



(RESEARCH ARTICLE)



Assessing GIS readiness and end-user preparedness in selected departments of a Philippine municipal government: An exploratory case study of the municipality of Rodriguez, province of Rizal, Philippines

Ronie Cañete Cesar *

Municipal Information Technology Office (MITO), Municipality of Rodriguez, Rizal, Philippines.

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Abstract

The increasing demand for data-driven governance has prompted local government units (LGUs) to adopt Geographic Information Systems (GIS) to improve planning, decision-making, and service delivery. This study aims to assess the level of GIS readiness and end-user preparedness in selected departments of the Municipal Government of Rodriguez, Rizal, which is currently undertaking GIS implementation initiatives.

Using a descriptive exploratory case study design, data were collected from ten (10) purposively selected respondents across GIS-relevant departments through a structured survey supported by informal interviews. Descriptive statistics and thematic analysis were applied to examine awareness, current practices, data management approaches, and organizational readiness.

Findings indicate that while 80% of respondents are aware of GIS and 100% express willingness to adopt a centralized system, the level of understanding remains predominantly basic. Current practices are fragmented, with departments relying on disparate tools such as Google Maps, spreadsheets, manual records, and independently developed systems. Data management is inconsistent, with limited standardization, weak inter-departmental data sharing, and absence of formal data governance mechanisms, resulting in challenges in data accessibility, updating, and reliability.

The study concludes that, among the selected departments, GIS readiness is at an early pre-deployment stage characterized by high willingness but limited operational preparedness. It recommends structured capacity-building programs, development of a centralized spatial database, establishment of data governance policies, and phased implementation strategies to support effective GIS adoption.

Keywords: Geographic Information Systems (GIS); Local Government Units (LGU); Organizational Readiness; Data Management; Digital Transformation; Spatial Data Infrastructure

1. Introduction

The increasing demand for efficient, transparent, and evidence-based governance has driven local government units (LGUs) to adopt digital technologies that support data-driven decision-making. Among these technologies, Geographic Information Systems (GIS) have emerged as a critical tool for managing and analyzing spatial data, enabling governments to enhance planning, resource allocation, and service delivery across sectors such as land administration, infrastructure development, disaster risk reduction, and public service management [1].

* Corresponding author: Ronie Cañete Cesar

GIS enables local governments to visualize and integrate data from multiple sources into a unified platform, improving coordination across departments and supporting more informed policy decisions [2]. In many cases, GIS adoption has contributed to improved operational efficiency and strengthened institutional capacity in managing spatially referenced information [1]. However, despite its potential benefits, the successful implementation of GIS is not solely dependent on the availability of technology. Organizational readiness—including user capability, data management practices, institutional processes, and governance structures—plays a critical role in determining the effectiveness and sustainability of GIS initiatives [2].

In the Philippine context, LGUs are increasingly encouraged to pursue digital transformation initiatives aligned with national e-governance strategies. As part of this effort, the Municipal Government of Rodriguez, Rizal is currently undertaking preparatory activities for GIS implementation, including field surveys, satellite-based boundary mapping, drone-assisted data collection, and the digitization of legacy maps and records. These initiatives aim to establish a comprehensive spatial data infrastructure to support multiple departments in improving operational efficiency and service delivery.

Despite these developments, existing practices within the municipality reveal a reliance on fragmented tools and processes for managing spatial data. Departments utilize a combination of platforms such as Google Maps, spreadsheets, manual records, and internally developed systems, which operate independently and lack standardization. Similar conditions have been observed in other local government contexts, where the absence of centralized data systems and standardized data management practices leads to inefficiencies, inconsistencies, and limited data sharing across departments [3].

Furthermore, studies have shown that awareness of GIS does not necessarily translate into effective utilization. While employees may be familiar with GIS concepts, limited technical knowledge and insufficient training can hinder their ability to apply these systems in practice [2]. This gap between awareness and capability represents a significant barrier to successful GIS adoption, particularly in organizations where capacity-building and institutional support mechanisms are not yet fully established.

Given these conditions, it is essential to assess organizational readiness prior to full system implementation. Understanding the current state of user preparedness, data management practices, and institutional capacity provides critical insights into potential barriers and enables the development of targeted strategies to ensure successful GIS deployment.

This study, therefore, aims to assess GIS readiness and end-user preparedness in selected departments of the Municipal Government of Rodriguez, Rizal, in order to identify key gaps and provide recommendations to support effective and sustainable implementation.

The Municipal Government of Rodriguez, Rizal is undertaking preparatory activities for the implementation of a Geographic Information System, including field surveys, satellite mapping, drone-assisted data collection, and digitization of legacy records. Despite these efforts, the extent to which selected departments are organizationally and operationally ready for GIS adoption remains unclear.

Initial assessment findings indicate that although many respondents are aware of GIS and express willingness to adopt a centralized system, their level of understanding is largely basic, suggesting limited technical capability for effective system use. In addition, current practices for managing spatial data are fragmented. Different departments rely on a combination of Google Maps, spreadsheets, paper-based records, and independently developed applications, resulting in inconsistent workflows and non-standardized data handling practices.

Data management is likewise dispersed across multiple formats and storage methods, creating challenges in data access, updating, sharing, and reliability. Limited inter-departmental coordination and the absence of formal data governance mechanisms further contribute to data inconsistency and operational inefficiency.

Given these conditions, it is necessary to determine the level of GIS readiness and end-user preparedness in selected departments of the municipality before full implementation proceeds. This study seeks to identify the specific organizational, technical, and data management gaps that must be addressed to support effective GIS adoption.

To assess the level of GIS readiness and end-user preparedness in selected departments of the Municipal Government of Rodriguez, Rizal.

Objectives of the study:

- To determine the level of awareness and understanding of GIS among selected municipal employees.
- To identify current practices and tools used for spatial data management.
- To evaluate existing data storage and management approaches across selected departments.
- To identify challenges and gaps in current mapping and data processes.
- To assess organizational readiness and willingness to adopt a centralized GIS system.
- To recommend strategies to improve readiness and support successful GIS implementation.

This study is significant because it provides a structured assessment of GIS readiness in selected departments of a local government unit currently preparing for system implementation. The findings may provide practical value to both institutional stakeholders and future researchers.

For the Municipal Government of Rodriguez, Rizal, the study offers baseline evidence that may guide planning and decision-making related to GIS adoption. For the Municipal Information Technology Office and other implementing units, the results may help identify training needs, data management gaps, and institutional requirements necessary for successful deployment.

The study may also benefit departmental offices by highlighting opportunities to improve coordination, standardization, and data-sharing practices. For policymakers and decision-makers, the findings may serve as a basis for strengthening digital transformation strategies at the local government level. Finally, the study contributes to the growing body of literature on GIS adoption, organizational readiness, and spatial data management in local government settings.

This study focuses on assessing GIS readiness and end-user preparedness in selected departments of the Municipal Government of Rodriguez, Rizal. It specifically examines awareness and understanding of GIS, current tools and practices for spatial data handling, data storage and management approaches, perceived challenges, and willingness to adopt a centralized GIS system.

The study is limited to ten (10) purposively selected respondents from GIS-relevant departments. As such, the findings should be interpreted as indicative of selected departments rather than statistically representative of the entire municipality. In addition, the study focuses on organizational and user readiness and does not include direct technical evaluation of system architecture, infrastructure performance, or live GIS platform functionality.

2. Review of Related Literature

2.1. Geographic Information Systems in Local Government

Geographic Information Systems (GIS) have become a fundamental component of modern governance, enabling local governments to manage spatial data and support evidence-based decision-making. GIS facilitates the visualization, integration, and analysis of geographically referenced information, improving planning, resource allocation, and service delivery [1].

Studies have shown that GIS contributes to enhanced efficiency in local government operations by enabling better coordination across departments and improving access to accurate and timely information [2]. In particular, GIS has been widely applied in land management, infrastructure planning, and disaster risk reduction, where spatial analysis plays a critical role in decision-making processes.

However, the adoption of GIS in local government contexts is not solely a technological issue. Organizational factors such as institutional capacity, staff competency, and governance structures significantly influence the success of GIS implementation [2]. These factors determine whether the system can be effectively utilized and sustained over time.

2.2. GIS Adoption and Organizational Readiness

Organizational readiness is widely recognized as a critical determinant of successful GIS implementation. Research indicates that while many organizations invest in GIS technologies, they often face challenges due to insufficient training, lack of technical expertise, and limited understanding of system capabilities [2].

A study on GIS adoption in local government settings found that although employees may be aware of GIS concepts, their ability to use the system effectively is often limited to basic knowledge, resulting in underutilization of available functionalities [2]. This gap between awareness and capability is a recurring issue in technology adoption studies.

Furthermore, successful implementation requires not only user willingness but also institutional support, including leadership commitment, resource allocation, and structured training programs [4]. Without these elements, even well-designed systems may fail to achieve their intended outcomes.

2.3. Data Management Practices in Local Government

Effective data management is a critical component of GIS implementation, as the quality and accessibility of data directly influence system performance. Studies have shown that many local government units rely on fragmented data storage approaches, including paper-based records, spreadsheets, and isolated databases [3].

This fragmentation leads to data inconsistencies, duplication, and difficulties in accessing and updating information. The absence of standardized data formats and centralized data repositories further complicates inter-departmental data sharing and integration [3].

In addition, inefficient data management practices can negatively affect decision-making processes by reducing data reliability and timeliness. These issues highlight the importance of establishing centralized data management systems and governance frameworks to support effective GIS utilization.

2.4. WebGIS and Integrated Spatial Systems

Advances in WebGIS technologies have enabled local governments to deploy centralized, web-based platforms that allow multiple users to access and interact with spatial data in real time. WebGIS systems typically utilize technologies such as PostgreSQL/PostGIS, GeoServer, and web-based interfaces to provide scalable and accessible solutions for spatial data management [5][6].

These systems enhance collaboration across departments, improve data transparency, and support concurrent access by multiple users. However, their effectiveness depends on the organization's ability to integrate existing datasets and ensure data standardization. Without proper integration and governance, the benefits of WebGIS systems may be limited [5].

2.5. Challenges in GIS Implementation

Despite its advantages, GIS implementation in local government environments is often associated with several challenges. Studies published in World Journal of Advanced Research and Reviews identify key barriers such as lack of technical expertise, inadequate infrastructure, insufficient training, and organizational resistance to change [7][8].

Another significant challenge is the fragmentation of systems and processes across departments. When different units use independent tools and data formats, integration becomes difficult, leading to inconsistencies and inefficiencies in spatial data management [7].

Additionally, concerns related to system complexity, usability, and vendor reliability may affect user confidence and hinder adoption. Addressing these challenges requires a comprehensive approach that includes capacity building, system standardization, and strong data governance mechanisms.

2.6. Synthesis of Literature

The reviewed literature consistently highlights that while GIS offers significant benefits for local government operations, its successful implementation depends on a combination of technological and organizational factors. Key themes identified include the importance of user capability, standardized data management practices, system integration, and institutional readiness.

A common finding across studies is the gap between awareness and actual capability, where users are familiar with GIS concepts but lack the technical skills required for effective utilization [2]. Additionally, fragmented data practices and lack of centralized governance structures are frequently cited as major barriers to successful implementation [3][7].

These insights directly support the findings of the present study, which reveal similar patterns within the Municipal Government of Rodriguez, Rizal. The alignment between existing literature and the study's findings reinforces the need for a structured readiness assessment prior to full-scale GIS implementation.

3. Methodology

3.1. Research Design

This study employed a **descriptive exploratory case study design** to assess the level of Geographic Information System (GIS) readiness and end-user preparedness in selected departments of the Municipal Government of Rodriguez, Rizal.

A descriptive approach was used to systematically characterize current conditions, practices, and perceptions related to GIS adoption, while the exploratory nature of the study allowed for the identification of emerging patterns and organizational gaps in a pre-implementation environment. This design is appropriate for assessing technology readiness in real-world organizational contexts where variables cannot be controlled or manipulated.

The case study approach focuses on a single local government unit (LGU) and provides in-depth insights into its organizational readiness, making it suitable for understanding context-specific challenges and informing implementation strategies.

3.2. Research Locale

The study was conducted in the Municipal Government of Rodriguez, Rizal, Philippines, a local government unit currently undergoing preparatory activities for GIS implementation. These activities include field surveys, satellite-based boundary identification, drone-assisted mapping, and digitization of legacy records.

Selected departments involved in the study include:

- Municipal Planning and Development Office (MPDO)
- Engineering Office
- Assessor's Office
- Business Permits and Licensing Office (BPLO)
- Municipal Disaster Risk Reduction and Management Office (MDRRMO)
- These departments were selected due to their direct involvement in spatial data generation, management, and utilization.

3.3. Respondents of the Study

The respondents of the study consisted of ten (10) personnel selected from the identified departments based on their involvement in mapping, data management, planning, or operational functions relevant to GIS implementation.

A purposive sampling technique was employed to ensure that respondents possessed relevant knowledge and experience related to spatial data processes. This approach is appropriate for exploratory studies where the objective is to obtain insights from individuals directly engaged in the phenomenon being studied.

Table 1 Distribution of Respondents by Department

Department	Number of Respondents
MPDO	1
Engineering	2
Assessor	3
BPLO	1
MDRRMO	3
Total	10

3.4. Research Instrument

Data were collected using a structured survey questionnaire administered through Google Forms. The instrument was designed to capture both quantitative and qualitative data across key dimensions of GIS readiness.

The questionnaire consisted of:

Closed-ended questions (multiple choice, Likert-scale, and checkboxes) to measure:

- GIS awareness and understanding
- Current tools and practices
- Data storage and management methods
- Readiness and willingness to adopt GIS

Open-ended questions to capture:

- Perceived challenges and gaps
- Training needs
- Insights on current workflows

The survey instrument was designed based on common indicators of organizational readiness identified in existing literature, including user capability, data management practices, and system adoption readiness.

3.5. Data Collection Procedure

Data collection was conducted over a defined period through online distribution of the survey questionnaire to selected respondents. Participation was voluntary, and respondents were informed of the purpose of the study prior to answering the survey.

In addition to the survey, **informal semi-structured interviews** were conducted with selected respondents to validate survey responses and provide deeper insights into organizational practices. These interviews focused on elaborating responses related to data management challenges, system usage, and readiness concerns.

Field notes were taken during interviews to document key observations and recurring themes.

3.6. Data Analysis

Quantitative data from closed-ended questions were analyzed using **descriptive statistical methods**, including frequency counts and percentage distributions, to summarize respondent characteristics and identify patterns in responses.

Qualitative data from open-ended responses and interviews were analyzed using **thematic analysis**, following these steps:

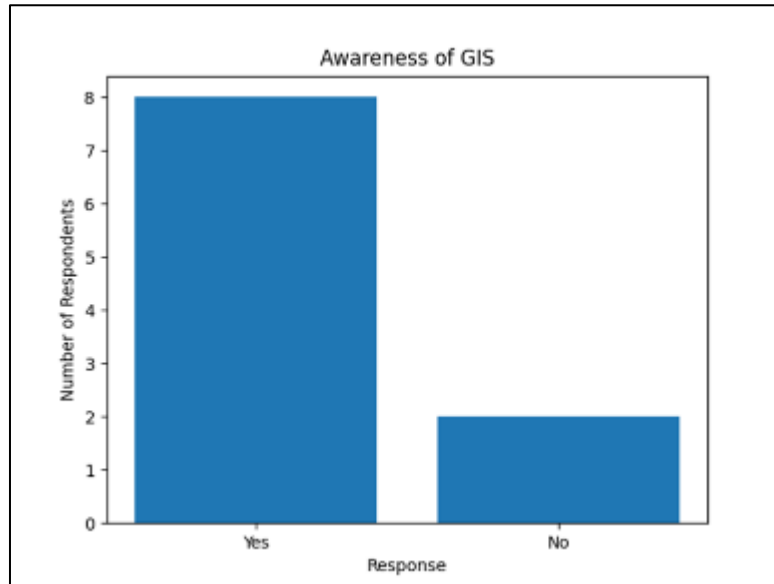
- **Data familiarization** – reviewing all responses
- **Initial coding** – identifying key phrases and recurring ideas
- **Theme development** – grouping codes into categories such as:
 - Current practices
 - Challenges and gaps
 - Training needs
- **Theme validation** – cross-checking themes against responses to ensure consistency

This mixed-method approach allowed for a comprehensive analysis of both measurable trends and contextual insights.

4. Results

4.1. Awareness of GIS

The results indicate that 8 out of 10 respondents (80%) are aware of Geographic Information Systems (GIS), while 20% reported no familiarity.



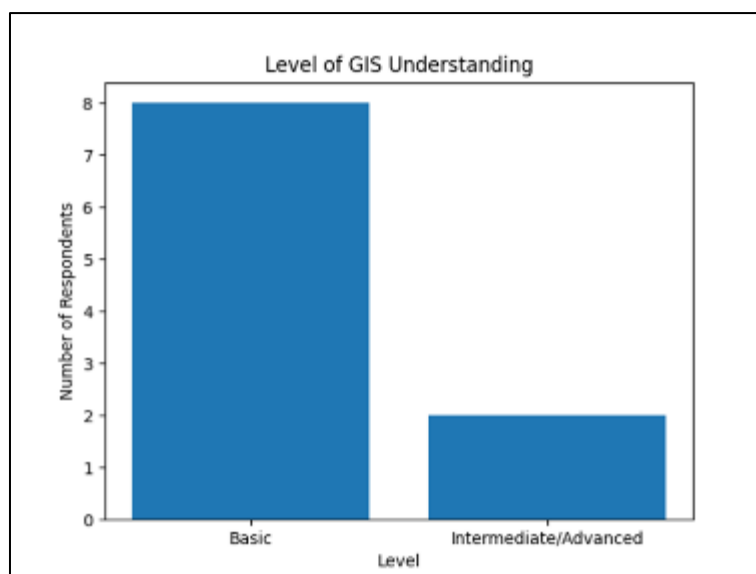
Source: Survey Results (2026)

Figure 1 Awareness of GIS among respondents

This suggests that awareness of GIS is generally present among respondents; however, awareness alone does not necessarily indicate readiness for system adoption.

4.2. Level of GIS Understanding

Despite relatively high awareness, the level of understanding remains limited. The majority of respondents (**80%**) rated their knowledge of GIS as **basic**, while only a small proportion demonstrated intermediate or advanced understanding.



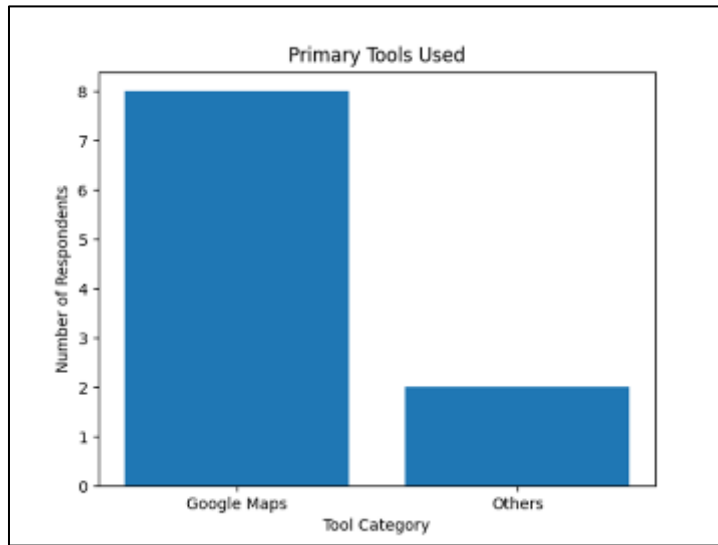
Source: Survey Results (2026)

Figure 2 Level of GIS understanding among respondents

This indicates that awareness has not translated into sufficient technical competency required for effective system utilization.

4.3. Current Practices in Mapping and Spatial Data Handling

Respondents reported the use of multiple tools and methods for handling spatial data. The most commonly used tool is **Google Maps**, supplemented by spreadsheets, manual mapping, AutoCAD, and internally developed applications.



Source: Survey Results (2026)

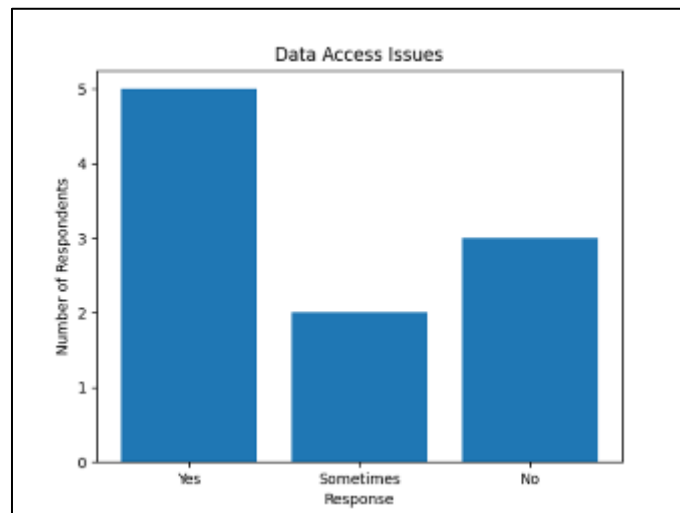
Figure 3 Primary tools used for mapping and spatial data tasks

The diversity of tools reflects the absence of a standardized system, resulting in fragmented workflows and inconsistent data handling practices across departments.

4.4. Data Management Practices and Challenges

The findings reveal that data storage practices are inconsistent, with respondents indicating the use of paper records, Excel files, and database systems, often in combination.

Additionally, 50% of respondents reported experiencing data access issues, while 20% reported occasional issues, indicating operational inefficiencies.



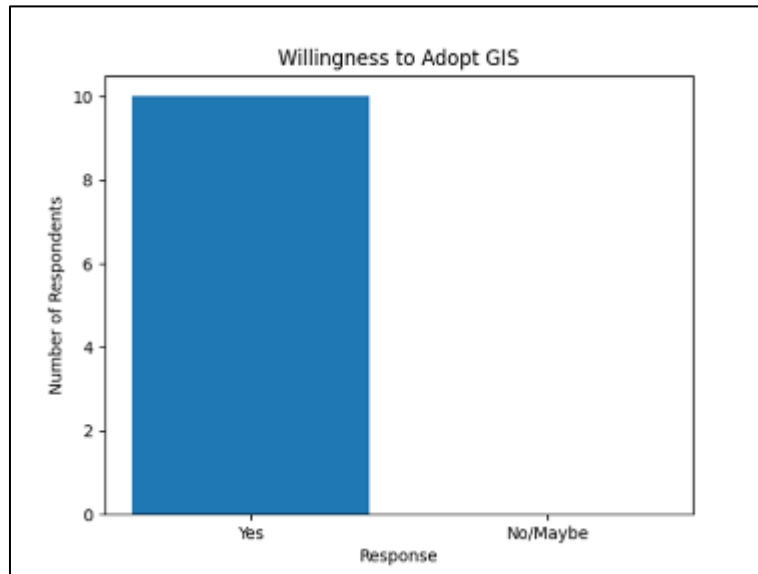
Source: Survey Results (2026)

Figure 4 Reported issues in accessing and updating data

These results highlight the challenges associated with decentralized data storage and the lack of standardized data management processes.

4.5. Organizational Readiness and Willingness to Adopt GIS

All respondents (100%) expressed willingness to adopt a centralized GIS system, indicating strong openness to technological change.



Source: Survey Results (2026)

Figure 5 Willingness to adopt a centralized GIS system

However, despite this high level of willingness, the findings suggest a discrepancy between perceived readiness and actual capability.

4.6. Data Sharing and Integration

The results indicate that only half of the respondents reported regular data sharing across departments, while others indicated limited or inconsistent coordination.

Additionally, several respondents expressed uncertainty regarding data consistency, suggesting the absence of standardized data governance and integration mechanisms.

Table 2 Summary of Key Findings

Indicator	Key Finding
Awareness	80% aware of GIS
Understanding	Majority at basic level
Tools Used	Fragmented (Google Maps, Excel, manual)
Data Storage	Mixed formats (paper, digital, systems)
Data Issues	70% experience access/update issues
Readiness	100% willing to adopt GIS
Data Sharing	Limited and inconsistent

5. Discussion

The findings of this study highlight a critical gap between awareness and operational readiness for GIS implementation within the selected departments of the Municipal Government of Rodriguez, Rizal. While a majority of respondents are aware of GIS and express strong willingness to adopt the system, their level of understanding remains predominantly basic.

This gap between awareness and technical capability is consistent with previous studies, which indicate that familiarity with GIS concepts does not necessarily translate into effective utilization due to insufficient training and limited technical expertise [2]. The results presented in Figures 1 and 2 reinforce this observation, demonstrating that awareness alone is not a reliable indicator of readiness.

Another key finding is the fragmentation of tools and workflows used for spatial data management. As shown in Figure 3, respondents rely on a combination of Google Maps, spreadsheets, manual records, and internally developed systems. This lack of standardization is consistent with findings in other local government contexts, where departments operate independently using different tools, resulting in inefficiencies and limited interoperability [7].

The study also reveals significant challenges in data management practices, particularly in terms of storage, accessibility, and consistency. The use of mixed data formats and decentralized storage systems contributes to difficulties in updating and accessing data, as reflected in Figure 4. These findings align with existing literature, which identifies fragmented data management and lack of centralized databases as major barriers to effective GIS implementation [3].

Furthermore, limited data sharing and the absence of formal data governance mechanisms indicate a lack of institutional structures necessary to support integrated GIS systems. Without standardized protocols for data creation, updating, and sharing, organizations may struggle to maintain data quality and consistency across departments.

Despite these challenges, the high level of willingness to adopt GIS (Figure 5) represents a significant opportunity for successful implementation. Unlike many technology adoption scenarios where resistance to change is a primary barrier, the findings suggest that the main challenges in this case are related to capacity, system integration, and data governance, rather than user acceptance.

These findings suggest that the organization is in an early pre-deployment readiness stage, characterized by strong interest in GIS adoption but limited operational preparedness. Addressing these gaps requires a comprehensive approach that includes capacity building, system standardization, and the establishment of governance frameworks to support sustainable implementation.

It is important to note that the findings of this study are based on a limited sample of respondents from selected departments and should therefore be interpreted as indicative rather than representative of the entire organization. Nevertheless, the results provide valuable baseline insights that can inform planning and decision-making for GIS implementation.

6. Conclusion

This study assessed the level of Geographic Information System (GIS) readiness and end-user preparedness in selected departments of the Municipal Government of Rodriguez, Rizal, within the context of ongoing preparatory activities for GIS implementation.

The findings indicate that, among the selected respondents, there is a generally high level of awareness of GIS and a strong willingness to adopt a centralized system. However, this willingness is not supported by sufficient technical capability, as most respondents possess only a basic level of understanding of GIS concepts and applications. This gap between awareness and capability suggests that users may not yet be adequately prepared to effectively utilize GIS in operational settings.

In addition, the study identified significant issues in current practices related to spatial data management. These include the use of fragmented tools and workflows, inconsistent data storage formats, limited data sharing across departments, and the absence of formal data governance mechanisms. These conditions contribute to inefficiencies in data handling and may pose challenges to system integration during implementation.

Taken together, the results suggest that, within the selected departments, GIS readiness is at an early pre-deployment stage, characterized by strong interest in adoption but limited operational preparedness. The findings highlight the need for organizational, technical, and procedural improvements prior to full-scale deployment.

While the study is limited by its small sample size and focus on selected departments, it provides valuable baseline insights into the current state of readiness and identifies key areas that require attention to support effective GIS implementation.

Recommendations

Based on the findings of the study, the following recommendations are proposed to enhance GIS readiness and support effective implementation within the Municipal Government of Rodriguez, Rizal:

- Capacity Building and Skills Development

A structured and phased training program should be implemented to address the gap between awareness and technical capability. This program should include:

- Basic GIS orientation for general users
 - Intermediate training for operational personnel
 - Advanced training for system administrators and technical staff
 - Hands-on workshops based on actual departmental workflows
 - Continuous learning mechanisms should also be established to sustain competency development over time.
- Establishment of a Centralized GIS Framework

To address fragmentation in current practices, the municipality should develop a centralized GIS framework that standardizes tools, workflows, and system usage across departments. This includes:

- Adoption of a unified GIS platform
 - Standardization of spatial data processes
 - Integration of existing datasets into a centralized system
 - Such a framework will improve consistency, efficiency, and coordination across departments.
- Development of a Centralized Spatial Database

A centralized spatial database should be established to serve as the primary repository for all location-based data. This should involve:

- Consolidation of existing datasets
 - Standardization of data formats and structures
 - Implementation of a spatial database management system (e.g., PostgreSQL/PostGIS)
 - A centralized database will enhance data accessibility, accuracy, and reliability.
- Implementation of Data Governance Policies

The municipality should establish formal data governance policies to ensure consistency and quality in data management. Key components include:

- Clear assignment of data ownership and responsibilities
 - Standard protocols for data creation, updating, and validation
 - Data quality assurance mechanisms
 - Regular data audits and monitoring
 - Strong governance is essential for maintaining data integrity in a multi-department environment.
- Strengthening Inter-Departmental Integration

Mechanisms should be developed to improve collaboration and data sharing across departments. These may include:

- Shared GIS dashboards and interfaces
 - Standardized data exchange formats
 - Coordinated workflows and communication channels
 - Improved integration will reduce duplication of efforts and enhance decision-making processes.
- Infrastructure and System Readiness

The municipality should ensure that the necessary technical infrastructure is in place to support GIS implementation, including:

- Reliable network connectivity
 - Adequate server capacity and storage
 - Secure access control systems
 - Infrastructure readiness is critical to system performance and user adoption.
- Pilot Implementation and Phased Deployment

A pilot implementation should be conducted in selected departments prior to full-scale deployment. This will allow the organization to:

- Test system functionality
 - Identify technical and operational issues
 - Refine workflows based on user feedback
 - A phased approach will reduce risks and improve overall implementation success.
- Monitoring and Continuous Improvement

A monitoring and evaluation framework should be established to assess system performance and user adoption over time. This may include:

- Key performance indicators (KPIs) for system usage
- Feedback mechanisms for users
- Periodic review of training effectiveness
- Continuous improvement will ensure that the GIS evolves in response to organizational needs.

Compliance with ethical standards

Acknowledgments

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Disclosure of conflict of interest

The author declares no conflict of interest.

Statement of ethical approval

This study was conducted in accordance with accepted ethical standards for academic research involving human participants.

Statement of informed consent

Informed consent was obtained from all respondents prior to participation.

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