the digital front, the research evaluated the acceptance of digitalization and different e-government models for cemetery and funeral services management. The level of acceptance of technology varied among stakeholders, where end users and formal institutions highly favored digitalization of cemetery management, while informal institutions and service providers demonstrated considerable resistance. There was strong support among households (HHs) for G2C governance models, while the officials at Union Councils (UCs) mostly prefer Government-to-Employee (G2E) and Government-to-Government (G2G) models. Among grave diggers (GDs) G2G is the preferred e-government model. The Graveyard Committees (GCs) demonstrated a preference for G2C and G2G models. The Muslim scholars predominantly favored state-led digitalization. The primary barriers to digitalization identified were public awareness gaps, a lack of technical capacity within municipal bodies, and concerns over unreliable infrastructure, such as electricity and internet connectivity.

The study proposes a dual-pronged solution, combining structural graveyard models and digital governance. For the land scarcity crisis, the immediate policy focus should be on facilitating the secure repurposing of existing graves. This includes installing security cameras and collaborating with law enforcement to prevent grave robbing. Further, institutionalization of alternative graveyard arrangements like grave-reuse, predicated on consultation with religious scholars, to build public trust. In the long term, the government should integrate cemetery planning into urban governance frameworks and incentivize the establishment of community graveyards through land donations. The findings of this study provide a foundational framework for the systemic reform of cemetery management and funeral service delivery in rapidly urbanizing contexts like Rawalpindi.

To combat discretionary pricing and inefficiency, it calls for the implementation of a digital system for grave allocation and pricing within municipal departments. From a logistical point of view, we suggest creating dedicated support cells in community mosques to provide bereaved families with financial and logistical assistance. For digital transformation, policymakers are urged to design and implement awareness campaigns, involving religious scholars and civil society, to bridge the information gap. Simultaneously, professional training for government employees is essential to build digital competency, and any e-governance system must be built on a reliable energy and infrastructure foundation. Further, since the G2C model is preferred by the end users, there is a need to create buy-in among UCs for a more interactive digital framework. Concurrently, enhanced digital record-keeping may be the key to tracking plot occupancy and ensuring dignified management of graveyards. These practical measures should be paired with institutional support for community-managed burial models, with oversight ensured by UCs.

In conclusion, this integrated approach presents a sustainable and equitable framework for managing cemeteries and funeral services in urban contexts, ensuring its lasting functionality and sustained effectiveness for future generations.

TABLE OF CONTENTS

ABSTRACT	i
PREFACE	ii
EXECUTIVE SUMMARY	iii
TABLE OF CONTENTS.....	v
LIST OF FIGURES	vii
LIST OF TABLES.....	vii
ABBREVIATIONS.....	viii
INTRODUCTION	1
1.1. Background of the study and Problem Statement.....	1
1.2. Rationale of the Study	2
1.3. Objectives of the Study.....	3
1.4. Contribution of the Study.....	3
1.5. Organization of the Study	4
LITERATURE REVIEW.....	5
2.1. Introduction.....	5
2.2. Graveyards, Burial Models, and Cemetery Management.....	5
2.3. Technology, Digital Cemetery Systems, and Technology Acceptance.....	6
2.4. E-Government Models and Governance Frameworks in Cemetery Management	7
METHODOLOGY.....	9
3.1. Stakeholder Mapping and Data Collection.....	9
3.3. Objective-wise Mapping of Research Tools.....	10
3.3.1. Logistic and Financial Challenges for Bereaved Families	10
3.3.2. Current Challenges and Inefficiencies in Cemetery Management.....	11
3.3.4. Challenges and Barriers in Transitioning to E-Governance Systems.....	12
3.3.5. Exploring Feasible Graveyard Models to Address Burial Space Scarcity	14
3.4. Objectives-Tools-Aspects-Stakeholders Matrix.....	14
OBJECTIVE-WISE ANALYSIS OF RESULTS.....	17
4.1. Objective 1 and 2: Logistical, Financial, and Institutional Challenges in Cemetery and Funeral Service Management	17
4.2. Objective 3: Attitude Toward Technology Adoption.....	19

4.3. Objective 4: Adoption of E-Governance Models and Key Barriers	21
4.4. Objective 5: Exploring Plausible Graveyard Models to Address Burial Space Scarcity.....	25
CONCLUSION.....	28
5.1. Synthesis of the Findings	28
5.2. Policy Implications and Implementation Strategy	30
5.3. Outputs of the Project.....	34
5.3.1. Geotagging and Spatial Documentation of the Graveyards.....	34
5.3.2. Benchmarking Report.....	35
REFERENCES.....	39
APPENDICES.....	42

LIST OF FIGURES

<i>Figure 1: Stakeholder Mapping</i>	10
<i>Figure 2: Technology Acceptance Model</i>	12
<i>Figure 3: E-Governance Model for Cemetery Management and Funeral Services</i>	13
<i>Figure 4: Overview of Different Graveyard Models</i>	14
<i>Figure 5: Burial Challenges Faced by Bereaved Families</i>	18
<i>Figure 6: Findings from Technology Acceptance Model</i>	21
<i>Figure 7: Comparative Analysis of E-Governance Model</i>	23
<i>Figure 8: Burial Space Scarcity and Core Management Challenges</i>	25
<i>Figure 9: Policy Implications and Implementation Strategy</i>	33
<i>Figure 10: Snapshots of Geotagging Interface</i>	34
<i>Figure 11: Difficulty Faced in Funeral Arrangements</i>	42

LIST OF TABLES

<i>Table 1: Stakeholder Typology</i>	9
<i>Table 2: Objectives-Tools-Stakeholders Matrix</i>	14
<i>Table 3: Synthesis of Findings and Triangulation Insights</i>	28
<i>Table 4: Benchmarking Analysis</i>	36
<i>Table 5: Stakeholder's Demographics</i>	42

ABBREVIATIONS

CDA	Capital Development Authority
UC	Union Council
GC	Graveyard Committees
GD	Grave Diggers
HH	Households
G2C	Government to Citizens
G2E	Government to Employee
G2G	Government to Government
GIS	Geographic Information System
MCR	Municipal Corporation of Rawalpindi
MGMS	Muslims Graveyard Management System
MRS	Minimum Standard Requirements
NITB	National Information Technology Board
PITB	Punjab Information Technology Board
PSKA	Punjab Shehr-e-Khamoshan Authority
RDA	Rawalpindi Development Authority
RMC	Rawalpindi Municipal Corporation
SDGs	Sustainable Development Goals
TAM	Technology Acceptance Model
TRA	Theory of Reasoned Action

INTRODUCTION

1.1. Background of the study and Problem Statement

Cemeteries in countries like Pakistan are integral to the social fabric, reflecting the community's traditions and values regarding life, death, and commemoration. However, the management and upkeep of these sacred spaces often need to catch up, where cemeteries are frequently neglected and become sites of social vices, as reported by Mitja (2017) and Petio (2023). This situation raises numerous concerns about the respect and dignity of the deceased, the distress of bereaved families, and urban planning. The challenges faced by cemeteries in Pakistan involve land scarcity, urbanisation, and a lack of resources and policy attention.

The challenges of cemetery management and funeral services in Rawalpindi must be understood within the context of the city's demographic and spatial expansion. Over the past two decades, Rawalpindi's population has grown substantially, exceeding 3.4 million in 2023 (GOP, 2023). This growth is projected to continue due to factors such as rural-to-urban migration and natural population increase. Rapid urbanization, coupled with unchecked urban sprawl, has placed significant strain on public infrastructure, including burial spaces. A preliminary assessment of cemeteries within the city reveals that most government-operated graveyards are nearing full capacity, with almost full occupancy rates in some locations. As a result, families are often compelled to reuse existing graves or turn to informal burial grounds, raising serious concerns around dignity, legality, and public health.

Despite Rawalpindi's expansion into peri-urban areas, there has been a lack of proportionate development in new cemeteries. Satellite imagery and municipal records show that while urban settlements have grown by over 30% in the past decade, designated cemetery land has increased by less than 5% (Yasin, 2023). Informal interviews with municipal officials and funeral service providers highlight several obstacles to efficient cemetery management, including departmental coordination issues, insufficient funding, and the absence of digitized records. A major concern is the lack of digital or centralized records of burials, with most cemetery data still manually maintained, making them prone to disputes, data loss, administrative inefficiency, and a lack of coordination among different stakeholders. This also means that the public has no access to updated information regarding available burial plots, leading to distress-driven decisions. Furthermore, the absence of zoning regulations in city master plans, combined with the weak institutional capacity of the Municipal Corporation of Rawalpindi (MCR), exacerbates the problem. Environmental concerns have also been raised regarding cemetery locations near water bodies, raising the risk of soil contamination.

This dismal situation has already been noticed by the Punjab Government, resulting in the Safar-Akhrat initiative, where they have developed a new cemetery covering 1,000 kanals at Rakh Dhamyal in response to the lack of space for new graves in Rawalpindi's 54 oldest cemeteries. This project includes allocating 500 kanals for Rawalpindi city, 200 kanals for Rawalpindi and Chaklala cantonment areas, and 100 kanals for the Christian community. Additionally, 200 kanals are reserved for funeral services, including space for prayer, mortuaries, parking, and open areas, addressing the growing need for burial and funeral service infrastructure. Similar projects were initiated in Lahore, namely Shehr-e-Khamoshan, which is facing neglect due to the gravedigger mafia exploiting the

situation of old cemeteries and offering graves at exorbitant prices. The issue with the market associated with rituals and activities pertaining to death is that for most families, it is not a frequently recurring event, leading to the lack of updated information on the part of the bereaved family regarding pricing of services and land availability. This information asymmetry may allow the service provider to exploit a family in their time of grief through non-competitive pricing and inconvenient land allocation, adding to the logistical costs of burial and other rituals. This situation calls for the exploration of structural and physical solutions for burial space shortages and the informalities of the burial and funeral market.

Modern economies are characterized by rapid digitalization, with governments also leveraging technology to create efficient, transparent, and citizen-focused systems for public service delivery. The COVID-19 pandemic further accelerated the global shift towards e-governance, as states turned to digital solutions to sustain economic activity and ensure uninterrupted essential services.

Pakistan is actively pursuing digital transformation, with institutions like the National Information Technology Board (NITB) and the Punjab Information Technology Board (PITB) driving e-governance initiatives such as the e-Khidmat Markaz. This trajectory is expanding into critical sectors like energy and real estate, where digitalization aims to enhance efficiency, transparency, and service delivery. Despite this progress, the transition has not yet occurred in the management of cemeteries in urban areas, where growing populations and urbanization present numerous challenges related to space, record-keeping, and accessibility. Traditional, paper-based cemetery management is inadequate, leading to issues like misplaced records, overcrowded plots, and disorganized graveyards, which add stress for bereaved families. Additionally, funeral service markets in Pakistan are unregulated, with inflated prices, making even burial services inaccessible for low-income families.

1.2. Rationale of the Study

This study seeks to address the problem through a dual lens:

1. Physical and structural solutions: exploring the viability of new graveyard models (such as planned cemeteries and alternative burial modes).
2. Digital governance solutions: evaluating the plausibility of e-management models for cemetery and funeral services and attitude towards technology adoption from both demand and supply side perspectives.

Exploring the feasibility of both physical and digital solutions together is essential because they complement each other. While new cemetery models address the structural challenge of land scarcity, digital platforms ensure efficiency, regulation, and accessibility in day-to-day management. A purely physical expansion without digital management risks perpetuating inefficiencies, while digitalization without new models cannot resolve the underlying shortage of burial space. Together, they create a holistic framework for dignified and sustainable cemetery management.

Furthermore, effective cemetery management is essential for sustainable cities. The Sustainable Development Goals (SDGs), particularly SDG 11 (Sustainable Cities and Communities), emphasize inclusive urban planning, environmental responsibility, and dignified service delivery. Mismanaged

burial systems not only affect bereaved families but also contribute to land misallocation, informal encroachments, and public health risks. A systematic approach to cemetery governance ensures that urban growth is planned, equitable, and respectful of cultural and religious practices.

1.3. Objectives of the Study

Given the background, the research aims to achieve the following objectives

1. To assess the logistical and financial challenges faced by bereaved families in terms of locating and arranging burial space and funeral services in Rawalpindi.
2. To analyse the current challenges and inefficiencies in cemetery management and funeral service faced by end users and the local government in Rawalpindi.
3. To evaluate the perspectives of different stakeholders, including bereaved families, charity organizations, religious scholars, and institutions (formal and informal), towards technology adoption for the management of cemeteries and funeral services.
4. To assess the plausibility of different e-government models from the perspectives of stakeholders.
5. To evaluate the feasibility of different graveyard models from multiple stakeholders' perspectives.
6. To integrate insights using benchmarking, geospatial analysis, and triangulation to develop evidence-based policy interventions for transparent and sustainable cemetery and funeral service management.

1.4. Contribution of the Study

This study addresses a critical but often overlooked urban service, cemetery and funeral management, in Rawalpindi, where rapid urbanization and traditional practices have created significant challenges. Documenting these issues and exploring innovative solutions fills an important knowledge gap relevant to many growing cities in Pakistan and similar countries.

The research combines physical solutions, such as new cemetery designs and sustainable burial models, with e-governance approaches like online grave mapping and transparent service platforms. This dual perspective offers a practical roadmap for city governments to improve efficiency in burial services.

Importantly, the study examines the attitude towards technology to understand how families, service providers, and religious institutions perceive digital tools, helping guide user-friendly and culturally sensitive digitalization efforts. By linking cemetery management to the Sustainable Development Goals, especially sustainable cities, the research underscores how better burial governance contributes to better urban planning and sustainable cities.

1.5. Organization of the Study

The remainder of the study is organized as follows: Chapter 2 contains the Literature review. Methodology is explained in Chapter 3. Chapter 4 presents the results and discussion, and Chapter 5 concludes.

LITERATURE REVIEW

2.1. Introduction

Cemetery and funeral management have become a complex governance and urban planning challenge across both developed and developing societies due to population growth and rapid urbanization. The strong preference for traditional burial systems has led to overcrowding, irregular grave layouts, weak documentation, limited access, and governance failures that affect both efficiency and dignity. As cemeteries increasingly compete with residential and commercial land uses, burial management has shifted from a purely cultural or religious concern to a multidimensional issue involving public administration, digital governance, and social trust. This section provides a review of the literature focusing on how countries all over the world are integrating cemetery management into broader urban planning.

2.2. Graveyards, Burial Models, and Cemetery Management

As urban land becomes increasingly scarce, households face growing difficulty securing dignified burial spaces, intensifying pressure on traditional cemetery models. In many settings, the shortage of public burial land and high costs of private plots have pushed families toward informal or adaptive solutions. Adeforiti (2023), examining Nigeria, documents the persistence of residential burial models, where corpses are interred within household premises due to weak regulation, inadequate public cemeteries, and unaffordable private options. While culturally ingrained, these practices pose serious public health risks, including water contamination and disease transmission, highlighting the need for regulated, affordable public burial alternatives. In response to land scarcity, several cities have adopted alternative graveyard models. In Indonesia, cemeteries in Jakarta and Surabaya have reached full capacity, prompting the adoption of grave reuse systems and vertical burial structures as pragmatic spatial solutions (Ladianto and Soemardiono, 2016). These cases illustrate a global shift away from expansive horizontal cemeteries toward denser, space-efficient burial models.

Cultural hybridity further shapes graveyard models in African contexts. Islamic communities increasingly emphasize simplicity and rapid burial, gradually transforming burial norms. Similar transitions are observed in Tanzania, where Islamic practices coexist with traditional customs amid economic and spatial constraints, prompting calls for reforms aligned with sustainable urban planning (Bernard et al., 2020; Becker, 2009).

In non-Muslim-majority countries, graveyard models have evolved to accommodate Islamic burial requirements within multicultural policy frameworks. In Germany, Islamic graves display distinct cultural expressions, including Arabic, Turkish, or Bosnian inscriptions, mosque-inspired designs, photographs, and national symbols (Klapetek, 2017). These practices reflect both religious devotion and identity negotiation within public space. Canada presents a contrasting model, where Muslim communities increasingly prefer local burial supported by multicultural policies, mosque-affiliated services, and designated cemetery sections (Akkaymak & Belkhodja, 2020).

Governance capacity and technology further differentiate graveyard models. In many Muslim-majority countries, cemetery management remains fragmented and informal. In contrast, Malaysia's Muslim Graveyard Management System (MGMS), integrating GIS and digital records, has improved

spatial efficiency, transparency, and public trust (Abdullah et al., 2022). The Bukit Kiara case illustrates how planned layouts and digital monitoring can mitigate land scarcity and administrative disorder (Daud et al., 2014; Ong, 2019).

Recent scholarship also reframes cemeteries as multifunctional landscapes. Studies from Oslo conceptualize cemeteries as green urban spaces supporting biodiversity and reflection (Skår et al., 2018). Religious norms and cultural knowledge systems continue to shape burial models. Shariah-compliant requirements, such as burial within 24 hours, Qibla orientation, and prohibition of cremation, limit adaptive options like unrestricted grave reuse (Ahmad et al., 2023). Nonetheless, Islamic scholars in Malaysia and Indonesia have permitted conditional grave reuse, reflecting jurisprudential flexibility under land constraints.

2.3. Technology, Digital Cemetery Systems, and Technology Acceptance

Technological innovation has become a central response to the structural challenges in cemetery and funeral management. Traditional cemetery systems in many developing contexts rely heavily on manual processes, irregular spatial layouts, and deteriorating physical markers. Rasam et al. (2013) document how unorganized management practices result in overlapping burials, lost graves, and difficulties for families attempting to locate burial sites over time. Urbanization intensifies these problems, as Afla and Reza (2012) identifies land scarcity as a critical issue that necessitates proactive planning and the adoption of technological tools.

Digitalization has emerged as a strategic response to these constraints. Kuznetsova (2022) conceptualizes the digital cemetery as an integrated ecosystem in which ICT, GIS, and IoT support systematic documentation, spatial mapping, and service delivery. Lee & Lee (2011) demonstrate that GIS-based cemetery systems enable precise plot identification, significantly reducing the risk of overlapping burials. Similar initiatives in Russia and China incorporate mobile applications, QR codes, and IoT-enabled services to improve record accuracy, accessibility, and user interaction. Ho et al. (2020) describe the emergence of Funeral IoT, where QR codes, remote memorial services, and online mourning platforms reflect broader societal demands for convenience, personalization, and continuity in remembrance practices.

Despite the demonstrated technical potential of digital cemetery systems, their success ultimately depends on user acceptance. The Technology Acceptance Model (TAM) provides a foundational framework for understanding adoption behavior by emphasizing perceived usefulness and perceived ease of use as primary determinants of technology uptake. However, the cemetery and funeral domain present unique characteristics that require extensions of the traditional TAM framework. Makararpong et al. (2024) extend TAM by incorporating perceived financial risk, social influence, and trust in their study of smartphone-based funeral applications in Thailand. Their findings reveal that adoption is shaped less by convenience and efficiency and more by social norms, legitimacy, and confidence in service providers. This suggests that in sensitive service domains, emotional reassurance and social validation play a more decisive role than purely functional benefits.

Records management studies highlight that weak documentation in cemeteries persists largely due to unclear record-keeping responsibilities, as shown by Rouget (2023) in South Africa, where poor records undermine efficient land use and long-term planning despite greater attention to burial

space shortages. The study stresses that technology adoption must be supported by staff training, institutional backing, and recognition of records management as a core governance function. Cultural and normative compatibility also strongly influences adoption: Afla et al. (2018) emphasize alignment with burial norms to preserve dignity, while Rasam et al. (2013) and Abdullah et al. (2022) document family resistance to digital systems perceived as being unfamiliar or incompatible. Together, these findings suggest that perceived compatibility should be treated as a key extension of TAM in evaluating digital cemetery management.

Recent studies from South Asia provide additional insights. Rahman et al. (2025) report high usability and acceptance of a digital burial record system among application users, while older and less technologically experienced staff express greater difficulty, highlighting generational and capacity-based divides. Alamgir et al. (2025) identify ethical concerns, data security risks, and technological inequalities as persistent barriers, despite broad recognition of the benefits of digitalization for mortality surveillance and civil registration. Ho et al. (2024) emphasize that privacy protection, standardized protocols, and practitioner training are essential for sustaining trust in IoT-enabled funeral systems.

Economic factors also influence adoption trajectories. Ba-An et al. (2022) show that financial status shapes burial expenditures, reflecting broader social values surrounding death and commemoration. Komalasari (2020) highlights the role of Cemetery Information Systems (CIS) as cost-effective decision-support tools for municipal authorities, while Sien and Ramachandiran (2018) demonstrate that e-cemetery portals can enhance efficiency, though their limitations point to the need for more integrated spatial and governance features.

2.4. E-Government Models and Governance Frameworks in Cemetery Management

Cemetery and funeral management exemplify a public service domain that stands to benefit significantly from e-government integration. Traditionally administered through fragmented municipal, religious, or community-based authorities, cemetery management often suffers from unclear institutional responsibilities, inconsistent documentation, and limited coordination. Joshi et al. (2017) propose a cloud-based Government-to-Government (G2G) e-government framework designed for developing-country contexts, demonstrating its effectiveness in improving inter-agency coordination, transparency, and service efficiency. Their findings from Nepal show that centralized digital governance can reduce implementation time and enhance institutional integration, an insight directly applicable to cemetery management, where responsibilities frequently overlap among land authorities, local governments, and service providers. Similarly, Farzali et al. (2012) argue that fragmented e-government systems undermine service completeness and citizen engagement, a condition mirrored in cemetery administration, where jurisdictional overlap and inconsistent records persist.

A substantial body of literature identifies systemic barriers to e-government adoption. Al-Hujran et al. (2015) highlight inadequate ICT infrastructure, limited access to digital tools, weak payment systems, and ineffective service delivery channels as major constraints. Lessa et al. (2016) and Magro (2012) further contend that governments often emphasize technological sophistication while neglecting user readiness and capacity, resulting in digital services that are underutilized or

mistrusted. These challenges are particularly acute in cemetery management, where low digital literacy, emotional vulnerability, and limited engagement with formal administrative processes can amplify resistance to digital platforms.

Empirical studies demonstrate that governance weaknesses have direct consequences for cemetery conditions. Amoah et al. (2025), examining public cemeteries in Kumasi, Ghana, find that joint management by traditional authorities and local governments under similar legal frameworks has not prevented substandard conditions due to financial constraints and weak coordination. Their study highlights governance and funding gaps, emphasizing the need for clearer institutional roles and sustainable resource allocation. Comparable challenges are documented in Bangladesh, where Alamgir et al. (2025) reveal wide variation in paper-based death record-keeping practices shaped by sociocultural norms and administrative fragmentation. Such non-standardized governance complicates civil registration, public health planning, and the protection of legal rights.

Urban planning literature further reinforces the necessity of integrating cemetery management into broader governance and planning frameworks. Anthony (2016) and Bennett and Davies (2015) argue that cemeteries must be embedded within municipal zoning and regulatory systems to reduce land-use conflicts and governance disputes. Grabalov and Nordh (2022) demonstrate that when cemeteries are strategically incorporated into urban planning, they function not only as burial grounds but also as cultural and green spaces that contribute positively to urban livability. The continued treatment of cemeteries as residual or marginal land uses, therefore, reflects governance failure rather than spatial inevitability.

Case studies of digital cemetery initiatives illustrate the potential of e-government-aligned systems. Abdullah et al. (2022) show that the absence of standardized digital governance frameworks led to unorganized grave sites and incomplete records, motivating the development of a GIS-based Graveyard Management System. Their findings demonstrate how digital tools aligned with public-sector governance structures can improve administrative efficiency while remaining socially appropriate. Comparative evidence suggests that countries with centralized digital governance frameworks have been more successful in integrating cemetery services into broader e-government ecosystems, reinforcing the importance of coherent policies, regulatory oversight, and institutional coordination.

METHODOLOGY

This section provides the details of the methodology with respect to the objectives of the study.

3.1. Stakeholder Mapping and Data Collection

The stakeholder mapping in Figure 1 highlights the multifaceted nature of cemetery and funeral service management in Rawalpindi, where diverse actors shape both challenges and opportunities for reforms. Bereaved families remain the primary stakeholders (demand side), directly experiencing logistical and financial constraints as well as influencing acceptance of digital interventions and different graveyard models. Service providers (supply side) act as operational intermediaries, managing day-to-day processes and adapting to potential reforms related to burial shortages and digitization. Local government institutions, the informal graveyard management committee, and the RDA hold regulatory and planning authority, thereby determining the feasibility of digital transition. Religious scholars and clergy provide cultural and spiritual legitimacy, ensuring reforms align with community norms. At the same time, technology providers introduce the tools, such as GIS mapping and e-management platforms, necessary to modernize services. Positioning these stakeholders along the involvement–impact matrix illustrates that successful reform requires balancing high-impact decision-makers with those most directly involved, ensuring inclusivity, cultural acceptability, and operational feasibility in moving toward improved space management and e-governance of cemetery and funeral services.

The cross-sectional study was carried out from June to December 2025 in Rawalpindi city. According to the Population Census 2023, Rawalpindi city is the 4th largest city of Pakistan. Rawalpindi city is divided into 46 union councils (UCs) for administrative purposes by the Rawalpindi Municipal Corporation. Each union council has a distinct administrative boundary defined as an area of population of > 20,000 people. Table 1 presents stakeholder typology and sample size.

Table 1: Stakeholder Typology

Stakeholder Classification	Data Collected
Bereaved Families (End Users)	470 Questionnaires
Union Councils (Formal Institutions)	46 Questionnaires
Gravediggers (Frontline Workers)	26 Structured Interviews
Graveyard Committees (Informal Institutions) +Charity Organization	26 + 4 Structured Interviews
Islamic Scholar (Moral Advocates)	7 Structural Interviews
Tech Experts (Facilitators)	7 Structured Interviews
City Government	DG RDA

Source: Authors' compilations.

1. The sampling unit is a bereaved family with the incidence of death in the last 3 years. The respondent is the individual who managed burial and funeral arrangements in the event of death. Considering the Muslim and Christian population and the mortality rates, with 99 % confidence interval and 5 % margin of error, the minimum required sample size for Muslims is 100 (300 for the last three years) and 15 (45 for the last three years) for Christian population. Given these calculations, the study sample comprises 400 Muslims and 70 Christian bereaved families, respectively.

2. The second stakeholder is the union council. As mentioned, Rawalpindi city is administratively divided into 46 UCs. The study covers all UCs.
3. Third stakeholders are frontline workers. 63 graveyards (26 public and 37 private/community) were approached for data collection from gravediggers. Only 23 public and 2 private gravediggers responded.
4. Fourth stakeholders are the graveyard informal committees. About 50 individuals belonging to different informal committees were approached for data collection, out of which 32 responded.
5. Fifth stakeholder, moral advocates (Muslim scholars) belonging to both Dars-Nazami and conventional academic streams were approached. The research team contacted 25 Muslim scholar, out of which 7 responded with 3 different schools of thought.
6. The sixth stakeholder was technology experts. About 15 technology experts were approached, out of which 10 interviews were obtained.
7. Finally, to incorporate the perspective of the city government, a detailed interview was conducted with DG-RDA, Ms. Kinza Murtaza.

3.3. Objective-wise Mapping of Research Tools

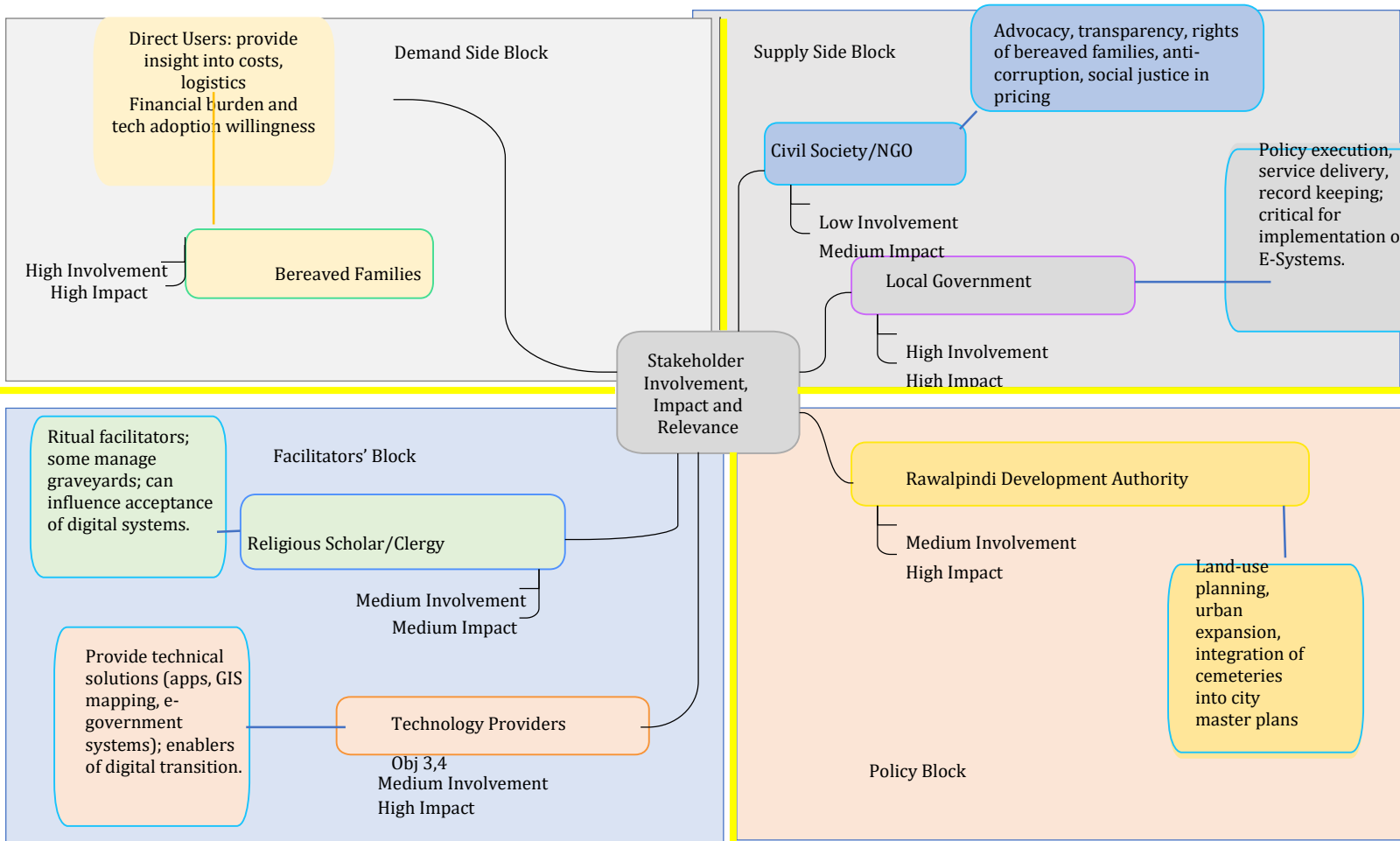
The section contains the research methodology for each objective as follows:

3.3.1. Logistic and Financial Challenges for Bereaved Families

In order to comprehensively assess the difficulties faced by bereaved families, the questionnaire was designed to capture both logistical and financial aspects of funeral and burial arrangements. The key aspects captured are presented in Table 2.

- . Research tool: Questionnaire
- . Measurement Scale: five-point Likert scale

Figure 1: : Stakeholder Mapping



Source: Author's construction.

3.3.2. Current Challenges and Inefficiencies in Cemetery Management

Research Tools: Questionnaire and Policy Document Analysis

Measurement Scale: five-point Likert scale

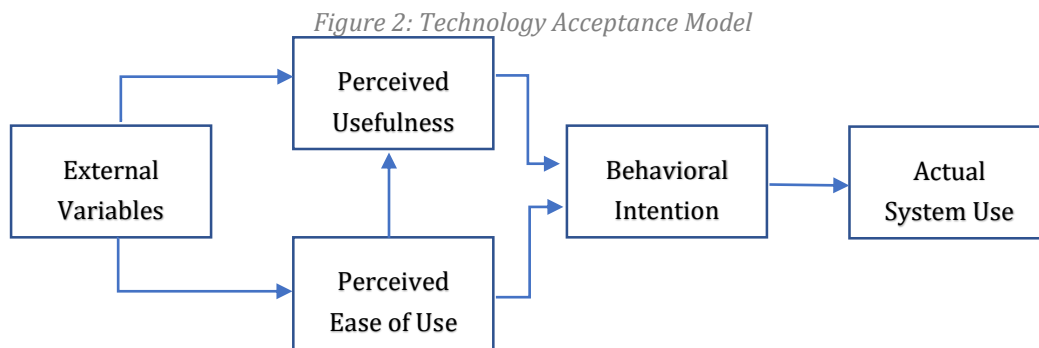
The key aspects from the bereaved family survey and the service provider survey are presented in Table 2.

3.3.3. Attitude Towards Technology Acceptance Model

To assess the acceptance of digital cemetery and funeral service management systems, the study proposes the end-use assessment through the Technology Acceptance Model (TAM) presented by Davis (1989) based on the Theory of Reasoned Action (TRA) presented by Ajzen & Fishbein (1988). The TAM framework explains how users come to accept and use a new technology, and it has been adapted to capture both traditional TAM constructs and external factors relevant to the socio-cultural and institutional context of cemetery and funeral management in Pakistan. The TAM framework is also utilized to assess the service provider's acceptance of transitioning to digital management of cemetery and funeral services. Figure 2 depicts the conceptual framework of TAM.

Research Tool: Questionnaire

Measurement Scale: five-point Likert scale



Source: Authors' construction.

The key aspects from the bereaved family survey and service provider survey based on TAM are presented in Table 2.

3.3.4. Challenges and Barriers in Transitioning to E-Governance Systems

Research Tool: Questionnaire and Interviews from Technology Experts

In addition to applying the TAM to assess the readiness and perceptions of both users and service providers, this study incorporates e-governance models (G2C, G2E, and G2G) within the bereaved family and service provider surveys. This framework not only captures individual acceptance of digital cemetery and funeral services but also identifies the institutional modes of interaction that are most acceptable to end users and operationally feasible for service providers.

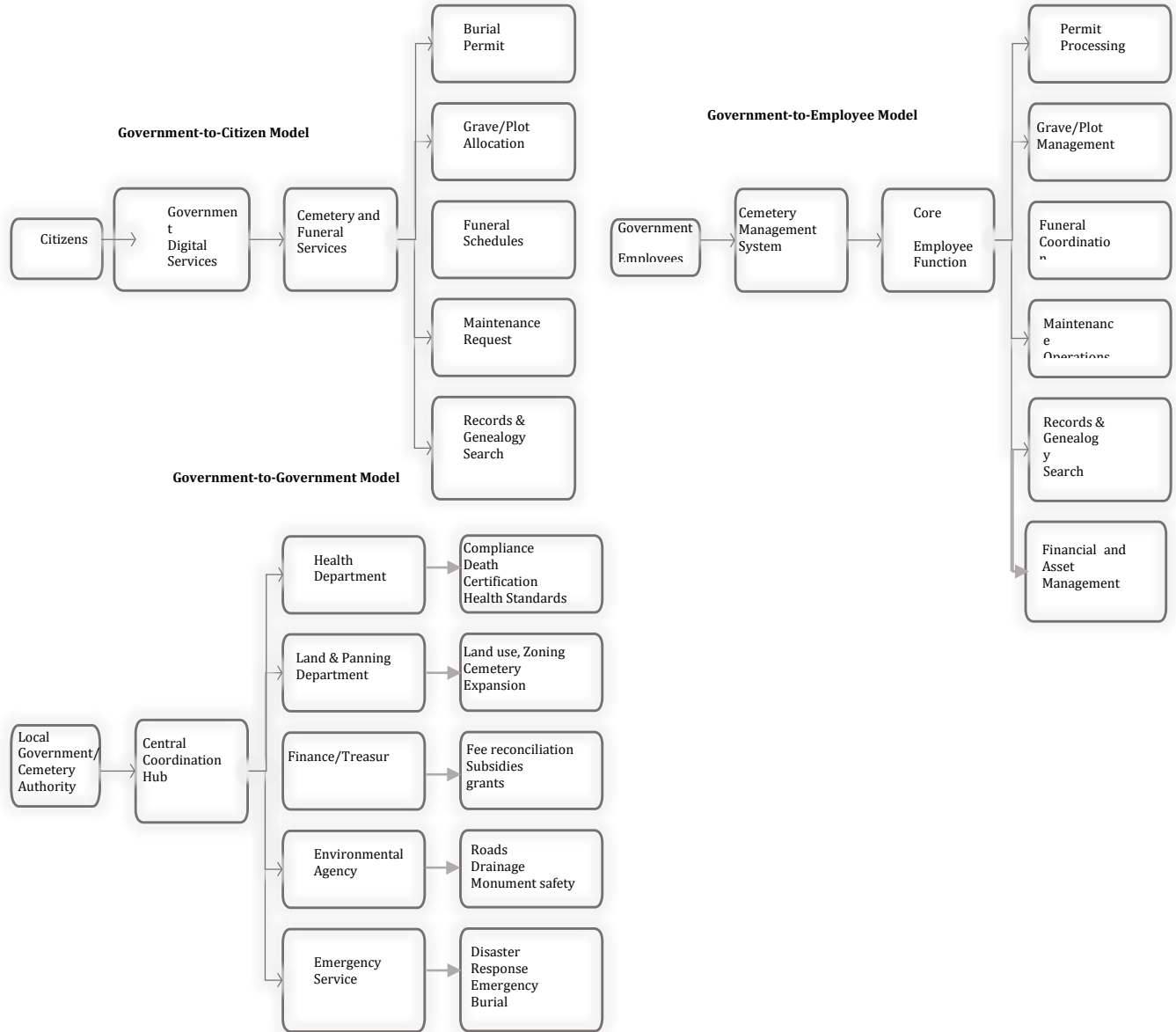
E-Governance refers to the use of digital technologies by government entities to streamline and enhance the delivery of public services. In the context of cemetery management and funeral services, e-Governance facilitates more transparent, efficient, and accessible services through various interaction models. Figure 3 captures the characteristics of different e-governance models. The figure shows that the G2C model focuses on direct engagement between the government and the public, allowing citizens to use online platforms to locate burial spaces, arrange funeral services, make payments, and access records conveniently without needing to visit government offices physically. This model significantly improves service accessibility and user experience by providing real-time information and online services.

The G2E model, on the other hand, is designed to support the internal operations of government staff responsible for cemetery and funeral service management. Through digital systems, employees can manage burial records, coordinate service schedules, and communicate effectively among departments, reducing errors and improving workflow. By using e-learning and digital communication tools, G2E enhances staff capabilities and operational efficiency, making the service delivery more reliable and responsive.

Finally, the G2G model facilitates collaboration and data sharing between different government agencies involved in cemetery and funeral services, such as municipal bodies, health departments, and civil registration authorities. This integration enables coordinated efforts in managing burial

records, ensuring legal compliance, and providing comprehensive services, including emergency responses or large-scale funeral events. The seamless exchange of information and resources between government units under the G2G model improves policy implementation, oversight, and accountability. Figure 3 compares the goals, operations, and outcomes of different e-governance models.

Figure 3: E-Governance Model for Cemetery Management and Funeral Services



Source: Author's construction.

3.3.5. Exploring Feasible Graveyard Models to Address Burial Space Scarcity

This objective focuses on evaluating alternative graveyard models as complementary solutions to address the challenge of burial space scarcity. While the earlier analysis emphasized digital readiness and governance mechanisms, the present objective extends the scope to consider the physical and structural design options for cemeteries, thereby providing a perspective that integrates both technological and spatial dimensions. Each model is evaluated in terms of its cultural and religious acceptability, environmental implications, and long-term sustainability. A brief overview of different models is presented in Figure 4.

Figure 4: Overview of Different Graveyard Models

Characteristic	Traditional in-Ground	Vertical Graves	Grave Reuse	Wall Vaults
Description	Individual Graves in open land	Graves stacked Vertically	Grave reused after fixed Period	Niches in vertical walls
Pros	Culturally acceptable, minimal ritual change	Space saving maximizes land use	Land efficient, cost effective	Efficient land use, low footprint
Cons	Rapid Land Depletion, high costs	Requires investment, potential resistance	Emotional Resistance, strict management	Perceived as less dignified, higher costs
Common in	Muslim Countries	Land scarce cities	Historically Muslim currently Europe	Catholic Majorities countries

Source: Author's construction.

3.4. Objectives-Tools-Aspects-Stakeholders Matrix

Table 2 presents a concise view of the methodology section.

Table 2: Objectives-Tools-Stakeholders Matrix

Objectives	Stakeholder	Research Tools	Aspects Captured
Logistic and Financial Challenges for Bereaved Families	Bereaved Families,	Questionnaire Surveys (470)	Logistic Challenges <ul style="list-style-type: none"> Burial space search and allocation Funeral arrangements and coordination Environmental and Situational Barriers Financial Challenges <ul style="list-style-type: none"> Cost of burial space Cost of funeral services Coping mechanism for expenses
	Charity Organizations	Structured Interviews	
	Religious Scholars,	Structured Interviews	
Current Challenges and Inefficiencies in Cemetery and Funeral Service Delivery and Management	Bereaved Families	Questionnaire Surveys	<ul style="list-style-type: none"> Maintenance & Infrastructure Staff & Service Quality Policies & Communication Safety, Security & Amenities:
	Service Provider (Local Government, Grave diggers, Funeral Service Provider, Charity Organizations), RDA	Policy/Document Analysis Structured Interviews	<ul style="list-style-type: none"> Record-Keeping & Data Management Operational & Logistical Challenges Regulatory Compliance & Oversight Financial Sustainability & Transparency Service Delivery & Coordination Preparedness & Crisis Management
	Religious Scholar and Clergy	Structured Interviews	<ul style="list-style-type: none"> Transparency in Operations: Inclusion in Policy-Making Ethics of Privatization Leadership Accountability Cemetery Conditions Government Capacity
Different Graveyard Models	Bereaved Families	Questionnaire Surveys	<ul style="list-style-type: none"> Awareness and Religious Permissibility of Grave Types Acceptability of Space-Saving Burial Models: Specific Concerns and Barriers:
	Service Provider (Local Government, Grave diggers, Funeral Service Provider, Charity Organizations)	International Case Studies Structured Interviews	
	Religious Scholar and Clergy	Structured Interviews	
Different E-Government Model	Bereaved Families	Questionnaire Surveys	<ul style="list-style-type: none"> For the G2C model, items focused on technical infrastructure and accessibility, service integration, legal and regulatory frameworks, financial sustainability, and stakeholder engagement, thereby examining the extent to which citizens consider direct online access to cemetery services feasible. For the G2E model, the survey explored aspects such as staff accessibility and usability of digital systems, training and support, infrastructure reliability, data security, change management, financial sustainability, and staff-citizen engagement. For the G2G model, questions examined technical compatibility, interdepartmental collaboration, financial and
	Service Provider (Local Government, Grave diggers, Funeral Service Provider, Charity Organizations)	International Case Studies Structured Interviews	

			<p>resource considerations, impact on service efficiency, citizen trust and transparency, and potential risks.</p> <ul style="list-style-type: none"> • Finally, a preference item was included to gauge respondents' judgments regarding which model or combination of models would be most suitable for cemetery and funeral service management.
	Religious Scholar and Clergy	Structured Interviews	<ul style="list-style-type: none"> • Openness to Digital Tools • Role in Facilitation • Support for Advisory Bodies
	Technology Experts	Structured Interviews	Feasibility of Digitalization
Attitude Towards Technology Adoption	Bereaved Families	Questionnaire Surveys	<ul style="list-style-type: none"> • Perceived Usefulness • Perceived Ease of Use • Attitude Toward Using
	Service Provider (Local Government, Grave diggers, Funeral Service Provider, Charity Organizations)	Structured Interviews	
	Religious Scholars and Clergy	Semi-structured Interviews, Observations of Rituals	<ul style="list-style-type: none"> • Openness to Digital Tools: • Role in Facilitation • Support for Advisory Bodies
	Technology Experts	Structured Interviews	Feasibility of Digitalization

Source: Authors' construction.

OBJECTIVE-WISE ANALYSIS OF RESULTS

This chapter presents the results of surveys and interviews conducted in Rawalpindi city with multiple stakeholders as per Table 2.

4.1. Objective 1 and 2: Logistical, Financial, and Institutional Challenges in Cemetery and Funeral Service Management

This section scrutinizes the logistical and financial challenges faced by bereaved families in securing burial space in Rawalpindi, including delays in burial arrangements, repeated searches for grave space, additional financial burdens, and emotional strain during the burial process. While objective 2 explores institutional inefficiencies in cemetery and funeral services management, focusing on administrative capacity, service quality, record management, and the role of local government policies in shaping burial consequences. Figure 5 presents the findings for these objectives.

The bar charts clearly demonstrate that bereaved families, particularly within Muslim communities, face substantial logistical and financial challenges when arranging burial space. In Muslim frameworks, burial arrangements appear largely reactive. The chart on *Arranging the Burial Plot* shows that a notable percentage of Muslim families rely on existing graves (26%), pay extra charges (25%), or wait for graves to become available (13%). A small share also resorts to temporary burial arrangements, signifying emergency coping strategies rather than planned systems.

In contrast, Christian burial practices reflect more structured graveyard models. The chart on *Securing Burial Space on First Attempt* determines that 92.1% of Christian families successfully secure burial space on the first attempt, compared to only 30.6% of Muslim families. This difference reflects the pervasiveness of family-owned plots, geographically detached cemeteries, and pre-planned burial systems in non-Muslim contexts.

The *Final Burial Plot Secured* bar chart further supports this distinction. Christian burials are more evenly distributed across public graveyards, graveyards in other areas, private graveyards, and family-owned plots. Muslim burials, however, are heavily concentrated in public graveyards (49%) and private or paid graveyards (38%), reflecting spatial pressure and limited alternatives. Collectively, the charts specify that grave reuse, monetized burial plots, temporary arrangements, and spatial relocation function as informal alternative graveyard models in Muslim communities, while institutionalized planning dominates non-Muslim contexts.

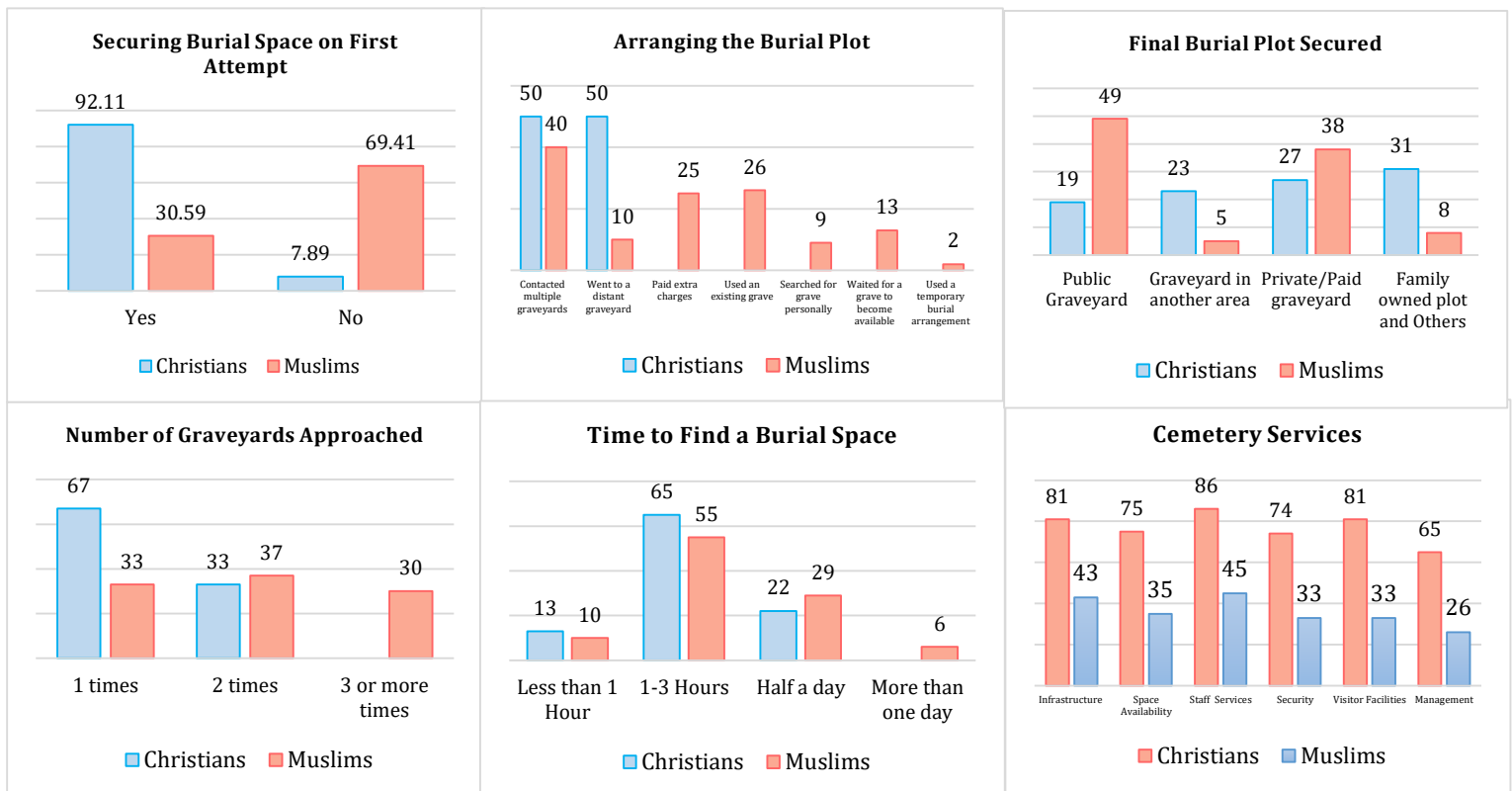
The bar chart showing the use of existing graves by 26% of Muslim respondents suggests that grave reuse is being adopted under necessity. Within Islamic jurisprudence, such practices are generally discussed under the principle of necessity, which permits otherwise discouraged actions when no practical substitutions exist. Although the graphs do not directly evaluate religious rulings, they provide insight into practices that are socially accepted under prevailing religious norms.

The bar chart also demonstrates that Muslim families experience repeated searches and delays, signifying that while certain alternative models may be jurisprudentially permissible, they are not perceived as fully aligned with ideal religious practice. On the contrary, Christian burial systems do not show evidence of grave reuse, reflecting different theological frameworks and fewer spatial constraints.

The bar charts on *Number of Graveyards Approached* and *Time to Find a Burial Space* provide strong indicators of bereaved families' emotional stress, as Muslim families are compelled to approach multiple graveyards, with 30% visiting three or more graveyards, compared to none among Christians. Similarly, while most Christian families complete burial arrangements within one to three hours, Muslim families show higher proportions experiencing delays of half a day or more. These extended searches, frequent need to negotiate space, pay extra charges, or wait for availability, indicate emotional strain and distress. On the other hand, Christian families face less distress owing to predictability and continuity, largely due to family-owned plots and better-managed cemetery systems.

The *Cemetery Services* bar chart reveals marked differences in the satisfaction with institutional capacity. Christian cemeteries score constantly higher across infrastructure, space availability, staff services, security, visitor facilities, and management. This reflects the feasibility of structured graveyard models that incorporate centralized planning and long-term land allocation. Muslim cemeteries, in contrast, show lower service scores across all indicators. The reliance on public graveyards and paid plots recommends congestion, administrative strain, and limited governance capacity. From a local government viewpoint, the charts indicate that current Muslim burial practices depend on short-term coping mechanisms rather than sustainable planning.

Figure 5: Burial Challenges Faced by Bereaved Families



Source: Authors' construction.

4.2. Objective 3: Attitude Toward Technology Adoption

This objective assesses stakeholder perceptions of digital systems in cemetery and funeral service management, focusing on perceived benefits and drawbacks, trust and acceptability, and the willingness of bereaved families to engage with online burial service platforms in line with the TAM. The comparative analysis draws on responses from Graveyard Diggers (GDs), Union Council officials (UCs), Graveyard Committees (GCs), and Households (HHs) across multiple attitudinal, operational, cultural, and institutional dimensions. The findings of this section are presented in Figure 6.

The radar chart shows that UCs consistently assign the highest perceived usefulness to digital systems across all indicators. Scores for smart navigation, service convenience, record maintenance, price transparency, financial transparency, time efficiency, operational coordination, and stress reduction cluster near the upper range. This reflects the institutional role of UCs in formal documentation, coordination, and regulatory oversight.

The radar chart further shows that HHs also report strong *Perceived Usefulness*, particularly for smart navigation, service convenience, and time efficiency. Their scores remain relatively lower than UCs, suggesting limited direct engagement with regulatory aspects during bereavement. GDs perceive moderate usefulness, particularly for operational coordination and time efficiency, but show visibly lower scores for financial and price transparency. This aligns with their informal operational context and limited involvement in standardized pricing or record systems. In contrast to UCs, GCs record the lowest scores across all usefulness indicators, revealing a weak perceived value of digital systems within informal community structures.

The radar chart on *Perceived Ease of use* shows a similar institutional gradient. UCs report very high ease of use for operational ease, ease of navigation, usability support, transaction ease, correction ease, and independent use. These scores indicate strong institutional capacity, trained personnel, and system familiarity.

HHs show moderate ease of use, particularly for navigation and transactions, but lower scores for independent use and correction ease. GDs display mid-range ease-of-use scores, suggesting partial familiarity but continued dependence on manual processes. GCs exhibit the lowest ease-of-use scores, especially for independent use and correction ease, highlighting digital literacy and access constraints.

The radar chart demonstrates that *Attitudes Toward Technology Adoption* are strongest among UCs. Adoption willingness, benefit perception, efficiency gain, long-run benefits, and stress relief all score high, indicating strong institutional readiness for digital transformation. HHs show moderately positive attitudes, particularly for efficiency gain and service reliability, but weaker long-term benefit perception. GDs maintain neutral-to-moderate attitudes, reflecting uncertainty about impacts on traditional work practices. GCs show weak attitudes across all dimensions, indicating hesitation driven by capability and familiarity.

The bar chart *Perceived Trust in the System* demonstrates that trust varies significantly by system characteristics and stakeholder. For public data integrity, GDs report the highest trust, followed closely by UCs. HHs show moderate trust, while GCs have very low trust. In private systems, trust is

low across all groups. For hybrid systems, all stakeholders show moderate confidence. In centralized price regulation, UCs express strong trust, GDs moderate trust, HHs lower trust, and GCs minimal confidence. These results indicate that trust is closely linked to perceived governance visibility and institutional accountability.

The bar chart *Cultural and Religious Acceptability* shows that UCs perceive digital systems as highly compatible with religious, cultural, and traditional fit, as well as adoption readiness. HHs also show strong acceptance, particularly for religious and cultural fit, though adoption readiness is slightly lower. GDs demonstrate moderate acceptance across all indicators. GCs consistently show the lowest acceptability, especially for adoption readiness, indicating cultural hesitation concentrated within informal community structures.

The bar chart, *Financial and Technical Barriers*, demonstrates an inverse pattern for barriers. UCs perceive minimal barriers across cost, accessibility, literacy, and awareness. HHs report moderate barriers, particularly in cost and literacy. GDs face noticeable constraints in accessibility and user literacy. GCs report the highest barriers across all indicators. This highlights a high risk of exclusion at the community level without targeted intervention.

The bar chart shows *Government Readiness and Support* that UCs express very high confidence in government motivation, infrastructure, capability, capacity building, and local competency. HHs report moderate confidence, indicating belief in intent but uncertainty in delivery. GDs show relatively moderate confidence across readiness indicators, while GCs exhibit very low confidence. These findings suggest that institutional readiness is not considered sufficient by frontline workers and informal stakeholders.

The bar chart *Access to Technology and Data Security* demonstrates that UCs have near-universal device access, internet access, data security confidence, and user privacy assurance. HHs have also scored well in these dimensions. GDs report limited access and moderate security awareness. GCs show the weakest access and lowest confidence in data security and privacy, reinforcing that inequality in access may constrain adoption.

The bar chart shows *Operational Readiness* that UCs are fully operationally ready across all dimensions. GDs demonstrate uneven readiness, with moderate skills but limited formal capacity. GCs display low readiness across all indicators, particularly in designated staff and technical capacity. This confirms that operational readiness declines sharply outside formal governance structures.

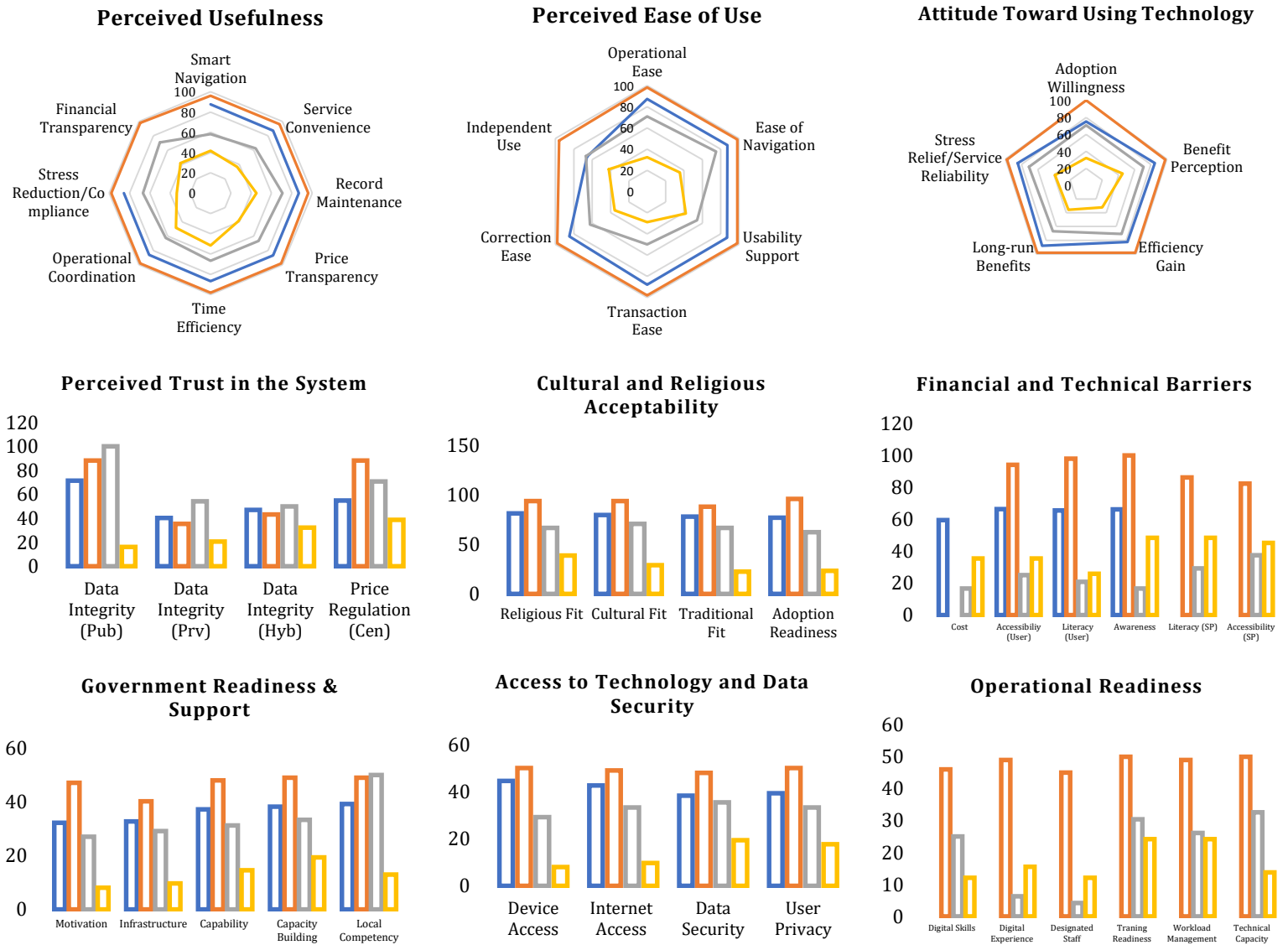
Overall, the results demonstrate that the feasibility of digital system adoption in cemetery and funeral service management is highly supported by HHs and UCs, though opinions remain diversified among GDs and GCs. Successful implementation will require not only technological deployment but also capacity building, trust enhancement, culturally sensitive communication, and targeted support for community-level stakeholders.

In Short,

Across all radar and bar charts, a consistent four-tier hierarchy emerges. UCs are quite confident about systems' capabilities for digitalization. Similarly, HHs are also positive towards technology adoption but have trust concerns regarding the system. GDs occupy a transitional position, showing

partial readiness but institutional limitations. GCs face structural, financial, and technical constraints rather than attitudinal resistance. This pattern suggests that proximity to formal governance structures and routine exposure to administrative technologies strongly shape positive attitudes, whereas emotional context, limited digital familiarity, and cultural considerations temper acceptance by the HHs.

Figure 6: Findings from Technology Acceptance Model



Source: Authors' construction.

4.3. Objective 4: Adoption of E-Governance Models and Key Barriers

This section discusses the findings of the surveys administered to assess the perception of multiple stakeholders regarding different e-governance models. By examining Government-to-Citizen (G2C), Government-to-Employee (G2E), Government-to-Government (G2G), and Hybrid models

simultaneously, the analysis demonstrates that e-governance acceptance is not uniform but varies significantly depending on their engagement as end users and service providers of cemetery services. The findings are presented in Figure 7.

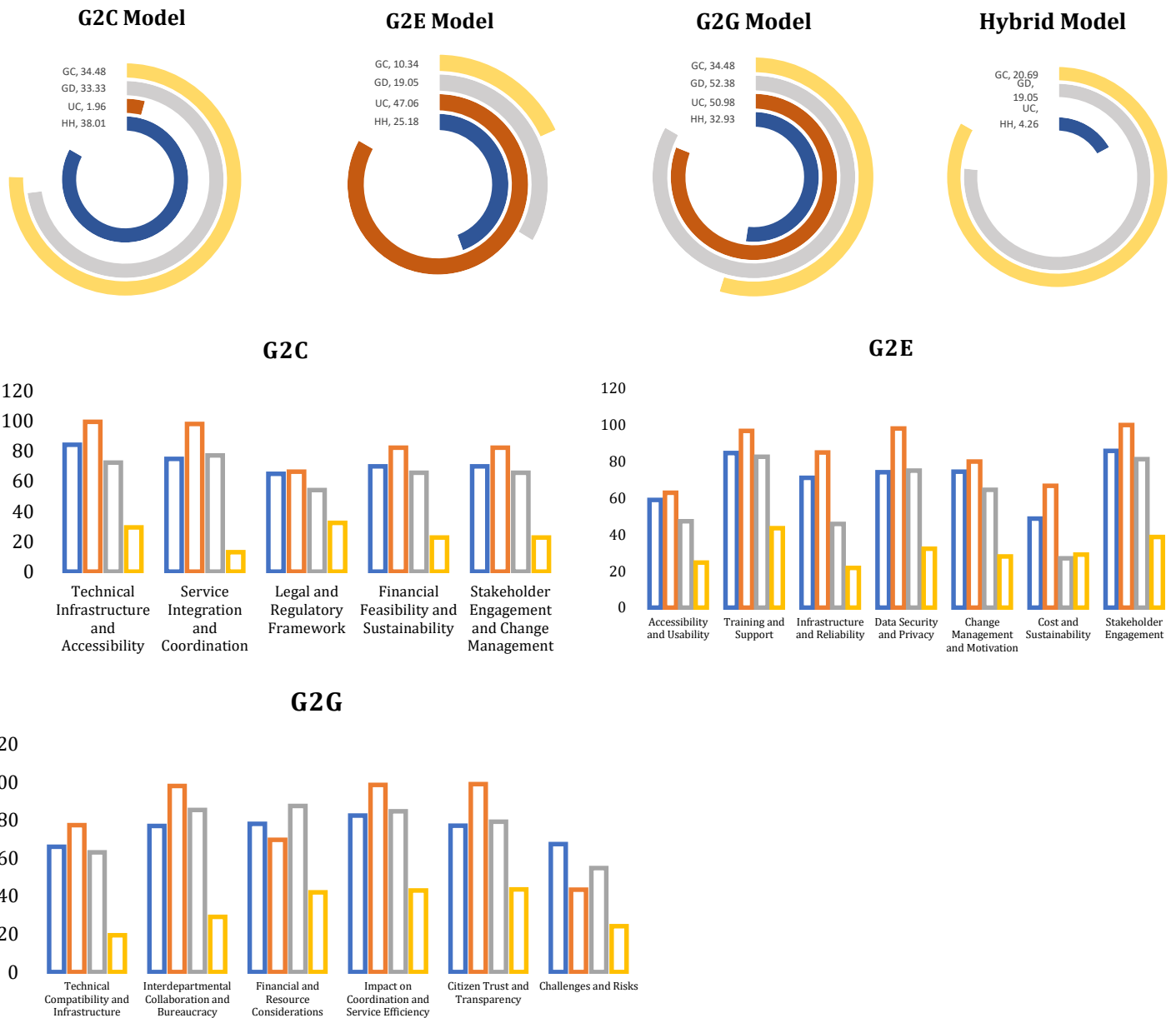
The results reveal that stakeholder perception patterns differ markedly across e-governance models, shaping both feasibility and effectiveness. It is evident from the figure *G2C* that the G2C model is preferred by HHs and informal service providers (GCs and GDs), indicating its citizen-centric nature and adaptive ease for informal service providers. Higher household acceptance reflects the model's emphasis on accessibility, service visibility, and trust, which are particularly important during emotionally sensitive periods such as bereavement. The strong preference of GCs further suggests that community-based actors can function as key intermediaries between citizens and digital service platforms.

However, the minimal preferences of UCs for the G2C model highlight a critical governance gap. While the bar chart results show relatively high scores for technical infrastructure, service integration, and stakeholder engagement, lower scores for legal and regulatory frameworks indicate that citizen-oriented digital services often operate without robust institutional backing. This lack of formal authorization undermines accountability, standardization, and long-term sustainability. Consequently, although G2C platforms are socially acceptable and responsive, they remain structurally fragile and heavily dependent on informal governance arrangements.

In contrast, the G2E model focuses on the digitalization of internal administration. The G2E model is strongly preferred by UCs, while institutional disconnect is strongly reflected in the low preferences for this model by GCs and GDs. The bar chart findings reinforce this orientation, as high scores are observed for training and support, data security, and infrastructure reliability. These results indicate that G2E frameworks are better aligned with organizational capacity building and internal process optimization.

Nevertheless, household preferences are low for the G2E model, revealing a disconnect between administrative digitization and citizen experience. Although internal systems may improve efficiency and data accuracy, their limited visibility reduces perceived value among bereaved families. Furthermore, the bar charts highlight persistent challenges related to cost and sustainability, change management, and staff motivation. These constraints suggest that institutional efficiency alone is insufficient to ensure effective implementation, particularly in service domains that require emotional sensitivity and public trust.

Figure 7: Comparative Analysis of E-Governance Model



Source: Authors' construction.

Overall,

The G2G is strongly preferred by all service providers, though HHs have shown moderate preference. This reflects that both formal and informal cemetery management institutions render digitalization of inter-agency coordination as imperative for efficient service delivery, manifesting a strong preference for this model. Correspondingly, the bar chart analysis shows high scores for interdepartmental collaboration, service efficiency, transparency, and citizen trust. These findings

suggest that G2G frameworks can address fragmentation in authority and improve formal mechanisms for service delivery.

However, the results also reveal that the efficacy of the G2G model may remain constrained due to certain challenges and risks. Challenges related to procedural delays, vested interests, and institutional resistance indicate that while coordination improves, flexibility and responsiveness may be reduced. This limitation is particularly problematic in cemetery and funeral services, where timely decision-making and adaptability are essential. Thus, although the G2G model strengthens governance coherence, it may risk prioritizing administrative order over human-centered service delivery.

All stakeholders express the weakest preference for the hybrid model, which is designed to integrate the strengths of G2C, G2E, and G2G frameworks. The results show minimal preference from HHs and absolutely no preference from UCs, which may signal a lack of operational clarity. This can be explained as, rather than achieving synergy, the Hybrid model appears to diffuse responsibility, leading to coordination failures and governance ambiguity. This outcome underscores a critical insight: integration in e-governance requires institutional readiness, clear role definition, and coordinated authority structures. Without these prerequisites, hybridization results in fragmentation rather than effectiveness. The weak preference of the Hybrid model thus reflects systemic governance constraints instead of conceptual flaws in integrative approaches.

From the perspective of bereaved families, the results indicate that acceptance is highest under the G2C model. Higher scores for accessibility, service availability, and stakeholder engagement reflect the importance of citizen-oriented design in emotionally sensitive public services. Digital platforms that prioritize ease of use, transparency, and trust are more likely to be accepted during periods of grief. In contrast, HHs' preferences decline sharply in G2E and G2G models, as internal administrative reforms are often invisible to users and lack emotional resonance.

Operational stakeholders, including GDs and GCs, demonstrate relatively consistent engagement across models. The bar charts indicate that these actors perceive e-governance as beneficial for coordination, record management, and service efficiency. However, their concerns regarding training gaps, digital literacy, and financial sustainability highlight persistent capacity constraints. These challenges are particularly pronounced in G2E frameworks, where insufficient training undermines the effectiveness of employee-oriented digital systems.

UCs perceive higher feasibility in G2E and G2G models due to alignment with administrative authority, data control, and regulatory oversight. Yet, financial limitations and resistance to change reduce their willingness to extend these systems into citizen-facing contexts. This divergence in stakeholder priorities may contribute to fragmented implementation and uneven outcomes.

The integrated analysis identifies several interrelated barriers that constrain effective e-governance adoption in cemetery management. First, institutional fragmentation emerges as a central challenge, evident in inconsistent UCs participation and the weak performance of the Hybrid model. Overlapping authority among municipalities, development authorities, and informal committees undermines coordinated implementation. Second, technical and infrastructural limitations persist across all models. Although certain dimensions score highly, the absence of standardized digital

platforms and interoperable records limits scalability and system integration. Third, human capacity constraints, including inadequate training and low digital literacy, particularly affect G2E outcomes and reduce operational efficiency. Fourth, financial sustainability remains a critical concern, especially for community-managed graveyards. High initial costs and uncertain funding streams may limit long-term maintenance and system upgrades.

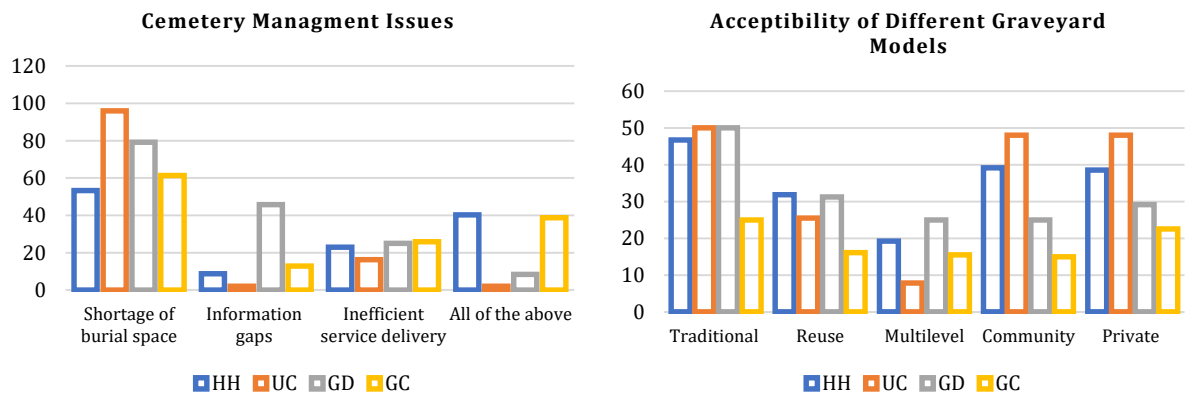
To Summarize,

The results demonstrate that the transition to e-governance in cemetery management is not merely a technological upgrade but a complex governance transformation. The integrated interpretation of stakeholder participation and challenge dimensions reveals that no single e-governance model independently addresses technical, institutional, and socio-cultural barriers. Citizen-centered G2C models enhance acceptance but lack institutional robustness, while G2E and G2G models strengthen administrative control at the expense of user experience.

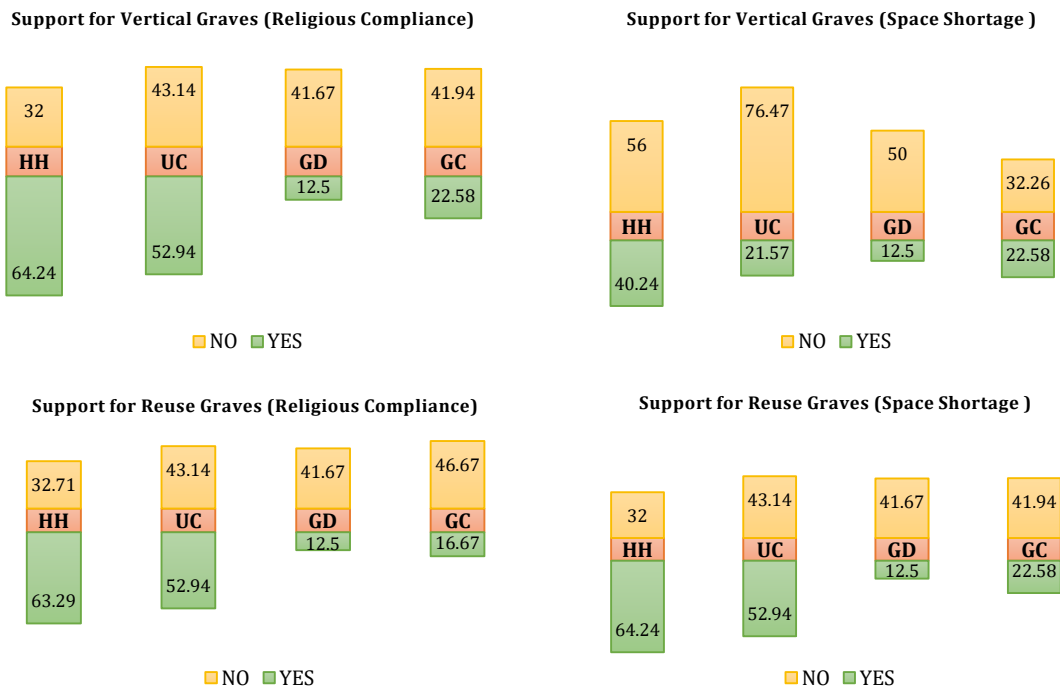
4.4. Objective 5: Exploring Plausible Graveyard Models to Address Burial Space Scarcity

This section discusses the empirical findings presented in Figure 8 by integrating stakeholder perceptions regarding alternative graveyard models to address burial space scarcity. The results reveal that while a range of innovative cemetery models has emerged globally to address land constraints, their plausibility within Muslim societies is shaped less by the spatial efficiency they offer and more by religious legitimacy, traditional practices, and emotional acceptance.

Figure 8: Burial Space Scarcity and Core Management Challenges



Source: Authors' construction.



Source: Authors' construction.

To Summarize,

At the same time, the findings indicate that burial space scarcity does not exist in isolation. Information gaps, inefficient service delivery, and overlapping governance challenges are frequently reported alongside land constraints. GCs and GDs emphasize deficiencies in record-keeping and grave identification, while UCs point to weak coordination among agencies. This triangulation of findings suggests that burial space scarcity is as much a governance and management problem as it is a physical land constraint.

The findings clearly establish burial space scarcity as the most pressing cemetery management issue across all stakeholder groups. UCs report the greatest concern regarding the shortage of burial space, which may reflect their informed opinion as formal institutions responsible for graveyard management. GDs and GCs also highlight space constraints, though their concerns are closely tied to operational difficulties and informal coping mechanisms, such as grave overlap or unregulated extensions. HHs, facing the issue directly, identify space shortage as a significant problem, particularly in densely populated urban areas.

Findings show that acceptance patterns vary for alternative models such as multilevel, reuse, and private burials. Multilevel burial systems receive the lowest acceptance among HHs, reflecting deep emotional and religious resistance. These systems are widely perceived as compromising the dignity of the deceased, the sanctity of the grave, and the symbolic finality of burial. Even among UCs and GDs, acceptance of multilevel graves is driven more by land optimization concerns than normative approval.

Reuse graves show slightly higher acceptance than multilevel systems, particularly among GDs and GCs, who are practically facing the challenges of managing land shortages. Private cemeteries, while administratively appealing to UCs, raise concerns among HHs and GCs regarding commercialization, equity, and erosion of communal responsibility.

UCs and HHs demonstrate high resistance to multilevel graves even with religious endorsement and in instances of land shortages, reflecting personal religious conviction. Respondents emphasized the individual burial, respect for the body, and non-disturbance of remains, principles widely viewed as incompatible with multilevel burial structures. However, the results also indicate limited conditional openness among GDs and GCs when multilevel graves are framed within the principle of *darura* (necessity) due to extreme land scarcity.

Compared to the multilevel burial model, reuse graves demonstrate relatively higher acceptance, particularly when framed as a response to severe space shortages. HHs show greater willingness to consider reuse of graves under conditions of necessity, especially when sufficient time has elapsed, and remains are treated with respect. This indicates an implicit moral distinction between temporal reuse and spatial stacking. Structured interviews of Islamic scholars of different schools of thought reaffirmed grave reuse as a viable modern graveyard solution to space shortages.

A key finding of this analysis is the acceptance of the reuse of graves by HHs and UCs as an alternative graveyard model, given religious compliance and land scarcity arguments. This high level of acceptance may be largely attributed to the ongoing burial practices involving reuse of existing graves among families and communities, albeit informally. Nonetheless, as not protected by concomitant laws, such alternative models may be perceived as reversible and may undermine the sense of security and sanctity. As a result, public acceptance alone is unlikely to shift attitudes without parallel religious and legal validation. This legal vacuum is also reflected in the disconnect between practice and acceptance: while GCs and GDs frequently report non-acceptance of the grave reuse model in surveys, they are often compelled to employ similar practices on the ground to manage capacity. This suggests that their stated reluctance is less about the model's utility and more about the absence of a legal framework. Their current actions are unsanctioned and lack protective protocols, leading them to nonacceptance of the model formally, even as they implement it informally.

CONCLUSION

This section contains four parts. The first part shows the synthesis and triangulation of findings, second part contains policy implications and implementations. The third part presents the outputs of the research in the form of geotagging of graveyards. The fourth part presents a benchmarking report.

5.1. Synthesis of the Findings

Table 3 represents the synthesis and triangulation of our findings. The results obtained highlight that all stakeholders involved report/acknowledge the existence and extent of challenges in arranging burial space and funeral arrangements faced by bereaved families. Interestingly, while HHs, GDs, GCs, charity organizations, and Islamic scholars recognize mismanagement of cemeteries, the institutional inertia among the UCs demonstrates a notable disconnect between government and private concerns. Most of the stakeholders depict a positive attitude towards technology adoption, with GDs and GCs being the only exceptions. This reflects a disincentive on the part of informal service providers in adopting digital technology, as that would entail limited opportunities for price discretion. There is also a disconnect between end users and service providers as to the favored e-governance model. The stakeholders unanimously oppose multi-level graves, while moderate acceptance for grave reuse was apparent. That said, informal service providers insist on continuing with traditional models. Finally, it is apparent that any innovation related to cemetery management has to be undertaken in consultation with religious scholars and technology experts in order to ensure broad acceptance and adoption.

To Summarize,

The findings indicate that no single graveyard model offers a universally acceptable solution to burial space scarcity in Muslim societies. While alternative models provide technical advantages, their adoption is constrained by religious norms, emotional attachments, and cultural expectations. Traditional and community-based cemeteries remain dominant because they embody legitimacy, trust, and continuity rather than efficiency. The most plausible policy pathway lies in incremental reforms, including improved spatial planning within existing cemeteries, enhanced record management, regulating informal reuse practices, and strengthened community-managed models supported by UC oversight. Any exploration of vertical or reuse graves must be accompanied by dialogue with religious scholars, transparent governance frameworks, and community participation. Addressing burial space scarcity, therefore, requires not only spatial innovation but also religiously informed, emotionally sensitive, and trust-based governance approaches. Without such integration, technically efficient solutions are likely to remain socially contested and emotionally unviable.

Table 3: Synthesis of Findings and Triangulation Insights

Stakeholders	Main Findings	Triangulation Insights
Logistic and Financial Challenges for Bereaved Families		
HHs (End Users)	Face acute distress due to burial space shortages and financial strain due to unregulated prices.	Families bear the brunt, frontline workers see the pain but lack systemic voice, informal
UCs (Formal institution)	Limited awareness of the issue	

GDs (Frontline workers)	Witness struggles daily and acknowledged the use of unsanctioned burial practices to address the shortages	committees recognize inefficiencies but lack authority, and union councils remain detached. Religious and charity actors provide moral urgency, but systemic custodians fail to operationalize solutions.
GCs (Informal institutions)	Recognize the sufferings of bereaved families	
Charity Organization (Facilitator)	Recognize sufferings	
Islamic Scholar (Moral Advocates)	Recognize sufferings and frame dignified burial as a moral/religious obligation	
Tech Experts	Not directly involved	
City Government	Acknowledges systemic neglect but has not translated recognition into a change mechanism	

Challenges and Inefficiencies in Cemetery and Funeral Service Management

HHs (End Users)	Reported overall operational crises	All actors recognize inefficiencies, underinvestment, and lack of priority, but authority is diffused. Frontline workers and informal committees are closest to the problem but powerless; systemic custodians see the urban planning risk but fail to prioritize, favoring community active involvement for effective graveyard management
UCs (Formal institution)	Limited awareness, demonstrated bureaucratic inertia, and deliberate neglect of the issue	
GDs (Frontline workers)	Struggle with fragmented practices and a lack of standardized procedures, neglect from formal institutions in the form of logistic and financial support	
GCs (Informal institutions)	Acknowledge inefficiencies and hold the city government responsible for cemetery management crises	
Charity Organization (Facilitator)	Recognize the mismanagement of cemeteries and the city government's failure	
Islamic Scholar (Moral Advocates)	Recognize the mismanagement of cemeteries and the community and city government's failure	
Tech Experts	Not directly involved	
City Government	Acknowledge the issues like lack of security, encroachment, lack of funds, and political will for transformation, see effective management imperative for sustainable cities	

Attitude Towards Technology Adoption

HHs (End Users)	Strong Openness to Technology, with reservations regarding personal capacities	There is strong readiness for digital solutions among most stakeholders, but frontline and informal actors resist. Reform must address this resistance through training and inclusion. Operating in an unregulated, multi-price market may create incentives for informal service providers to resist technological reforms, as greater transparency could reduce price discretion and associated economic gains.
UCs (Formal institution)	Very Strong Openness to Technology	
GDs (Frontline workers)	Fragmented adoption attitudes	
GCs (Informal institutions)	Weak adoption attitudes	
Charity Organization (Facilitator)	Strong Openness to Technology	
Islamic Scholar (Moral Advocates)	Strong Openness to Technology	
Tech Experts (Facilitators)	Very Strong Openness to Technology	
City Government	Strong openness to technology and demonstrated no technological adoption in cemetery management to date, albeit strong governmental capacities for such adoption	

Transitioning to E-governance Systems

HHs (End Users)	Favor citizen-facing solutions (G2C)	Citizens want direct access, while institutions prefer internal coordination. A dual-track
UCs (Formal institution)	Favor Institutional Coordination (G2G/G2E)	
GDs (Frontline workers)	Favor Institutional Coordination (G2G/G2E)	

GCs (Informal institutions)	Favor citizen-facing solutions (G2C)	e-governance model is needed
Charity Organization (Facilitator)	Neutral	
Islamic Scholar (Moral Advocates)	Favor Hybrid Solutions	
Tech Experts (Facilitators)		
City Government	Favor Institutional Coordination (G2G/G2E)	
Plausible Graveyard Models to Address Burial Space Scarcity		
HHs (End Users)	Open to community/Private graveyards and grave reuse (religious endorsement).	Broad acceptance exists if religious legitimacy is secured. Informal Institutional conservatism (frontline and informal committees) is the main barrier. Religious scholars are key influencers so any future intervention will require their endorsement for effective implementation.
UCs (Formal institution)	Open to community graveyards/Private and grave reuse (religious endorsement).	
GDs (Frontline workers)	Insist on traditional models	
GCs (Informal institutions)	Insist on traditional models	
Charity Organization (Facilitator)	Neutral	
Islamic Scholar (Moral Advocates)	Open to community/Private graveyards and grave reuse	
Tech Experts (Facilitators)	Not Directly Involved	
City Government	Open to solutions endorsed by Islamic Jurisprudence and general acceptability.	

Source: Authors' construction.

5.2. Policy Implications and Implementation Strategy

The proposed policy framework and its implementation strategy are presented in Figure 9 and comprise multiple stages. The foundational triangle for implementation heavily involves three key stakeholders, namely, the city government, religious scholars, and technology experts. The focus at this stage will be on ensuring immediate relief for the bereaved families through the formation of a dedicated logistical and financial support cell. The first step involves technology adoption for improved recordkeeping and providing access to technical aid. The Islamic scholars will simultaneously provide counsel for and legitimacy to innovative governance initiatives. In this regard, dedicated funds for the maintenance and upkeep of existing cemeteries, as well as the reservation of land for future cemeteries, need to be ensured by the RDA. The concerns regarding grave robbing require the arrangement of security measures, such as installing security cameras and assigning security personnel. The latter can be done in collaboration with the law enforcement departments.

The subsequent stage entails the expansion of the institutional ecosystem through the development of a comprehensive integrated cemetery database covering grave occupancy and space availability. This will initiate an effective G2G model for intra-governmental coordination and data sharing. While an interface for interacting with end users (G2C) can be embedded in the existing e-government platforms like city government websites or Citizen portals, with active feedback through helplines and other communication platforms. Meanwhile, the government personnel can be trained in

operational use of digital tools (G2E) along with explicit allocation of responsibilities to the UCs regarding security and maintenance of graveyards in their jurisdiction.

The final stage is that of ongoing transformation and evolution of the established institutional ecosystem. In this stage, the religious scholars can be engaged in creating awareness campaigns and providing religious acceptability to the interventions and creating consensus for institutionalization of new cemetery models, starting with more accepted models of grave re-use and community-managed graveyards. Technology experts will be overseeing the backend software for the digital platforms and ensuring data integrity, while frontline workers will be engaged for on-ground activities in both funeral services and graveyard maintenance. Finally, an on-ground operational assessment can be initiated for scalability and replication of the strategy beyond the city of Rawalpindi.

Figure 9: Policy Implications and Implementation Strategy



Source: Authors' construction.

5.3. Outputs of the Project

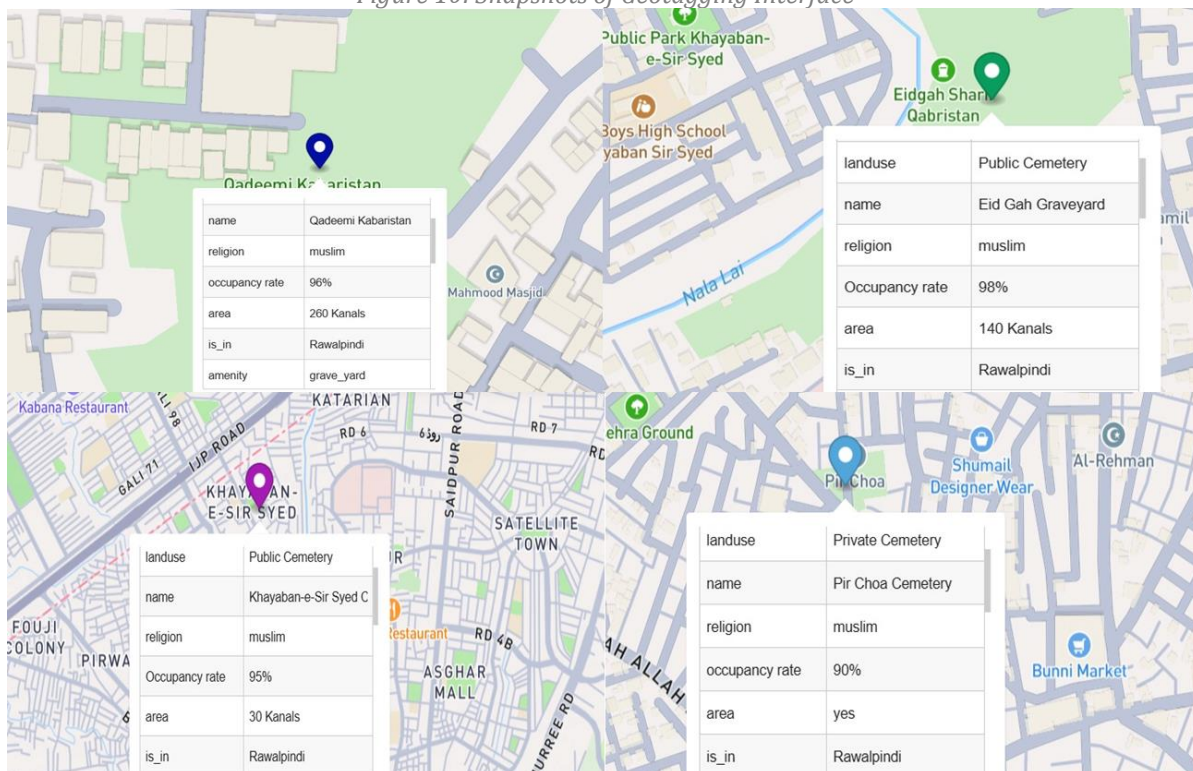
5.3.1. Geotagging and Spatial Documentation of the Graveyards

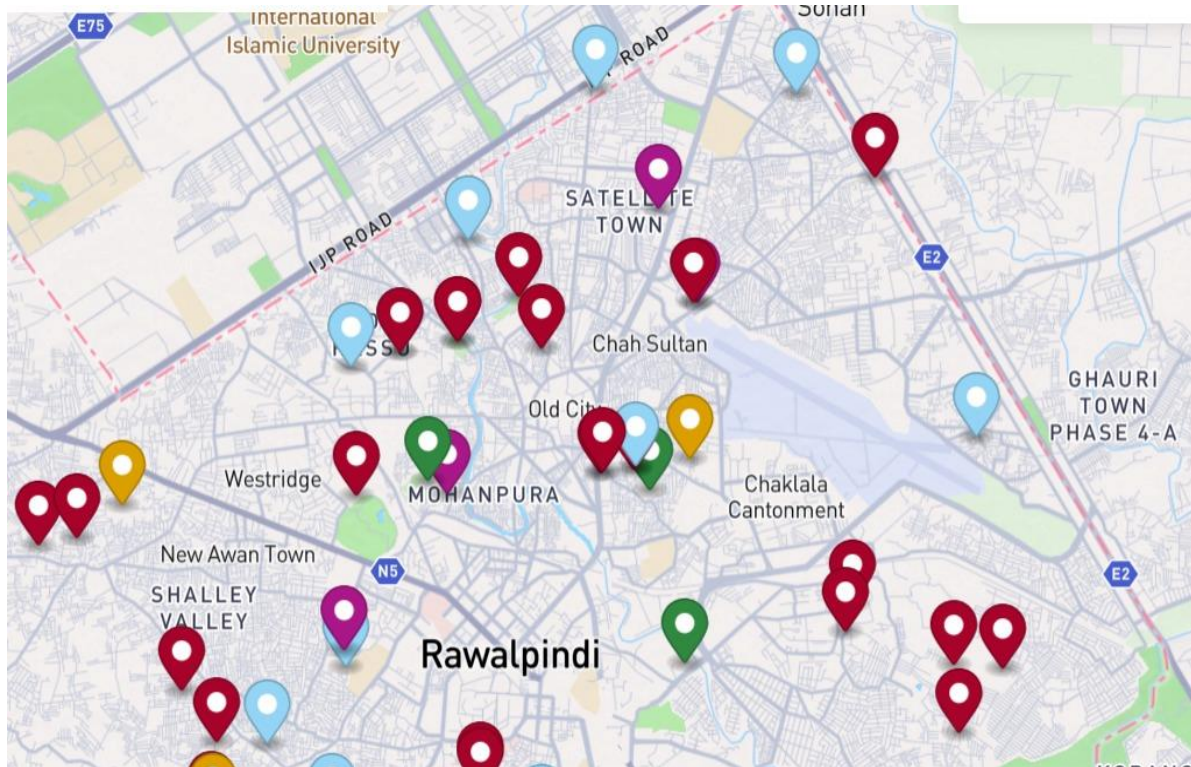
As part of the project’s evidence-based assessment of cemetery management systems, a comprehensive spatial mapping exercise was undertaken to document and visualize the existing burial spaces within Rawalpindi city. The activity involved identifying, locating, and geotagging 63 public and private graveyards across the urban and peri-urban landscape. For each site, detailed attributes were recorded, including land use classification (public/private), total area, religious affiliation, and occupancy rate.

Data collection was carried out through a combination of field visits and verification through digital mapping tools like Google Maps. Geographic coordinates for each site were captured and compiled into a GeoJSON database, enabling spatial analysis. This structured dataset forms a foundational layer for understanding the spatial distribution, capacity constraints, and management disparities of burial grounds in the city.

The exercise not only provides an empirical basis for evaluating the city’s cemetery infrastructure but also serves as a replicable model for other urban centers aiming to improve data-driven decision-making in cemetery and land-use governance.

Figure 10: Snapshots of Geotagging Interface





Source: Authors' Construction.

The complete data can be accessed at:

https://drive.google.com/drive/folders/1ypjLDHC9PKfRBwmmNuaGZf5sBdSloqoS?usp=drive_link

5.3.2. Benchmarking Report

Rapid urbanization and population growth have amplified the challenges of cemetery management worldwide. Governments have been forced to reconsider burial space management due to the growing shortage of land, ineffective record systems, and administrative fragmentation. Major Pakistani cities, such as Karachi, Lahore, and Rawalpindi, face comparable issues, including

uncontrolled cemetery growth, inadequate institutional frameworks, and limited use of digital technology.

This section benchmarks international practices in cemetery management, identifying how both Muslim-majority countries have addressed space shortages and governance gaps. The objective is to evaluate the adaptability of these practices to Pakistan’s sociocultural and religious context and to propose feasible policy recommendations for sustainable cemetery governance.

Benchmarking involves a structured comparison of policies, technologies, and governance models across contexts to identify best practices adaptable to local conditions. The framework in this study focuses on five interrelated dimensions:

1. **Governance and Policy Framework:** Ownership models, legal mandates, and institutional coordination.
2. **Land Use and Reuse Policies:** Strategies for optimizing limited land resources.
3. **Digitalization and Data Systems:** Adoption of GIS tools, databases, and automation platforms.
4. **Sustainability Measures:** Environmentally responsible and space-efficient burial practices.
5. **Public Accessibility:** Transparency, inclusivity, and citizen-facing services.

To capture both cultural alignment and technological innovation, Muslim-majority countries, including Malaysia, Turkey, and the UAE are chosen for their efforts to integrate Islamic burial principles with modern cemetery planning, governance, and management practices;

Table 4 summarizes the governance and management characteristics of Muslim-majority countries, offering insight into how religious compliance and digital modernization can coexist effectively.

Table 4: Benchmarking Analysis

Indicator	Key Service Provider & Legal Basis	Design, Land Use & Reuse Policy	Digitalization (GIS Records) & Sustainability Practices	Public Accessibility & Fee Structure	Overall System Efficiency	
Malaysia	Joint federal-municipal management under State Islamic Religious Councils, governed by Islamic Administration Enactments	Horizontal burial with regulated reuse after 15–20 years, subject to family consent	Fully developed e-Cemetery system with GIS mapping and searchable digital databases	Modular layouts, green burial plots, and efficient land-use planning	Online grave locating and booking; formal and regulated service fees	Efficient
Turkey	Municipality-led cemetery management is regulated	Horizontal burial with controlled reuse regulated through municipal bylaws	Smart city-based GIS registry integrated with municipal e-services	Urban landscape integration and reuse of reclaimed land	Online grave locating and booking; subsidized municipal services	Efficient
UAE	Centralized control under the General Authority of Islamic	Horizontal burial with permanent	Centralized national digital cemetery database linked	Automated irrigation systems and climate-	Free national burial services with full public access	Highly efficient

	Affairs and Endowments	plots; reuse not permitted	to national ID systems	adaptive landscaping		
Saudi Arabia	Centralized Islamic governance under the Ministry of Municipal and Rural Affairs	Horizontal burial with permanent plots; reuse not permitted	Advanced G2C/G2G/G2E digital cemetery service platforms	Digital land-use optimization and efficient burial space management	Free state-funded burial services	Highly efficient
Egypt	Fragmented governance under weak municipal oversight and informal local arrangements	Mixed-use burial spaces; informal settlements; no formal reuse policy	Very limited digital tools; records largely manual; GIS absent	Minimal sustainability measures; unmanaged growth and land encroachment	Limited access due to socio-economic barriers; informal payments are common	Inefficient
Indonesia	Municipal authorities operating under provincial oversight and local government regulations	Horizontal and high-density vertical cemeteries; eco-friendly, Shariah-compliant designs	GIS-based mapping in major cities with partial digital monitoring and some manual systems	Eco-friendly cemetery models and vertical land-saving systems	Moderate accessibility through city services; small administrative fees; informal payments in overcrowded areas	Moderately efficient
Pakistan	Fragmented management by municipal bodies, Auqaf departments, private trusts, and religious committees under local bylaws (West Pakistan Graveyards Act, 1958; Punjab Shehr-e-Khamoshan Authority Act, 2017).	Horizontal burial practices with no systematic reuse policy; informal expansion and land encroachment	Predominantly manual record keeping; no centralized digital database; GIS largely absent	Minimal sustainability initiatives; lack of planned landscaping and land optimization	Public graveyards are generally free; informal fee practices are reported	Inefficient

Source: Authors' Construction.

These countries demonstrate that Islamic burial traditions can effectively align with modern governance systems. Malaysia and Turkey show how digitalization and strong municipal oversight improve accountability, while the UAE and Saudi Arabia ensure religious compliance through centralized, state-led models. Indonesia further illustrates innovation by adopting vertical and eco-friendly cemeteries, reducing land pressure, an area where Egypt continues to struggle due to overcrowding and fragmented governance. In contrast, Pakistan remains behind, with uncoordinated management, paper-based records, poor planning, and limited resource efficiency. Overall, the comparison highlights that institutional coordination, digital systems, and supportive legislation are essential to modernize cemetery management while preserving Islamic values.

Drawing from insights extracted from the benchmarking exercise, several practices are adaptable to Pakistan's socio-religious environment:

1. **GIS-Based Allocation Systems:** Develop a national *Digital Graveyard Management System* using GIS mapping and unique plot identifiers. Pilot projects could be initiated in Rawalpindi.
2. **Municipal Governance:** Empower local governments to manage cemeteries as essential urban services, supported by provincial supervision to ensure standardization.
3. **Central Monitoring:** Establish a **Cemetery Management Authority** at the provincial or federal level to regulate land allocation, record-keeping, and policy enforcement.
4. **Legal Reuse Framework:** Introduce legally guided reuse for congested urban areas, aligned with religious rulings and ethical standards.
5. **Urban Planning Integration:** Institutionalize cemetery zoning in master and local development plans, linking it to projected population growth and spatial equity.
6. **Public Digital Services:** Create web and mobile platforms enabling citizens to locate graves, register burials, and request maintenance digitally.

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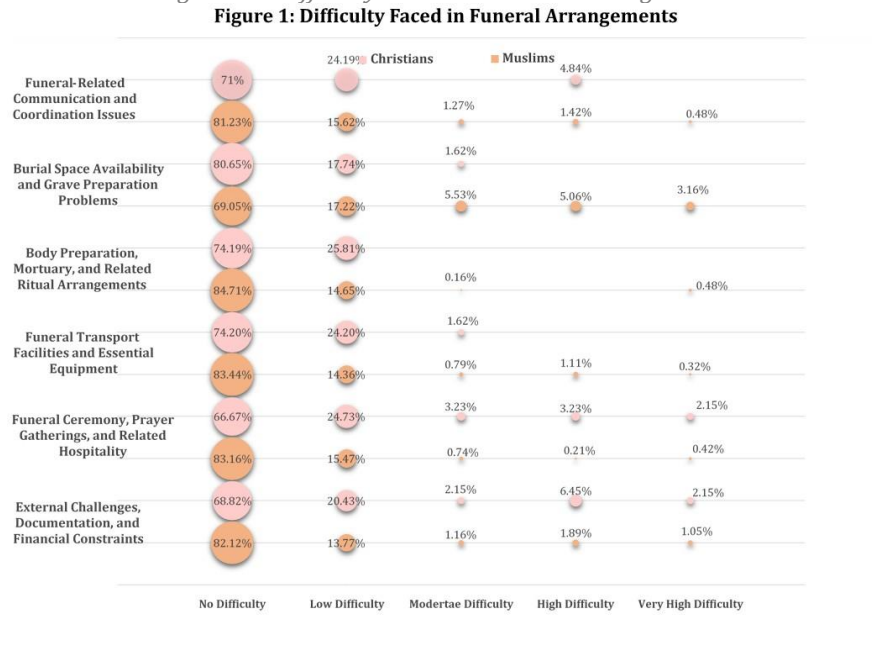
APPENDICES

Table 5: Stakeholder's Demographics

Age	HH	UC	DG	DC
< 25	11.94%	0.00%	3.85%	6.25%
25 - 50	66.29%	80.39%	80.77%	65.63%
51 - 75	21.08%	19.61%	15.38%	25%
>75	0.70%	0.00%	0.00%	6.25%
Education	HH	UC	DG	DC
No formal education	8.53%	0	53.85%	0%
Primary (up to grade 5)	3.08%	1.96%	0%	6.90%
Middle (6-8)	8.05%	5.88%	7.69%	6.90%
Secondary (matric)	31.99%	29.41%	23.08%	44.83%
Higher secondary (F.A./F.Sc./Intermediate)	31.52%	29.41%	7.69%	31.03%
Undergraduate (BA/BSc, etc.)	15.17%	21.57%	3.85%	6.90%
Postgraduate (MA/MSc, MPhil, PhD)	1.66%	11.76%	3.85%	3.45%
Religion	HH	UC	DG	DC
Muslim	91.10%	100%	100%	90.32%
Christian	8.90%	-	-	9.68%
Experience Years	HH	UC	DG	DC
≤ 5 years	-	13.73%	16.67%	40.63%
6 - 10 years	-	5.88%	20.83	46.88%
11 - 20 years	-	64.71%	29.17%	15.63%
> 20 years	-	15.69%	33.33%	6.25%

Source: Author's construction.

Figure 11: Difficulty Faced in Funeral Arrangements



Source: Author's construction.