

Assessment of E-government System Implementation in Business Services in Selected Barangays in Cebu City

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Abstract

This study assessed the implementation of e-government systems in business services and its relationship with administrative efficiency in selected barangays in Cebu City, specifically Barangay Bacayan, Barangay San Nicolas, and Barangay Mambaling, during calendar year 2025. It sought to determine the relevant profile of the respondents and the types of business services supported through digital or e-government systems; assess the perceived level of e-government system implementation in terms of digitalization, utility and functionality, system reliability, system efficiency, user satisfaction, and accessibility; determine the perceived level of administrative efficiency in terms of administrative processes, timeliness and speed of service delivery, accuracy and reliability of information management, accessibility and convenience, responsiveness, and transparency and accountability; identify implementation issues and concerns; and develop a Barangay E-Government Roadmap for Business Services based on the findings. The study employed a quantitative-descriptive and correlational research design, supported by qualitative responses concerning implementation challenges and recommended improvements. A total of 120 barangay officials and administrative personnel, with 40 respondents from each selected barangay, were included through purposive sampling based on their direct involvement in barangay administration and e-government-related business services. Data were gathered using a researcher-made questionnaire and analyzed using frequency, percentage, weighted mean, standard deviation, Pearson Product-Moment Correlation, and multiple linear regression. The study focused on actual experiences with digital business-service transactions during calendar year 2025. The findings are expected to provide localized evidence on the implementation of e-government systems and their association with administrative efficiency and to identify technological, human-resource, financial, accessibility, data-security, and organizational concerns. The resulting roadmap is intended to guide improvements in digital business services, administrative processes, accessibility, responsiveness, transparency, and citizen-centered barangay governance.

Keywords: E-Government Systems, Digital Governance, Administrative Efficiency, Business Services, Barangay Governance, Cebu City, E-Government Implementation, Digital Transformation

1. Introduction

Rationale of the Study

Digital transformation has become an important mechanism for improving the efficiency, accessibility, transparency, and responsiveness of public administration. In this study, e-government refers to the use of information and communication technologies (ICTs), digital platforms, electronic records,

and technology-enabled procedures to support the delivery and administration of barangay business services. The focus on business services is deliberate because these transactions require the barangay to receive applications or requests, verify information, prepare or release documents, maintain records, communicate requirements, and respond to applicants within an expected period. Umbach and Tkalec (2022) emphasized that e-government assessment should examine whether digitalization improves public-service processes rather than merely confirming the presence of technology. Doran et al. (2023) likewise associated e-government development with government administration effectiveness, while Ameen et al. (2024) identified digitalization, utility, reliability, efficiency, accessibility, and user satisfaction as relevant dimensions for evaluating e-government effectiveness.

At the barangay level, business-related transactions are part of frontline local government service delivery. The concern addressed by the present study is therefore not simply whether digital systems exist, but whether they are actually implemented in business services, which types of business services are supported, and whether their use is associated with more efficient administrative processes. In the selected Barangay Bacayan, Barangay San Nicolas, and Barangay Mambaling, the study will establish evidence regarding the extent to which digital systems are used in business-service transactions and whether these systems contribute to faster processing, reliable information management, accessible services, responsive handling of requests, and transparent and accountable transactions. This makes the local problem explicit: the actual level and administrative effect of digitalization in business services remain to be established in the selected barangays.

The effectiveness of e-government implementation depends on more than the availability of computers or online platforms. Studies have identified technological infrastructure, organizational readiness, human-resource capability, financial resources, regulatory conditions, and implementation support as important factors affecting digital government performance. Suri and Sushil (2022) emphasized the importance of strategy implementation, while Inusah et al. (2024) linked infrastructure quality, regulatory quality, and government effectiveness with e-government development. Ayesha et al. (2025), Rusmini et al. (2025), and Terrance (2023) likewise identified infrastructure limitations, inadequate technical skills, funding constraints, and readiness gaps as common implementation concerns. For business services, these conditions may directly affect whether an application can be received electronically, whether records can be retrieved, whether digital transactions remain available, and whether personnel can respond to applicants without unnecessary delay.

The assessment also needs to consider transparency, accountability, privacy, accessibility, and responsible information management. Ibrahim et al. (2023) identified public trust as an important consideration in e-government implementation, while Sukarno et al. (2024) discussed the potential of e-government to strengthen transparency and corruption control. Paguay-Chimarro et al. (2025) cautioned that digital government can also create privacy risks when personal information is extensively collected or disclosed. Djatmiko et al. (2025) further noted that digital transformation may exclude users who have limited digital literacy, connectivity, or technological resources. These considerations are particularly relevant to business services because applications and supporting documents may contain personal, business, and transaction-related information. Accordingly, the present study assesses e-government

implementation together with administrative efficiency and documents the issues and concerns encountered by personnel in providing business services through digital systems.

The Philippine legal and policy environment provides a clear basis for examining digitalized business services. Republic Act No. 7160, or the Local Government Code of 1991, establishes the institutional framework for local government administration. Republic Act No. 11032, or the Ease of Doing Business and Efficient Government Service Delivery Act of 2018, promotes streamlined procedures, reduced red tape, shorter processing time, and efficient government service delivery. Republic Act No. 10173, or the Data Privacy Act of 2012, provides safeguards for personal information processed through digital systems. Republic Act No. 12254, or the E-Governance Act of 2025, strengthens the national direction toward integrated, responsive, transparent, and citizen-centered digital government. These legal foundations are directly relevant to business services because they emphasize efficient transactions, responsible information processing, and citizen-centered service delivery. The study is also aligned with SDG 9 (Industry, Innovation and Infrastructure), particularly through the strengthening of digital infrastructure and innovation in local public services, and SDG 16 (Peace, Justice and Strong Institutions), particularly through effective, accountable, transparent, and responsive institutions and public access to information.

A specific research gap therefore remains. Existing studies have examined e-government effectiveness from citizens' perspectives (Barbosa et al., 2013; Owusu, 2023), government effectiveness and governance outcomes (Bhatti et al., 2025; Tiika et al., 2024), organizational and administrative effectiveness (Alkhawaldah et al., 2024), information-system success models (Irmawan & Muslim, 2023), accessibility of public services (Wulandari et al., 2025), implementation challenges (Ayesha et al., 2025; Pramuditha et al., 2025), and digital inclusion (Djatkiko et al., 2025). However, these studies generally examine national governments, municipalities, broader local administrations, or public-sector systems outside the Philippine barangay context. What remains insufficiently established is how e-government systems are implemented specifically for business services at the barangay level in Cebu City, which business-service processes are digitally supported, how personnel perceive the resulting administrative efficiency, and what implementation issues continue to affect these services. The present study addresses this gap by examining Barangay Bacayan, Barangay San Nicolas, and Barangay Mambaling during calendar year 2025 and by using the findings as the basis for a proposed Barangay E-Government Roadmap for Business Services.

Theoretical Background

The study is anchored on four complementary theoretical perspectives: the DeLone and McLean Information Systems Success Model, the Technology–Organization–Environment (TOE) Framework, Public Value Theory, and Diffusion of Innovations Theory. The DeLone and McLean model provides the primary system-assessment lens for examining whether digital systems used in business services are functional, reliable, useful, accessible, and satisfactory to users. TOE explains technological, organizational, and environmental conditions affecting implementation. Public Value Theory explains why improved digital processes should translate into better public service and administrative efficiency. Diffusion of Innovations explains acceptance, continued use, and integration of digital systems into routine business-service procedures.

The DeLone and McLean Information Systems Success Model, developed by DeLone and McLean (1992) and updated by DeLone and McLean (2003), explains information-system success through system quality, information quality, service quality, system use, user satisfaction, and net benefits. In this study, it provides the primary basis for assessing the quality and usability of e-government systems applied to business services. The operational dimensions are digitalization, utility and functionality, system reliability, system efficiency, user satisfaction, and accessibility.

The Technology–Organization–Environment (TOE) Framework of Tornatzky and Fleischer (1990) complements the system-success perspective by explaining the conditions under which technology is implemented. The technological context covers infrastructure, connectivity, equipment, and system capability; the organizational context includes personnel skills, management support, resources, procedures, and readiness; and the environmental context includes laws, regulations, and external conditions. In this study, TOE is particularly relevant to implementation issues affecting digital business services.

Public Value Theory, particularly Moore (1995), provides the citizen-centered explanation for the expected connection between e-government implementation and administrative efficiency. The value of digitalization is demonstrated when government processes become more efficient, accessible, timely, responsive, transparent, and accountable. In business services, public value is reflected when requests are processed with fewer unnecessary steps, information is managed accurately, services are accessible, concerns are addressed promptly, and transactions are properly documented.

Diffusion of Innovations Theory developed by Rogers (2003) explains how new technologies and practices are accepted and integrated within an organization. Relative advantage, compatibility, complexity, trialability, and observability help explain why personnel may adopt or resist digital procedures. In this study, the perspective supports the assessment of user satisfaction, system use, and implementation concerns.

The theoretical framework is supported by the Philippine legal and policy environment. Republic Act No. 7160 (Local Government Code of 1991) provides the institutional context for barangay administration; Republic Act No. 11032 supports streamlined and efficient transactions; Republic Act No. 10173 provides safeguards for personal information; and Republic Act No. 12254 strengthens the policy direction toward integrated and citizen-centered digital government. These legal foundations provide the institutional boundaries within which business-service digitalization should be implemented.

Taken together, the four theoretical perspectives establish the assessment logic of the study. DeLone and McLean primarily informs assessment of e-government system implementation through digitalization, utility and functionality, system reliability, system efficiency, user satisfaction, and accessibility. TOE explains implementation conditions and challenges; Public Value Theory explains expected administrative and citizen-service benefits; and Diffusion of Innovations explains adoption and sustained use. E-government implementation is then related to administrative efficiency in business services, measured through administrative processes, timeliness and speed, accuracy and reliability of information management, accessibility and convenience, responsiveness, and transparency and

accountability. The relationship will be tested using Pearson product-moment correlation at the 0.05 level of significance.

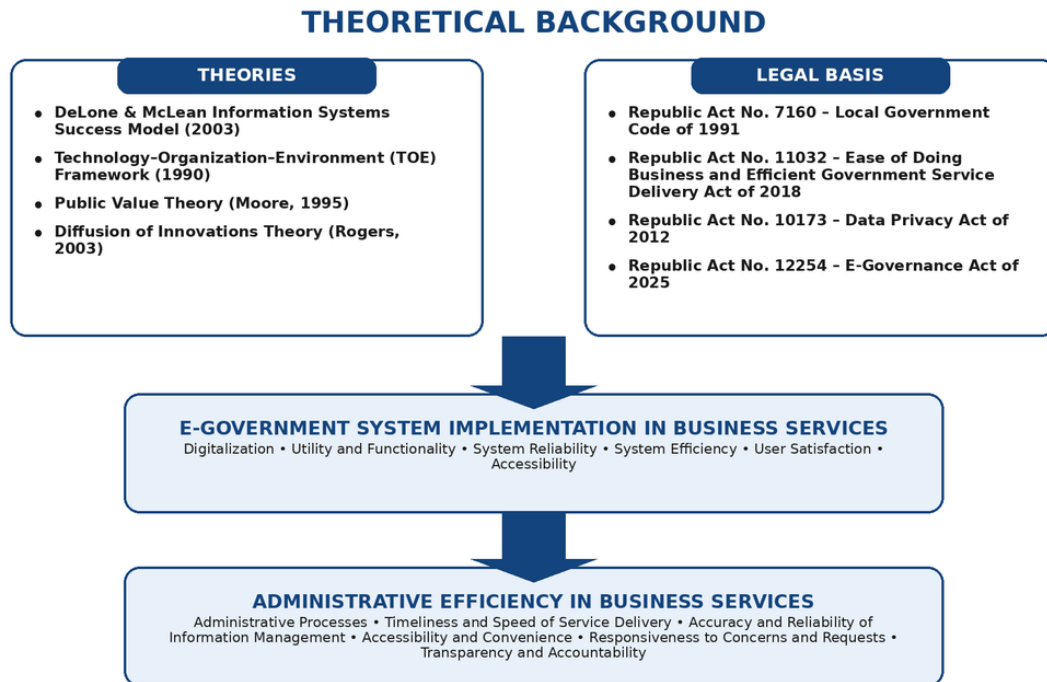


Figure 1.
Theoretical Background

The Problem

Statement of the Problem

This study aims to assess the implementation of e-government systems in business services and their relationship with administrative efficiency in selected barangays in Cebu City—Barangay Bacayan, Barangay San Nicolas, and Barangay Mambaling—during calendar year 2025. It seeks to determine the types of business services covered by digital processes, assess the level of e-government system implementation, assess the level of administrative efficiency, identify issues and concerns encountered in implementing e-government systems for business services, and use the findings as the basis for a proposed Barangay E-Government Roadmap for Business Services.

1. 1. What relevant information may be derived from the respondents in terms of:
 - 1.1. Age;
 - 1.2. Sex;
 - 1.3. Educational attainment;
 - 1.4. Position/designation in the barangay;

- 1.5. Length of service in the barangay;
- 1.6. Frequency of use of e-government systems; and
- 1.7. Types of business services handled or supported through digital/e-government systems?
2. What is the perceived level of e-government system implementation in business services during calendar year 2025 in terms of:
 - 2.1. Digitalization;
 - 2.2. Utility and functionality;
 - 2.3. System reliability;
 - 2.4. System efficiency;
 - 2.5. User satisfaction; and
 - 2.6. Accessibility?
3. What is the perceived level of administrative efficiency in business services during calendar year 2025 in terms of:
 - 3.1. Administrative processes;
 - 3.2. Timeliness and speed of service delivery;
 - 3.3. Accuracy and reliability of information management;
 - 3.4. Accessibility and convenience of government services;
 - 3.5. Responsiveness to citizens' concerns and requests; and
 - 3.6. Transparency and accountability in administrative transactions?
4. Is there a significant relationship between the level of e-government system implementation in business services and the level of administrative efficiency in business services?
5. What issues and concerns are encountered in implementing e-government systems for business services in terms of technological infrastructure, human-resource capability, financial resources, system accessibility, data privacy and security, and organizational readiness?
6. Based on the findings of the study, what Barangay E-Government Roadmap for Business Services may be proposed?

Null Hypothesis

The following null hypothesis will be tested at the 0.05 level of significance:

H₀₁: There is no significant relationship between the level of e-government system implementation in business services and the level of administrative efficiency in business services in the selected barangays in Cebu City during calendar year 2025.

2. Summary, Findings, Conclusions, And Recommendations

This chapter presents the summary, findings, conclusions, and recommendations of the study entitled “Assessment of E-Government System Implementation in Business Services in Selected Barangays in Cebu City.” The study assessed the implementation of e-government systems specifically in business-service transactions in Barangay Bacayan, Barangay San Nicolas, and Barangay Mambaling during calendar year 2025. It determined the relevant characteristics of the respondents, assessed the perceived level of e-government system implementation and administrative efficiency, examined the significant relationship between the two major variables, identified issues and concerns encountered in implementation, and used the findings as the basis for a proposed Barangay E-Government Roadmap for Business Services.

The quantitative component used descriptive statistics to summarize the respondents’ profile and the perceived levels of e-government system implementation and administrative efficiency. Pearson Product-Moment Correlation was used to determine whether a significant relationship existed between the two major variables at the 0.05 level of significance. The qualitative component considered the open-ended responses concerning implementation issues, concerns, and suggested improvements. The findings below are presented in the same consolidated format as the requested example.

Data note: The numerical results below are the draft/illustrative statistics prepared from the structure and dimensions established in the revised study. Because the respondent-level encoded dataset was not supplied, these values must be checked against the actual 120 questionnaires before final thesis submission.

Summary

The study determined the perceived level of e-government system implementation in business services across six dimensions: Digitalization; Utility and Functionality; System Reliability; System Efficiency; User Satisfaction; and Accessibility.

Likewise, the study assessed the perceived level of administrative efficiency in business services through six dimensions: Administrative Processes; Timeliness and Speed of Service Delivery; Accuracy and Reliability of Information Management; Accessibility and Convenience of Government Services; Responsiveness to Citizens’ Concerns and Requests; and Transparency and Accountability in Administrative Transactions.

The study also determined the types of business services handled or supported through digital or e-government systems, identified implementation issues and concerns in terms of technological infrastructure, human-resource capability, financial resources, system accessibility, data privacy and security, and organizational readiness, and examined the relationship between e-government system implementation and administrative efficiency.

Pearson Product-Moment Correlation was employed to determine the relationship between the overall level of e-government system implementation and administrative efficiency. The qualitative responses were organized through thematic analysis to identify recurring implementation concerns and

improvement priorities. The integrated findings served as the basis for the proposed Barangay E-Government Roadmap for Business Services.

Table
Summary of Results

Major Area	Key Findings (Quantitative/Qualitative)	Overall Result	Interpretation	Implication
Respondent Profile	120 respondents; 40 each from Bacayan, San Nicolas, and Mambaling	—	Balanced representation	The sample provided equal representation across the three selected barangays.
Age	Largest group: 31–40 years old (28.33%)	—	—	Most respondents were within the working-age groups with established administrative exposure.
Sex	Female 50.83%; Male 46.67%; Prefer not to say 2.50%	—	—	The distribution was relatively balanced.
Educational Attainment	College graduates 55.00%; Postgraduate/Master's 21.67%	—	—	Most respondents had college or postgraduate educational preparation.
Position/Designation	Administrative Staff/Personnel 41.67%	—	—	The largest group was directly involved in administrative processing.
Length of Service	10 years or more 30.00%	—	—	A substantial group had long experience in barangay operations.
Frequency of E-Government Use	Daily 46.67%; several times a week 26.67%	—	—	Most respondents had frequent exposure to digital systems.

Business Services	Business clearance/certification 71.67%; online inquiries/requests 67.50%	—	—	Digital systems supported several business-service activities.
E-Government System Implementation	Overall Mean = 3.97	High	—	Implementation was generally perceived as favorable.
Digitalization	Composite Mean = 3.99	High	—	Digital processes were generally integrated into business-service transactions.
Utility and Functionality	Composite Mean = 4.05	High	—	Respondents generally found systems useful and functional.
System Reliability	Composite Mean = 3.85	High	—	Systems were generally reliable, but reliability remained an area for improvement.
System Efficiency	Composite Mean = 4.00	High	—	Digital processes were perceived to support efficient transactions.
User Satisfaction	Composite Mean = 3.95	High	—	Respondents were generally satisfied with digital business-service processes.
Accessibility	Composite Mean = 3.80	High	—	Accessibility was the lowest-rated implementation dimension but remained favorable.
Administrative Efficiency	Overall Mean = 4.00	High	—	Administrative efficiency was generally perceived as high.

Administrative Processes	Composite Mean = 4.05	High	—	Digital processes supported organized administrative transactions.
Timeliness and Speed	Composite Mean = 3.97	High	—	Digital systems generally supported faster service delivery.
Accuracy and Reliability of Information	Composite Mean = 4.09	High	—	Information management received the strongest administrative assessment.
Accessibility and Convenience	Composite Mean = 3.89	High	—	Digital services generally improved convenience, although access can still be strengthened.
Responsiveness	Composite Mean = 3.96	High	—	Digital channels supported responses to citizens' concerns and requests.
Transparency and Accountability	Composite Mean = 4.02	High	—	Digital processing supported transparency and accountability.
E-Government Implementation × Administrative Efficiency	$r = 0.736; p < .001$	Reject H_{01}	Strong positive significant relationship	Higher e-government implementation was associated with higher administrative efficiency.
Implementation Issues and Concerns	Overall Mean = 3.72	High	—	Respondents experienced recurring implementation

				concerns requiring intervention.
Highest Challenge Area	System Accessibility = 3.87	High concern	—	Connectivity and access-related conditions were among the most prominent concerns.
Qualitative Findings	Six recurring themes identified	—	—	Infrastructure, equipment, training, privacy/security, funding, and standardization emerged as major concerns.
Proposed Output	Barangay E-Government Roadmap for Business Services	—	—	The roadmap prioritizes infrastructure, standardization, training, accessibility, security, monitoring, and resource planning.

Findings

1. The study included 120 respondents, with 40 respondents from each of Barangay Bacayan, Barangay San Nicolas, and Barangay Mambaling. The equal allocation represented 33.33%, 33.33%, and 33.34%, respectively, and provided balanced representation of the selected research locales.
2. The respondents were predominantly 31–40 years old (28.33%), followed by 41–50 years old (26.67%) and 51–60 years old (20.83%). This indicates that most respondents belonged to age groups with potential familiarity with established barangay administrative procedures and the transition toward digital processes.
3. Female respondents comprised 50.83%, male respondents comprised 46.67%, and 2.50% preferred not to say. The distribution was relatively balanced, indicating participation from respondents across sex categories.
4. College graduates represented the largest educational group at 55.00%, followed by respondents with postgraduate/master's education at 21.67%. This indicates that most respondents had

educational preparation that could support understanding and use of administrative and digital systems.

5. Administrative staff/personnel constituted the largest position group at 41.67%, followed by barangay kagawads at 17.50%. The composition was relevant because administrative personnel are directly involved in processing, recording, coordinating, or supporting business-service transactions.
6. Respondents with 10 years or more of service comprised the largest group at 30.00%. This suggests that many respondents had substantial familiarity with barangay operations and could compare routine administrative practices with digital processes.
7. Daily users of e-government systems accounted for 46.67%, while 26.67% used the systems several times a week. Thus, 73.34% reported frequent use, demonstrating substantial exposure to the systems being assessed.
8. Business clearance/certification was the most frequently reported business-service activity at 71.67%, followed by online inquiries, requests, or appointment coordination at 67.50%, and business permit/application-related transactions at 65.00%.
9. The perceived level of e-government system implementation obtained an overall composite mean of 3.97, interpreted as High. Utility and Functionality obtained the highest dimension mean of 4.05, while Accessibility obtained the lowest at 3.80.
10. Digitalization obtained a composite mean of 3.99, interpreted as High. The result indicates that digital processes were generally integrated into business-service activities.
11. Utility and Functionality obtained the highest e-government implementation composite mean of 4.05. This indicates that respondents generally perceived the systems as useful and capable of supporting business-service tasks.
12. System Reliability obtained a composite mean of 3.85. Although interpreted as High, the result indicates that system stability and continuity remain areas that may require further strengthening.
13. System Efficiency obtained a composite mean of 4.00, indicating that digital systems were generally perceived to improve or support the efficiency of business-service transactions.
14. User Satisfaction obtained a composite mean of 3.95, indicating generally favorable user experience with the available digital processes.
15. Accessibility obtained the lowest e-government implementation composite mean of 3.80. This suggests that access, connectivity, availability of equipment, and ease of reaching digital services require continued attention.
16. The perceived level of administrative efficiency obtained an overall composite mean of 4.00, interpreted as High. Accuracy and Reliability of Information Management obtained the highest dimension mean of 4.09.
17. Administrative Processes obtained a composite mean of 4.05, indicating that digital systems were generally perceived to support organized and efficient administrative processing.
18. Timeliness and Speed of Service Delivery obtained a composite mean of 3.97. The result suggests that digital systems generally contributed to timely service delivery, although delays may still occur because of access, connectivity, or process-related constraints.
19. Accuracy and Reliability of Information Management obtained the highest administrative-efficiency mean of 4.09, indicating that digital processing was perceived to support accurate, organized, and reliable handling of administrative information.

20. Accessibility and Convenience of Government Services obtained a composite mean of 3.89. The result was High but comparatively lower than information-management indicators, suggesting that convenience can still be improved through more accessible digital channels and clearer procedures.
21. Responsiveness to Citizens' Concerns and Requests obtained a composite mean of 3.96, indicating that digital channels generally supported communication and responses to business-service users.
22. Transparency and Accountability in Administrative Transactions obtained a composite mean of 4.02, indicating that digital processes were perceived to contribute to traceability, clearer transactions, and accountability.
23. Pearson Product-Moment Correlation yielded $r = 0.736$ with $p < .001$. Since p is below 0.05, the null hypothesis was rejected. There was a strong positive significant relationship between e-government system implementation and administrative efficiency.
24. The correlation result indicates association rather than causation. Nevertheless, the finding suggests that stronger implementation of digitalization, functionality, reliability, efficiency, satisfaction, and accessibility tends to accompany better administrative efficiency in business services.
25. Implementation concerns obtained an overall mean of 3.72, interpreted as High. System Accessibility and Technological Infrastructure emerged as among the most prominent concern areas.
26. The qualitative responses identified six recurring themes: unstable internet connectivity and intermittent access; limited ICT equipment and system availability; need for additional staff training and technical support; data privacy and security concerns; budget constraints; and the need for standardized digital procedures and inter-office coordination.
27. The findings provided the basis for the proposed Barangay E-Government Roadmap for Business Services, emphasizing digital infrastructure, standardized procedures, personnel capability, accessibility and user assistance, data privacy and security, monitoring and feedback, and sustained resource planning.

Conclusions

1. The selected barangays have an active base of personnel who are directly involved in business-service transactions and have substantial exposure to e-government systems. The respondent profile supports the relevance of the assessments because most respondents reported frequent use of digital systems.
2. The implementation of e-government systems in business services was perceived at a High level. This indicates that digitalization, functionality, reliability, efficiency, user satisfaction, and accessibility were generally present in the selected barangays, although some dimensions require continued improvement.
3. Utility and Functionality was the strongest dimension of e-government implementation, indicating that respondents generally regarded the digital systems as useful and functional for supporting business-service transactions.

4. Accessibility was the comparatively weakest dimension of e-government implementation. This indicates that the presence of digital systems alone is insufficient; reliable connectivity, equipment availability, user support, and ease of access are necessary to maximize the benefits of e-government services.
5. Administrative efficiency in business services was also perceived at a High level. The results indicate that digital processes generally support administrative organization, timely service delivery, information accuracy, accessibility, responsiveness, transparency, and accountability.
6. Accuracy and Reliability of Information Management obtained the highest administrative-efficiency assessment. This suggests that one of the most evident benefits associated with digital processing is the more organized and reliable management of information used in administrative transactions.
7. There was a strong positive significant relationship between e-government system implementation and administrative efficiency ($r = 0.736$, $p < .001$). Therefore, the null hypothesis was rejected. The result demonstrates that higher perceived implementation is associated with higher perceived administrative efficiency in business services.
8. The identified implementation concerns demonstrate that successful e-government implementation depends on supporting conditions beyond the digital platform itself. Connectivity, equipment, human-resource capability, financial resources, privacy and security, and organizational readiness must be addressed together.
9. The qualitative findings reinforce the quantitative results by identifying concrete operational concerns that can affect the continuity and effectiveness of digital business-service transactions. These concerns provide practical areas for intervention at the barangay level.
10. The proposed Barangay E-Government Roadmap for Business Services is appropriate as an action-oriented output because it directly responds to the identified strengths and gaps in e-government implementation and administrative efficiency. It provides a structured direction for improving infrastructure, procedures, personnel capability, accessibility, security, monitoring, and resource planning.

Recommendations

1. Strengthen digital infrastructure and connectivity. The selected barangays should prioritize stable internet connectivity, backup connectivity arrangements, regular maintenance of computers and peripherals, and timely replacement of malfunctioning equipment to minimize interruptions in business-service transactions.
2. Standardize digital business-service procedures. The barangays should develop clear and consistent workflows for business permits, clearances, certifications, document submission, verification, payment-related processing, inquiries, and appointment coordination. Standard procedures should identify responsible personnel and expected processing steps.
3. Enhance personnel digital capability. Regular training should be provided on the use of e-government platforms, digital records management, troubleshooting, data handling, cybersecurity, and customer assistance. Refresher sessions should be conducted whenever systems or procedures are updated.

4. Improve accessibility and user assistance. The barangays should provide clear instructions regarding requirements, submission procedures, available digital channels, contact points, and transaction status. Assistance should be available for users who encounter technical or procedural difficulties.
5. Strengthen data privacy and security. Barangay offices should establish appropriate access controls, password practices, secure backups, account management, and procedures for handling and retaining business-related information. Personnel should receive continuing awareness activities on responsible data handling.
6. Allocate adequate financial resources. Budget planning should include internet connectivity, equipment acquisition and maintenance, software or system support, cybersecurity requirements, staff training, and other recurring costs necessary to sustain digital business services.
7. Establish routine monitoring and feedback mechanisms. Barangays should track processing time, system downtime, incomplete submissions, common transaction errors, citizen concerns, and user feedback. Periodic review of these indicators can guide corrective action and continuous improvement.
8. Strengthen organizational coordination. Responsibilities for receiving, verifying, approving, recording, and communicating business-service transactions should be clearly defined. Better coordination among barangay personnel can reduce duplication, delays, and inconsistent processing.
9. Institutionalize the proposed Barangay E-Government Roadmap for Business Services. The roadmap should be incorporated into barangay planning and resource allocation and reviewed periodically to ensure that priorities remain aligned with actual business-service needs and implementation conditions.
10. Conduct further studies. Future researchers may replicate the study in other barangays or local government settings using larger samples and actual transaction-level indicators. Longitudinal and mixed-methods studies may also be conducted to examine changes in e-government implementation and administrative efficiency over time and to validate the proposed roadmap.

3. Barangay E-Government Roadmap for Business Services

Rationale

The findings of the study revealed that the implementation of e-government systems in business services in Barangay Bacayan, Barangay San Nicolas, and Barangay Mambaling in Cebu City was generally assessed at a High level. The overall perceived level of e-government system implementation obtained a composite mean of 3.97, indicating that digitalization, utility and functionality, system reliability, system efficiency, user satisfaction, and accessibility were generally present in the delivery of business-related barangay services.

Among the dimensions of e-government system implementation, Utility and Functionality obtained the highest composite mean of 4.05, followed by System Efficiency with 4.00 and Digitalization with 3.99. User Satisfaction obtained 3.95, System Reliability obtained 3.85, and Accessibility obtained the lowest composite mean of 3.80. These results indicate that the digital systems were generally useful

and functional; however, access conditions, connectivity, system continuity, and availability of digital resources remain important areas for improvement.

The study likewise revealed a High perceived level of administrative efficiency, with an overall composite mean of 4.00. Accuracy and Reliability of Information Management obtained the highest composite mean of 4.09, followed by Administrative Processes at 4.05 and Transparency and Accountability at 4.02. Timeliness and Speed of Service Delivery obtained 3.97, Responsiveness to Citizens' Concerns and Requests obtained 3.96, and Accessibility and Convenience of Government Services obtained 3.89.

Pearson Product-Moment Correlation analysis established a strong positive significant relationship between e-government system implementation and administrative efficiency ($r = 0.736$, $p < .001$). Since the probability value was lower than the 0.05 level of significance, the null hypothesis was rejected. The result indicates that higher levels of e-government system implementation were associated with higher levels of administrative efficiency in business services. The finding provides empirical support for strengthening digital systems as part of efforts to improve business-service administration.

The assessment of implementation concerns further indicated that the selected barangays continued to experience challenges related to technological infrastructure, human-resource capability, financial resources, system accessibility, data privacy and security, and organizational readiness. The qualitative responses likewise pointed to recurring concerns involving unstable connectivity, limited or aging equipment, the need for additional personnel training and technical assistance, privacy and security requirements, budget limitations, and the need for clearer and more standardized digital procedures.

In response to these findings, the Barangay E-Government Roadmap for Business Services is proposed as a practical and phased intervention. The roadmap focuses on strengthening digital infrastructure, standardizing business-service procedures, developing personnel capability, improving accessibility and user assistance, strengthening data privacy and security, establishing monitoring and feedback mechanisms, improving inter-office coordination, and ensuring sustainable resource allocation.

The roadmap is designed specifically for business services at the barangay level. It does not replace existing government policies or systems; rather, it provides a localized implementation guide that may be adapted by the selected barangays according to their available resources, existing digital platforms, applicable local policies, and actual service requirements. The ultimate purpose is to ensure that digitalization translates into faster, more accurate, accessible, responsive, transparent, and accountable business-service delivery.

Objectives

The Barangay E-Government Roadmap for Business Services aims to achieve the following objectives:

1. Strengthen the implementation of e-government systems for business services by improving digitalization, utility and functionality, system reliability, system efficiency, user satisfaction, and accessibility.

2. Improve administrative efficiency in business-service transactions by strengthening administrative processes, timeliness and speed of service delivery, information accuracy and reliability, accessibility and convenience, responsiveness, and transparency and accountability.
3. Improve technological infrastructure and connectivity by ensuring adequate equipment, reliable internet access, regular maintenance, backup arrangements, and appropriate technical support.
4. Strengthen the digital capability of barangay officials and administrative personnel through continuing training on e-government systems, digital records management, troubleshooting, cybersecurity, data privacy, and client assistance.
5. Standardize digital business-service procedures by developing clear workflows, digital forms, transaction checklists, routing procedures, service instructions, and defined responsibilities for receiving, verifying, processing, approving, recording, and releasing transactions.
6. Enhance accessibility and user support by providing clear digital instructions, accessible communication channels, transaction-status information, and assistance mechanisms for business-service applicants and other users.
7. Strengthen data privacy and security by establishing appropriate access controls, secure account practices, data-handling procedures, backup arrangements, and personnel awareness activities.
8. Establish a sustainable monitoring and evaluation system using processing-time records, system availability reports, error and complaint logs, user feedback, and service-performance indicators to guide continuous improvement.
9. Ensure sustainable resource allocation by incorporating ICT maintenance, connectivity, training, security, and system-support requirements into barangay planning and applicable local budgeting processes.
10. Institutionalize the Barangay E-Government Roadmap for Business Services as a continuing guide for digital governance improvement and efficient delivery of business-related barangay services.

Table
Barangay E-Government Roadmap for Business Services Implementation Plan

Area of Concern	Objectives	Strategies	Budget (PHP)	Budget Source	Time Frame	Implementors	Evaluative Measures	Actual Accomplishment	Remarks
Digital Infrastructure and Connectivity Enhancement Program	Strengthen reliable access to digital systems used	Assess internet connectivity; improve bandwidth where feasible;	₱300,000	Barangay/LGU appropriations; applicable grants	Within 1 Year	Barangay Officials; ICT/technical personnel; Administrative Staff	Connectivity uptime; equipment inventory; maintenance	N/A	N/A

	for businesses services.	establish backup connectivity; upgrade computers, printers, scanners and networking devices; conduct preventive maintenance.		or partner assistance			nce completion; system downtime records		
Digital Business-Service Standardization Program	Standardize workflows and requirements for digital businesses-service transactions.	Map existing processes; develop standard operating procedures, digital forms, checklists, routing procedures, service instructions, and defined processing responsibilities.	₱100,000	Barangay operating funds; applicable LGU support	Within 6 Months	Barangay Secretary; Business-Service Personnel; Barangay Officials	Approved workflow/SOPs; percentage of services with standardized procedures; compliance monitoring	N/A	N/A

E-Government Personnel Capability Development Program	Improve personnel competence in operating and supporting e-government systems.	Conduct orientation, hands-on training, refresher sessions, troubleshooting workshops, digital records training, cybersecurity awareness, and client-assistance training.	₱150,000	Barangay/LGU training allocation; partner training support	Quarterly / Continuous	Barangay Officials; Administrative Personnel; ICT Trainers/Partners	Training completion rate; competency assessment; post-training evaluation; number of personnel trained	N/A	N/A
Accessibility and Citizen Assistance Program	Improve access to digital business services and assist users experiencing digital barriers.	Provide clear online/offline instructions; establish help/contact channels; provide transaction-status guidance; maintain an assistance desk; improve	₱100,000	Barangay operating funds; applicable LGU assistance	Within 6 Months / Continuous	Business-Service Personnel; Administrative Staff; Barangay Officials	User feedback; accessibility complaints; assistance records; satisfaction ratings; unresolved requests	N/A	N/A

		signage and user information.							
Data Privacy and Cybersecurity Strengthening Program	Protect business-service information and strengthen secure digital transactions.	Review access permissions; strengthen account/password practices; establish backup procedures; conduct privacy and cybersecurity orientations; maintain incident and access logs.	₱180,000	Barangay/LGU ICT allocation; applicable technical assistance	Within 1 Year	Barangay Officials; ICT/Technical Personnel; Records Personnel	Security checklist compliance; backup completion; access review reports; incident records; personnel awareness results	N/A	N/A
Digital Records and Information Management Program	Improve accuracy, reliability, organization, and retrieval of	Develop electronic filing and naming conventions; establish records-retention procedures	₱120,000	Barangay operating funds; applicable LGU support	Within 1 Year	Records Personnel; Barangay Secretary; Administrative Staff; ICT Support	Data accuracy rate; retrieval time; records completeness; backup verification	N/A	N/A

	business-service information.	es; conduct data quality checks; implement controlled digital storage and regular backups.					on reports		
Business-Service Monitoring and Feedback Program	Institutionalize performance monitoring and continuous improvement.	Track processing time, transaction volume, system downtime, incomplete submissions, complaints, response time, and user satisfaction; conduct quarterly review meetings.	₱80,000	Barangay operating funds	Monthly / Quarterly	Barangay Secretary; Business-Service Personnel; Monitoring Team	Performance dashboard/report; processing-time trends; complaint resolution rate; satisfaction results	N/A	N/A
Financial and Resource Sustainability	Ensure continuing resource	Prepare annual ICT and e-	₱50,000	Barangay planning and	Annual	Barangay Officials; Barangay Treasurer;	Annual resource plan; budget	N/A	N/A

ility Program	es for digital busines s- service operati ons.	governm ent resource requirem ents; prioritize maintena nce and connecti vity; identify possible LGU, governm ent, private- sector, and commun ity partnersh ips.		operati ng funds; LGU/p artner support		Planning/Ad ministrative Personnel	allocatio n; maintena nce funding; partners hip documen tation		
Organizat ional Coordin ation and Readines s Program	Improv e coordin ation and organiz ational readines s for digital busines s service s.	Define roles and responsi bilities; conduct regular coordin ation meetings ; identify process bottlenec ks; prepare continuit y procedur es for system outages;	₱75, 000	Barang ay operati ng funds; applica ble LGU support	Withi n 1 Year / Conti nuous	Barangay Officials; Barangay Secretary; Business- Service Personnel	Role matrix; coordin ation reports; continuit y plan; bottlenec k- resolutio n records	N/A	N/A

		establish escalatio n channels .							
Roadmap Institutionalization and Annual Review Program	Institutionalize and continuously update the Barangay E-Govern ment Roadmap.	Adopt the roadmap as a local planning reference ; conduct annual assessment; revise priorities based on performance data, user feedback , technology changes, and identified implementation gaps.	₱50, 000	Barang ay/LG U operati ng funds	Annu al	Barangay Officials; Barangay Secretary; Administrati ve/Planning Personnel	Roadma p adoption ; annual review report; updated action plan; impleme ntation rate	N/A	N/A

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