

Payment Systems and Collection Performance of Local Water Districts in the Province of Cotabato

Charlene B. Valdez

Graduate School, University of Southern Mindanao, Kabacan, Cotabato

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ABSTRACT

This study analyzed payment systems and collection performance of Local Water Districts in the Province of Cotabato from 2019 to 2025. Specifically, it described district profiles, assessed collection performance in terms of timeliness of payments, accuracy of collection, and operational efficiency, compared manual and electronic payment systems using available record-based indicators, and proposed strategies for improvement. A mixed-methods design was employed, primarily quantitative through descriptive and descriptive-comparative analysis, supported by Key Informant Interviews and organizational/technological challenge documents. Records were obtained from five of eight Local Water Districts that granted permission and submitted usable data. Findings showed that manual payment systems remained dominant and necessary because they were familiar, accessible, and allowed direct verification for customers with limited digital access. Electronic and intermediary based payment systems gradually expanded payment access and convenience, but adoption differed across districts. Total billing, total collection, and revenue increased, while timeliness slightly improved and operational efficiency remained high. However, the decline in accuracy of collection indicated that higher revenue volume did not automatically translate into stronger collection quality. Quarterly customer count data from LWD-A only, covering 2024 to 2025, showed a modest increase in electronic payment use and a corresponding decrease in manual payment use. Qualitative themes revealed challenges involving customer readiness, digital literacy, financial inclusion, delayed posting, reconciliation, transaction errors, platform reliability, staff workload, policy support, and data protection. The study concluded that an inclusive hybrid payment system, supported by customer education, staff training, system integration, faster posting, strong internal controls, and confidentiality safeguards, is most appropriate.

INTRODUCTION

Background of the Study

Public administration mainly focused on the efficient, accountable, and responsive delivery of basic services. Local Water Districts constituted part of the public service sector because they offered water supply services to support households, institutions, businesses, and communities. Their capability to maintain operations was mostly dependent on the effective collection of revenues. Therefore, the effectiveness of payment systems was not just a matter of finance but also a matter of administration, as collection procedures influenced the continuity of service, sustainability of the institution, and public trust.

Manual payment systems, especially counter cash payments, check payments, and office-based transactions, have traditionally been used by Local Water Districts. Such systems still play a major role as they are well-known to customers and allow an instant check of payment. On the other hand, manual systems have been linked to queuing, longer processing time, increased staff workload, delayed posting, and human errors. These drawbacks can potentially influence promptness of payments, accuracy of collections, and operational effectiveness.

As a result of the development of electronic payment systems, new possibilities for enhancing utility revenue collection were unveiled. Via online banking, mobile banking, e-wallets, payment centers, QR payments, and third-party payment channels, customers can be given the most convenient methods to fulfill their commitments.

On a national level, digital payments have been supported as a component of both financial inclusion and digital transformation. Bangko Sentral ng Pilipinas also pointed out that digital retail payments represented 57.4% of the total transaction volume in 2024, signaling greater public reliance on cash-lite transactions (Bangko Sentral ng Pilipinas, 2024).

Nonetheless, having access to electronic payment systems alone does not necessarily result in improved collection performance. Technology Acceptance Model posited that adoption hinged upon the two factors of perceived usefulness and perceived ease of use (Davis, 1989), while Innovation Diffusion Theory argued that relative advantage, compatibility, complexity, trialability, and observability all play a role in adoption (Rogers, 2003). For Local Water Districts, these theories implied that customers' acceptance of electronic payment systems would be higher if these systems were complementing their habits, in addition to being convenient, simple, and reliable. They further implied that the switch to digital systems would bring in benefits to the organizations only when the factors of infrastructure, personnel capability, internal processes, and management support are met sufficiently.

Local Water Districts in the Province of Cotabato, were providing services under varying levels of service conditions, customer bases, technological readiness, and institutional capacities. While some had already introduced electronic or intermediary-based payment systems, others were still heavily reliant on manual payment systems. Even though digital payments are being increasingly used, there is a lack of local evidence on how these payment systems correspond to actual collection performance, particularly when it comes to timeliness of payments, accuracy of collection, and operational efficiency. This research tackled that issue by looking at documented records and Key Informant Interview data from the participating Local Water Districts.

Objectives of the Study

The general objective of the study was to analyze the payment systems and collection performance of Local Water Districts in the Province of Cotabato. Specifically, the study aimed to:

1. Describe the business profile of Local Water Districts in the Province of Cotabato in terms of years in operation, years of adopting the Payment Systems, and the extent of customer adoption and usage of the available payment systems;
2. Assess the collection performance of Local Water Districts in terms of timeliness of payments, accuracy of collection, and operational efficiency;
3. Determine and compare the actual collection performance between the traditional manual payment systems and the electronic payment systems using available record-based indicators, and
4. Propose strategies and policy recommendations for improving the effectiveness of the Payment Systems and enhancing the overall collection performance of Local Water Districts.

Significance of the Study

The research played a crucial role to the Local Water Districts (LWDs) since it provided them with the documentary and the interview based evidences on how payment systems impact collection performance. The findings might serve managers to identify the pain points in the supply chain that covers billing, collection, posting, reconciliation, staff coordination as well as customer payment support.

Also, the research offered decision-makers, regulators, and LGUs a share of the information that can be the foundation of the policies on digital payment, public utility revenue management, data protection, and institutional modernization. The study might be translated by customers and concessionaires into higher payment accessibility, more payment options, and better service continuity. The paper may first of all be considered by researchers as a primary reference to the study of payment systems, public utility performance, and digital transformation in local government-related institutions.

Scope of the Study

The research examined Local Water Districts within the Province of Cotabato and their payment systems as well as collection performance. It centered on traditional manual payment systems and electronic payment systems in the context of three collection performance indicators: timeliness of payments, accuracy of collection, and operational efficiency.

On the qualitative side, interviews were conducted with the selected officials and staff who were directly involved in billing, collection, accounting, financial management, information technology, or payment-system administration. They responded to questions that gave insights into the organizational and technological challenges they encounter in the implementation and sustainability of payment systems.

Delimitations of the Study

Originally, the study aimed to include all eight Local Water Districts in the Province of Cotabato. However, only five Local Water Districts were included in the final analysis because they approved participation and submitted usable records aligned with the objectives of the study.

The other three Local Water Districts were excluded because the requested data were not released due to Data Privacy Act concerns, there was no formal management approval or feedback, or the submitted records were incomplete and could not be validly compared across the indicators.

For Objective 3, which determined and compared the actual collection performance between traditional manual payment systems and electronic payment systems using available record-based indicators, the comparative presentation was further delimited by the availability of payment system specific customer count data. Figure 6 were based only on one participating Local Water District in the Province of Cotabato because it was the only district that provided usable data on the number of paying customers classified under manual and electronic payment systems. Hence, the quarterly comparison was treated as a descriptive case indicator and was not generalized to all participating Local Water Districts.

The data for Figure 6 were presented using quarterly averages because water bills were commonly paid in the following month, which created a time lag between the billing month and the actual month of payment. Quarterly aggregation therefore provided a more appropriate and stable presentation than strict monthly comparison.

As an additional limitation, direct customer or concessionaire perspectives were not systematically captured. Thus, qualitative claims were confined to institutional and personnel-based experiences. Future studies may include customer level surveys or interviews to examine adoption, satisfaction, trust, and barriers from the concessionaires' perspective.

The study did not disclose the names of the participating Local Water Districts in the results and discussion. Rather, code labels were used to keep the confidentiality and protect the sensitive financial and operational data. The qualitative results, furthermore, were limited to the perspectives and experiences of selected key informants and thus did not represent all personnel, customers, or concessionaires of the Local Water Districts.

Operational Definition of Terms

The following terms were defined in order to have a better understanding of this study:

Accuracy of Collection referred to the extent to which payments were correctly recorded, posted, and reconciled in the billing and collection system. It was assessed using available records and interview data on posting errors, billing discrepancies, reconciliation issues, and related inconsistencies.

Collection Performance referred to the efficiency and effectiveness of revenue collection among the participating Local Water Districts. In this study, collection performance was determined using three dimensions: timeliness of payments, accuracy of collection, and operational efficiency.

Electronic Payment Systems referred to digital or technology-based payment systems that allowed customers to pay water bills electronically through online banking, mobile banking, electronic wallets, QR payments, payment centers with digital posting, or third-party payment platforms.

Local Water Districts (LWDs) referred to government-owned and controlled corporations mandated to provide water supply services within their respective service areas in the Province of Cotabato.

Operational Efficiency referred to the ability of the participating Local Water Districts to carry out collection activities in a timely and resource-efficient manner. It was assessed using available indicators such as collection efficiency, transaction processing, workload efficiency, and related documentary measures.

Organizational Challenges referred to institutional factors that affected the adoption, implementation, and sustainability of payment systems, including personnel capability, staff training, internal procedures, management support, budget limitations, and policy implementation.

Payment Systems referred to the methods, channels, and platforms used by the participating Local Water Districts to receive customer payments. These included traditional manual payment systems and electronic payment systems.

Revenue referred to the amount generated by the participating Local Water Districts from water sales and other related service charges, based on reported billing, collection, total revenue, and other relevant financial records.

Technological Challenges referred to technology-related constraints that affected payment systems, including system downtime, internet connectivity problems, delayed posting, poor system integration, limited technical support, and user accessibility issues.

Timeliness of Payments referred to the extent to which customer payments were made, remitted, and posted within expected billing cycles and due dates. It was assessed using available record-based indicators such as payment delays, timeliness of remittance, or proportion of payments posted on time.

Traditional Manual Payment Systems referred to conventional payment methods requiring physical transactions and direct human intervention, such as over-the-counter cash payments, check payments, and authorized collection points.

REVIEW OF RELATED LITERATURE

Payment systems played an essential role in helping public utilities become financially independent since the payments that their customers make are the major source of their operating funds. Moreover, in the case of the water sector, the effectiveness of an institution in securing payments has always been a main factor of its capability to hold the infrastructure, raise operating capital, and provide services without any interruptions. Recent articles written about public utilities have shown that revenue collection is not solely a financial operation; it is also a governance problem that involves, very much, efficiency, accountability, transparency, and continuous service (Velasco et al., 2020; Murrar et al., 2024).

While research on digital financial services has, inter alia, underlined that the multiplication of payment options could result in lower transaction costs, quicker availability of funds, more effective control, and higher resilience if accompanied by robust infrastructure and proper institutional set-up (Pazarbasioglu et al., 2020; Demirguc-Kunt et al., 2022). Payments systems therefore may be determining collection results by means of such attributes as ease of use, less walking, immediate payment confirmations, outstanding record-keeping, and better customer accessibility.

Traditional Manual Payment Systems

Traditional manual payment systems refer to those payment methods which mainly relied on physical transactions and personal interactions. They included over-the-counter cash payments, cheque payments, and payments through authorized collection points. These systems still existed in rural and semi-rural areas since

they were most compatible with customers' longstanding habits and, at the same time, allowed customers' direct interaction with the staff.

Manual payment systems, however, were often associated with delays in processing, overworked staff, customer queuing, delayed posting, risk of human error, and the like. Innovation Diffusion Theory (IDT) suggests that the use of manual payment modes was an indicator of compatibility with existing customer behavior, however, at the same time, it was a demonstration of the complexity and access barriers that might prevent or slow down the adoption of electronic payment systems (Rogers, 2003).

Electronic Payment Systems in Public Utilities

Electronic payment systems provide customers with ways to pay without physically going to the office. These systems include e-wallets, online banking, mobile banking, QR-code-based payments, payment centers, and third-party payment platforms. In public utilities, digital transformation may improve customer service, data management, monitoring, billing, and revenue collection when supported by organizational readiness, reliable infrastructure, and technical capacity (Daniel et al., 2023; Fery, 2022; Grigg, 2025; Sarni et al., 2023; World Bank, 2024).

The Technology Acceptance Model (TAM) provides an explanation of what influences customers to adopt or avoid electronic payments. Customers are more likely to use digital channels when they perceive the system as useful, easy to use, secure, and compatible with their needs (Davis, 1989). Studies on mobile and e-wallet adoption also identify perceived usefulness, ease of use, trust, security, facilitating conditions, compatibility, system reliability, and technological factors as important determinants of digital payment use (Al-Saedi et al., 2020; Alkadi & Abed, 2023; Belmonte et al., 2024; Karsen et al., 2019; Yang et al., 2021).

Collection Performance of Water Districts

Collection performance in water utilities generally related to the competence to collect billed revenues in an efficient and accurate manner. Murrar et al. (2024) highlighted that collecting receivables is a major factor in financial efficiency in the water sector. For this aspect, payment-related behaviors were analyzed in the area of timeliness of payments, accuracy of collections, and efficiency of operations.

Timeliness of payment was a function of how prompt the customer was in making the payment and the speed at which the payment was recorded or posted. Accuracy of collection related to whether the payments were correctly recorded, posted, and reconciled. Efficiency at the operational level was closely allied with the ability of the employees and the systems to handle the processing of a transaction with minimal delay and with the least possible use of resources. These aspects represent more than just the total collections alone since a high amount collected does not guarantee that the payments were done on time or that they were accurately processed.

Adoption of Digital Payments

Digital payment adoption has been rising globally and nationally. The Global Findex Database reported that digital payment use increased as financial services became more accessible during and after the COVID-19 period (Demirguc-Kunt et al., 2022). In the Philippines, the BSP Digital Payments Transformation Roadmap encouraged the transition toward safe, efficient, and inclusive digital payment ecosystems (Bangko Sentral ng Pilipinas, 2020). The 2024 e-payments measurement report further showed that 57.4% of total transaction volume was conducted through digital retail payments, reflecting the increasing use of cash-lite transactions in the country (Bangko Sentral ng Pilipinas, 2024). International mobile-money and digital-payment reports also show that electronic payments can support access and convenience when users have the necessary infrastructure, accounts, and confidence to transact (GSMA, 2024).

At the same time, digital adoption is not universal because customers differ in access, capability, trust, and financial readiness. Studies show that lack of smartphones, weak internet connection, absence of bank or verified e-wallet accounts, trust concerns, perceived risk, and user resistance can limit the adoption of digital payments (Balakrishnan & Shuib, 2021; Chand & Kumar, 2024; Migliore et al., 2022; Patil et al., 2020; Sahi et al., 2021).

These factors are important for Local Water Districts because electronic payment systems can be used only when customers have the capability and confidence to access them.

Hybrid Payment Systems and Inclusive Utility Collection

Recent digital payment literature recognizes that the shift from cash-only to digital payment does not require the immediate abandonment of traditional payment systems. In the public utility setting, a hybrid payment arrangement remains necessary because customers differ in financial access, digital literacy, internet connectivity, trust, and payment habits. In the Philippines, cashless transaction challenges and cash-digital coexistence remain relevant because customer access, affordability, and consumer preference continue to shape payment behavior (Glindro et al., 2023; Nair, 2016). Financial inclusion also requires digital access, consumer capability, and infrastructure support (Bangko Sentral ng Pilipinas, 2022). These perspectives justify the present study because electronic payment adoption was not a uniform experience among Local Water District customers.

Organizational Readiness, System Integration, and Change Management

Organizational readiness is one of the key determinants of the success and effectiveness of electronic payment systems. In the context of Local Water Districts, digital transformation does not only involve the adoption of new payment platforms but also requires adjustments in internal processes, personnel capability, data management, monitoring, customer support, and accountability mechanisms. Amankwaa et al. (2024) emphasized that digital transformation in public water utilities may generate operational value, but this value depends on organizational adaptation and the ability of the institution to redesign its processes. Similarly, Sausi et al. (2021) noted that revenue collection information systems require reliable procedures, user capability, and institutional support to function effectively.

The success of electronic payment systems may also be explained through the DeLone and McLean Information Systems Success Model. This model emphasized that system quality, information quality, and service quality influence user satisfaction, system use, and net benefits (DeLone & McLean, 2003). In the context of Local Water Districts, this means that electronic payment systems can improve collection performance in terms of timeliness of payments, accuracy of collection, and operational efficiency only when the payment platform is reliable, payment information is accurate, posting and reconciliation are timely, and technical support is available. Thus, delayed posting, system downtime, incorrect payment details, and manual verification may reduce the expected benefits of electronic payment systems even when customers are willing to use them.

Digital Payment Adoption and Customer Behavior

Studies show that electronic payment adoption is influenced by perceived capability, usefulness, security, ease of use, trust, and available support. Oney et al. (2017) and de Luna et al. (2019) found that consumer perception and payment technology type affect adoption. Chaveesuk et al. (2021) showed that behavioral intention and actual use of digital payments are influenced by perceived risk, facilitating conditions, and attitude. Studies on younger users and e-wallet adoption also emphasize the role of trust, facilitating conditions, and perceived usefulness in sustaining mobile payment use (Lian & Li, 2021; Lin et al., 2022; Thi et al., 2024; Wei et al., 2021). In the Philippine context, Acopiado et al. (2022) found that digital payment adoption during the COVID-19 pandemic was influenced by access to digital resources and the need for business continuity. These studies support the present study's emphasis on customer readiness, internet access, trust, and familiarity with digital payment platforms.

Theoretical Framework/Lens

This study used two theoretical models namely the Technology Acceptance Model and Innovation Diffusion Theory. The first one is a framework for understanding the technology acceptance psychologically and stated that technological changes, specifically computers and computer applications will be accepted if two failure points can be overcome; the first is whether the technology is regarded as useful to bring about a better performance and the second whether the use of technology is regarded as free of effort (Davis, 1989). In this paper, convenience, shorter time of transaction, lesser need for traveling, and higher number of payment options

reflected perceived usefulness whereas whether customers would have a smooth and easy navigation of e-wallets, online portals, and payment instructions, reflected perceived ease of use.

On the other hand, Innovation Diffusion Theory refers to the process by which an innovation, a new idea or behavior is communicated through certain channels over time among the members of a social system. Digital payment systems in this study were conceived to move from one organization to another and also across customer groups through the processes known as relative advantage, compatibility, complexity, trialability, and observability (Rogers, 2003). Relative advantage was characterized in this case as greater convenience and wider availability of payment access; compatibility was the degree to which payment systems fit customer habits; complexity referred to digital literacy deficiencies and transaction fatigue; and observability was the customers' confidence after the confirmation and posting of successful transactions.

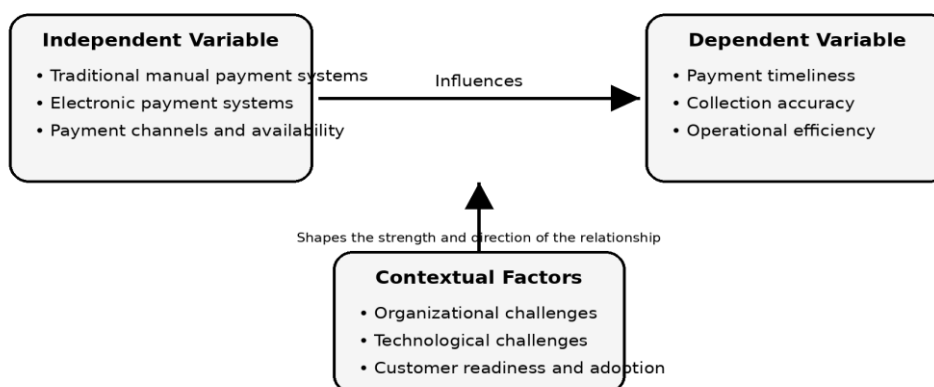
Conceptual Framework

In this study, payment systems were taken as the independent variable while collection performance was the dependent variable. Payment systems comprised manual traditional payment systems and electronic payment systems. Timeliness of payments, collection accuracy, and operational efficiency were the measures of collection performance.

Organizational and technological challenges were treated in two related but distinct ways. First, some were contextual conditions, such as infrastructure, regulatory environment, internet availability, and customer access to digital resources, which shaped the setting in which payment systems operated. Second, some were mechanism or mediating factors, such as reconciliation workflows, posting procedures, staff skills, internal controls, and customer assistance, which directly influenced how payment systems translated into collection performance. This distinction clarified that payment systems did not affect timeliness, accuracy, and operational efficiency automatically; their effects depended on the organizational and technological mechanisms that supported implementation.

The framework assumed that electronic payment systems could improve collection performance when customers perceived them as useful and easy to use, when the innovation was compatible with customer and institutional routines, and when supporting mechanisms such as reliable posting, reconciliation, staff capacity, and internal controls were functioning effectively.

Conceptual Framework of the Study



Evidence sources: documentary records (2019-2025) + key informant interviews

Figure 1. Conceptual framework showing the relationship between payment systems, collection performance, and organizational and technological challenges.

METHODOLOGY

This chapter presents the research methods and procedures used in the study entitled Payment Systems and Collection Performance of Local Water Districts in the Province of Cotabato. It discusses the research design, locale, respondents, sampling method, research instruments, role of the researcher, data gathering procedure, data analysis procedure, trustworthiness, and ethical considerations. The study relied mainly on secondary records and documentary data from the participating Local Water Districts, while qualitative data were gathered through Key Informant Interviews to explain the organizational and technological conditions affecting the implementation of traditional manual and electronic payment systems.

Research Design

The study employed a mixed-methods research design that was primarily quantitative in orientation, using descriptive and descriptive-comparative procedures supported by qualitative inquiry. The descriptive component was used to describe the profile of the participating Local Water Districts, the status of payment systems, and the collection performance indicators. The descriptive-comparative component was used only to compare available record-based indicators for manual and electronic payment systems; it was not intended to establish causal, quasi-experimental, inferential, or customer level effects.

The qualitative aspect was aimed at giving a deeper understanding of the organizational and technological hurdles faced by payment system implementation. It comprised of key informant interviews and challenge documents sourced from personnel who were directly exposed to billing, collection, accounting, financial management, information technology, or payment system administration. This design was suitable since the study needed not only solid documentary evidence but also insights from the personnel who are directly involved in the payment related processes.

Locale of the study

The research was carried out with the Local Water Districts in the Province of Cotabato. The province was an appropriate place for the study as its water districts were functioning under different service sizes, customer bases, technological capacities, and payment system conditions. Despite the fact that there were eight Local Water Districts in the province, only five made it to the final analysis as they gave their consent to participate and also managed to provide usable data.

Respondents of the Study

The quantitative component used documentary and secondary records from the participating Local Water Districts. These included business profiles, active service connection data, billing and collection records, total revenue records, collection efficiency indicators, collection ratios, and payment-system-specific collection data from 2019 to 2025, subject to availability and completeness.

The qualitative component involved key informants who were officials or staff directly involved in billing, collection, accounting, financial management, information technology, or payment-system administration. The key informants provided information on payment systems, customer adoption, organizational challenges, technological challenges, and recommended improvements.

A total of fourteen (14) key informants from the five participating Local Water Districts provided interview responses. The key informants represented functional areas related to billing, collection, accounting, cashiering, customer service, finance, information technology, and payment-system administration. The distribution of key informants was considered sufficient for the qualitative component because their responses came from personnel directly or moderately involved in payment-related processes across the participating institutions.

Sampling Method

The study originally intended to use total enumeration with respect to the eight Local Water Districts in the Province of Cotabato. Still, only five Local Water Districts that agreed to participate and whose records were usable became the basis for the final quantitative analysis. Three Local Water Districts were not considered

because of their concerns under the Data Privacy Act, absence of formal management approval or response, or uncompleted and non-comparable data.

Purposive sampling was applied for the qualitative part. Key informants were chosen for the reason that they had factual knowledge of implementation of payment systems and related collection processes.

Enough interviews were conducted until the point of thematic sufficiency. In other words, the last interviews kept highlighting the very same major issues, e.g., customer familiarity, delayed posting, system downtime, manual reconciliation, wrong payment details, budget constraints, and the need for customer information drives. The emergence of a new major theme that would alter the thematic structure of qualitative findings did not occur.

Research Instrument

Two main tools were used in the research. The first instrument consisted of documentary and secondary data which were collected from the Local Water Districts covered by the study. The second was the semi-structured Key Informant Interview Guide that discussed different payment systems, collection performance, organizational challenges, technological challenges, customer adoption, and recommendations. Role of the Researcher

The researcher mainly focused on creating the research instruments, contacting the Local Water Districts, getting permission for using the relevant records, conducting the Key Informant Interviews, sorting out the obtained data, and analyzing the results that correspond to the study goals.

In the quantitative component, the researcher checked whether the documentary records were exhaustive, coherent, and suitable for the analysis. In the qualitative component, the researcher employed the approved interview guide to obtain the informed consents and conduct the interviews of the key informants who met the eligibility criteria. The researcher also maintained neutrality by solely reporting the findings from the records and responses and by refraining from making assertions in areas where the records were incomplete or non-comparable.

Data Gathering Procedure

Before commencing the data gathering, the researcher first secured the necessary approvals and ethical clearance. In order to request access to the relevant records and permission to conduct the Key Informant Interviews, formal letters of request were sent to the management of the Local Water Districts.

After permission was granted, the researcher collected documentary records covering the years 2019 to 2025, such as business profiles, service connection data, billing, collection, revenue records, payment-system-specific records, and the number of paying customers by payment system when available. Thereafter, the researcher conducted Key Informant Interviews with selected officials and staff. The study objective was disclosed before each interview, informed consent was obtained, and the participants were reminded of the voluntary nature of the research.

Following the data collection, the researcher merged, verified, coded, and organized both quantitative and qualitative data. For confidentiality reasons and to safeguard sensitive financial information, the names of the participating Local Water Districts were replaced with coded labels.

Data Analysis Procedure

The analysis was aligned with the research objectives. The following table summarizes the connection between the objectives, data sources, and analytical procedures used in the study.

Matrix 1 Alignment of objectives, data sources, and data analysis procedures

Objective	Data Source	Data Analysis Used
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Describe the profile of Local Water Districts	Business profiles, service connections, payment system records	Frequency, percentage, tabular presentation, and descriptive analysis
Assess collection performance	Billing records, collection records, operational efficiency, accuracy of collection, timeliness of payments indicators, total revenue	Totals, averages, percentage change, trend analysis, and descriptive interpretation
Determine and compare the actual collection performance between the traditional manual payment systems and the electronic payment systems using available record-based indicators	Available payment system specific collection records and quarterly customer count data by manual and electronic payment systems from one participating Local Water District	Descriptive-comparative analysis of available indicators; quarterly averages and line graph for the one district with usable customer count data; interpreted as record based and descriptive only, not causal or province wide
Propose strategies and policy recommendations	Integrated quantitative findings and Key Informant Interview responses	Braun and Clarke thematic analysis and recommendation matrix

Note. The analysis followed the mixed-method design and was limited to available and usable data submitted by the participating Local Water Districts.

Quantitative data were encoded, organized, and computed using Microsoft Excel. Descriptive statistics were used to analyze the profile, payment systems, total billing, total collection, total revenue, average timeliness of payments, operational efficiency, accuracy of collection, and the quarterly distribution of paying customers by manual and electronic payment systems when available. Frequency, percentage, totals, means, quarterly averages, and percentage change were computed depending on the nature of the indicator. Percentage change was computed by subtracting the earlier value from the later value, dividing the difference by the earlier value, and multiplying the result by 100. Comparative tabular analysis and graphical presentation was used only for available payment channel records. All quantitative findings were interpreted at the institutional and record based level, not at the individual customer level.

Accuracy of Collection referred to the extent to which payments were correctly recorded, posted, and reconciled in the billing and collection system. It was assessed using available records and interview data on posting errors, billing discrepancies, reconciliation issues, and related inconsistencies.

Following Braun and Clarke's methodological framework for thematic analysis, the researcher (1) read the interview responses and challenge documents several times to become familiar with the content, (2) prepared initial semantic codes using both deductive and inductive approaches, (3) identified themes by grouping related codes, (4) reviewed the themes for internal coherence and fit with the data, (5) defined and named the final themes, and (6) developed the analytical narrative (Braun & Clarke, 2006, 2021). The coding process was completed manually using coding matrices. Trustworthiness was strengthened through cross-checking of documentary records and interview responses, adviser consultation, and careful review of the actual data supporting each theme.

Trustworthiness

Trustworthiness was backed by the triangulation of documentary records, institutional data, and key informant responses. Credibility was further enhanced by using actual records and direct responses from the personnel involved in payment-related processes. The reliability of the study was supported by clearly documenting the sources, coding choices, and calculations in the tables. Then again, confirmability was ensured mainly by basing the results on documentary and interview data rather than on personal biases.

Detailed explanations of the research setting, data limitations, and coding procedures were given to support transferability. Besides, the thematic coherence was tested through adviser consultation and peer debriefing, and it was also checked if the interpretation was in line with the data.

Ethical Considerations

Ethical standards concerning human participants and the use of institutional records were observed throughout the study. Before data gathering, the researcher secured Ethical and Biosafety Clearance from the University of Southern Mindanao Research Ethics Committee and obtained written permission from the participating Local Water Districts. The study involved documentary review and Key Informant Interviews only; it did not involve biological samples, clinical procedures, physical intervention, hazardous substances, or laboratory work.

The Informed Consent Form was presented and explained to each eligible participant before the interview. Participants were informed of the purpose of the study, the expected duration of participation, the voluntary nature of the interview, their right to decline any question, and their right to withdraw at any time without penalty or effect on their employment, position, performance evaluation, or relationship with their office. Participation proceeded only after voluntary consent was obtained.

The eligibility criteria followed the approved Informed Consent Form. Participants had to be eighteen (18) years old and above, literate, capable of understanding the consent form, directly involved in billing, collection, accounting, financial management, information technology, or payment-system administration, and willing to participate voluntarily. Individuals below eighteen (18) years old, unable to understand the consent form, not directly involved in the relevant processes, or unwilling to participate were excluded from the study.

The potential risks were minimal but not ignored. As stated in the approved Informed Consent Form, participants could experience minor discomfort when discussing internal payment processes, operational difficulties, or institutional performance. There was also a minimal social or professional risk if critical statements were associated with a participant or office, as well as a minimal data privacy risk if records or responses were not handled properly. These risks were mitigated by conducting interviews in a respectful and non-threatening manner, allowing participants to refuse or stop answering questions, and protecting responses through coding, anonymized reporting, and secure data handling consistent with Republic Act No. 10173 (2012).

Confidentiality and data protection were strictly observed. The names of the participating Local Water Districts were coded as LWD-A to LWD-E, and individual names or directly identifying information were not disclosed in the manuscript. Financial and operational records were used only for research purposes and were kept securely. Digital files were stored in password-protected folders, hard-copy documents were kept in a secure location, and access to research data was limited to the researcher and adviser. Consent forms were kept separately from interview responses. Audio recordings, if used with permission, were used only for transcription and verification and were deleted after transcription checking and completion of the study, subject to institutional data-retention requirements.

The exclusion of three Local Water Districts was also reported transparently because their records were not released due to privacy concerns, lacked formal management approval or feedback, or were incomplete and non-comparable. This disclosure was made to preserve the integrity of the research scope and to avoid overstating the representativeness of the findings.

The study also acknowledged the possibility of potential bias in the qualitative findings because the key informants were internal personnel of the participating Local Water Districts. Their responses may have been influenced by organizational loyalty, familiarity with internal practices, concern for institutional image, or hesitation to disclose weaknesses in payment-related processes. To minimize this limitation, the researcher used neutral and non-leading questions, assured confidentiality, avoided naming individual personnel, and interpreted the interview findings together with the documentary records. Thus, the qualitative findings were treated as internal personnel perspectives and not as independent customer-level or external assessments.

The study did not receive external funding. Expenses related to printing, communication, transportation, and data gathering were shouldered by the researcher. The ethics clearance approval number and date should be reflected in the final bound copy based on the issued Ethical and Biosafety Clearance certificate attached in the appendices.

RESULTS AND DISCUSSION

This chapter presents the results and discussion of the study in the sequence of the research objectives and the tables and figures retained for the final manuscript. The discussion begins with the profile of the participating Local Water Districts, followed by the collection performance indicators, the descriptive comparison of manual and electronic payment systems, the essential themes from Key Informant Interviews and organizational and technological challenge documents, and the integrated strategies and policy recommendations. Only the tables and figures aligned with the final analytical basis were retained in this chapter.

Although the study originally considered the eight Local Water Districts in the Province of Cotabato, only five were included in the final analysis because they approved participation and submitted usable records. The other districts were not included because their data were not released due to privacy concerns, lacked formal management approval, or were incomplete and non-comparable. To protect institutional confidentiality, the participating districts were coded as LWD-A to LWD-E throughout the discussion.

Profile of the Participating Local Water Districts

The first objective described the payment-system profile of the participating Local Water Districts based on available records. Table 1 shows that all participating districts maintained manual or office-based payment channels, while electronic and intermediary-based payment options were adopted at different levels of maturity. This finding indicates that payment modernization was already occurring, but it was uneven across the districts. The continued use of manual channels also shows that traditional collection remained important for customers who preferred cash-based payment, direct verification, and face-to-face assistance.

The pattern supports the Technology Acceptance Model because customers are more likely to adopt electronic payment systems when they perceive them as useful and easy to use (Davis, 1989). It also supports Innovation Diffusion Theory, which explains that innovations spread gradually depending on relative advantage, compatibility, complexity, trialability, and observability (Rogers, 2003). In the context of Local Water Districts, electronic payment channels may provide convenience and wider access, but manual payment systems remain compatible with the habits, confidence, and access conditions of many concessionaires.

Table 1 Profile of participating Local Water Districts based on available records

Code	Coverage in Source	Main Payment Systems Reflected in Records and Manual/Office-Based Collections Reflected	Electronic/ Intermediary Collections Reflected	Status of EPS Adoption and Key Pattern Observed
LWD-A	2019-2025	Manual/office-based and collection intermediaries; Not fully separated from office collection in the available records	Intermediaries increased from ₱32,993.27 in 2019 to ₱17,354,310.78 in 2025	Adopted multiple intermediary-based options; Strong growth in collection intermediaries; multiple channels expanded payment access
LWD-B	2019-2025	Office collection, collecting agents, and online payment portals; Office collection increased from	Online LinkBiz payment was recorded from 2019 to 2023; collecting agents also contributed	Adopted online and third-party payment options; Office collection remained dominant, but agents and online

		₱56,195,985.20 in 2019 to ₱79,726,662.91 in 2023		payments supported access
LWD-C	2019-2025	Cash collection and online payment channels; Cash collection was reported as a main channel	Online payment channels were identified, but complete annual channel- level data were limited	Adopted online payment options; Payment systems existed, but not all annual channel-level data were comparable
LWD-D	2019-2025	Over-the-counter collection and e-wallet payment; Cash/over-the- counter collection increased from ₱6,918,757.37 in 2019 to ₱15,699,794.32 in 2025	Electronic payment appeared in 2024 at ₱464,444.39 and increased to ₱1,026,407.78 in 2025	Adopted e-wallet payment in the later years covered; Electronic adoption was recent but increasing
LWD-E	2019-2025	Cash/over-the-counter payment and e-wallet payment; Cash/over-the- counter collection increased from ₱1,551,973.99 in 2019 to ₱2,737,144.88 in 2025	E-wallet collection appeared in 2024 at ₱1,805.50 and increased to ₱120,251.54 in 2025	Adopted e-wallet payment in the later years covered; Electronic adoption was recent and still limited

*District names were coded to protect institutional confidentiality and sensitive financial data

Collection Performance of the Participating Local Water Districts

The second objective assessed collection performance using record-based indicators. The analysis focused on total billing, total collection, collection growth, timeliness of payments, operational efficiency, and accuracy of collection. Collection growth was computed using the formula: $\text{Collection growth} = \frac{(\text{Collection in 2025} - \text{Collection in 2019})}{\text{Collection in 2019}} \times 100$. Because collection performance is multidimensional, the findings were interpreted not only according to total amounts collected but also according to payment timeliness, operational efficiency, and collection accuracy.

Figure 2 shows that LWD-B recorded the highest seven-year total billing and total collection, indicating the largest revenue volume among the participating districts. LWD-A followed in total billing, while LWD-C had a lower but still substantial collection base. LWD-D recorded the highest collection growth at 127.39%, suggesting rapid expansion in collection volume from 2019 to 2025 despite a smaller overall revenue base. LWD-E had the smallest total billing and collection, which was consistent with its smaller scale of operation.

These results indicate that collection performance should not be measured by total collection alone. A district with a large revenue base may not necessarily have the strongest performance in all indicators, while a smaller district may show strong growth or better timeliness. This interpretation is consistent with water-sector studies that emphasize revenue collection, receivables management, and operational processes as important components of financial efficiency and service sustainability (Murrar et al., 2024; Velasco et al., 2020).

Summary of Collection Performance by Participating Local Water District, 2019-2025

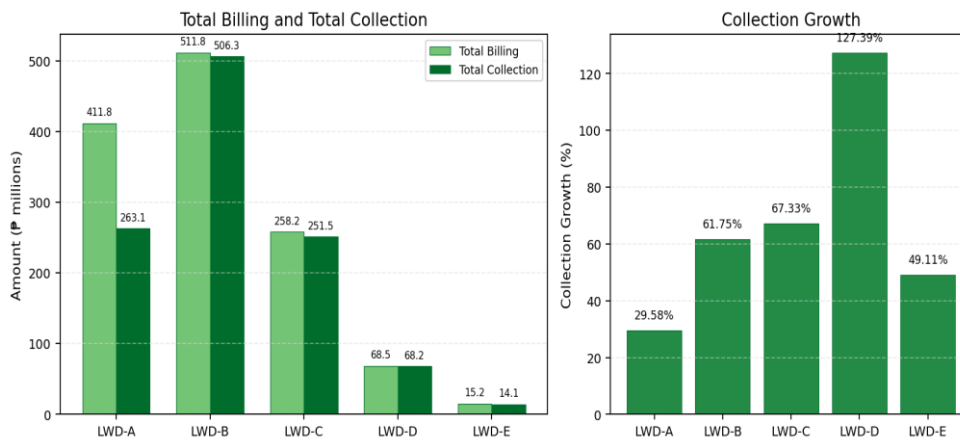


Figure 2. Bar graph of summary of collection performance by participating Local Water District, 2019-2025

Figure 3 shows that LWD-E recorded the highest average timeliness of payments at 86.20%, followed by LWD-B at 71.71%. LWD-C recorded the lowest average timeliness at 59.20%, while LWD-D and LWD-A had averages of 61.37% and 63.31%, respectively. This variation suggests that timely payment was shaped not only by the availability of payment channels but also by customer readiness, financial capacity, access to digital resources, and the efficiency of posting and reconciliation procedures.

The finding is consistent with digital financial services literature, which explains that payment convenience may improve transaction access, but actual use depends on connectivity, user capability, trust, and facilitating conditions (Demirguc-Kunt et al., 2022; Pazarbasioglu et al., 2020; Venkatesh et al., 2003). Therefore, electronic payment options may support timeliness, but their effect is limited when customers lack access to internet service, verified e-wallets, bank accounts, or sufficient confidence in digital transactions.

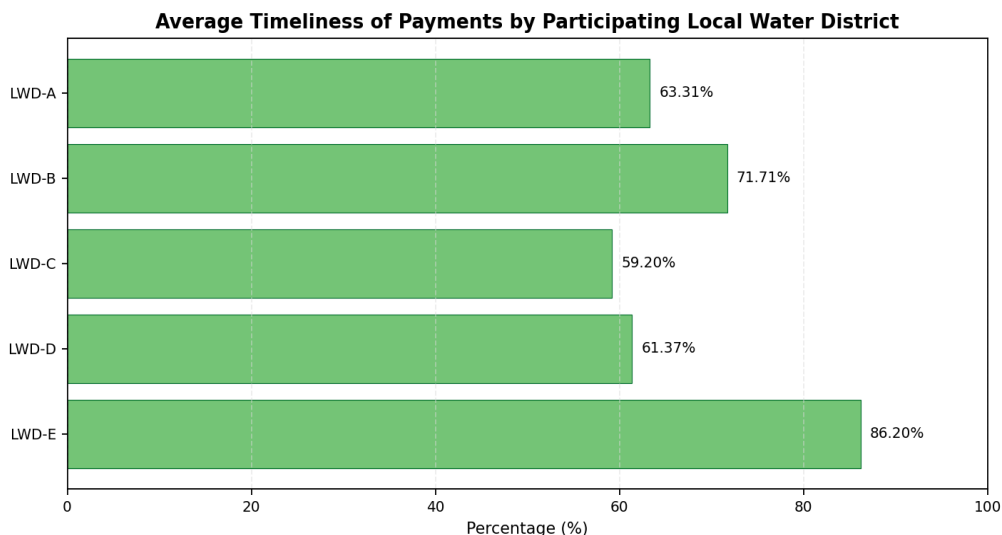


Figure 3. Bar graph of average timeliness of payments by participating Local Water District

Figure 4 shows that operational efficiency was generally high across the participating Local Water Districts. LWD-D posted the highest average operational efficiency at 97.91%, followed closely by LWD-A at 97.19%, LWD-B at 97.14%, and LWD-E at 96.01%. LWD-C recorded the lowest average operational efficiency at 91.73%, although this level still indicated generally strong operational performance. These results show that the participating districts were able to sustain collection operations despite differences in system maturity and district size.

However, high operational efficiency should be interpreted with attention to workload distribution. Electronic payment systems can reduce walk-in transactions and improve processing speed, but these gains may be reduced when staff still manually verify reference numbers, reconcile bank reports, or handle unposted transactions. This interpretation supports the information systems success perspective, which emphasizes that system quality, information quality, and service quality influence user satisfaction, system use, and organizational benefits (DeLone & McLean, 2003). It is also aligned with Sausi et al. (2021), who noted that revenue collection systems require reliable procedures and institutional support.

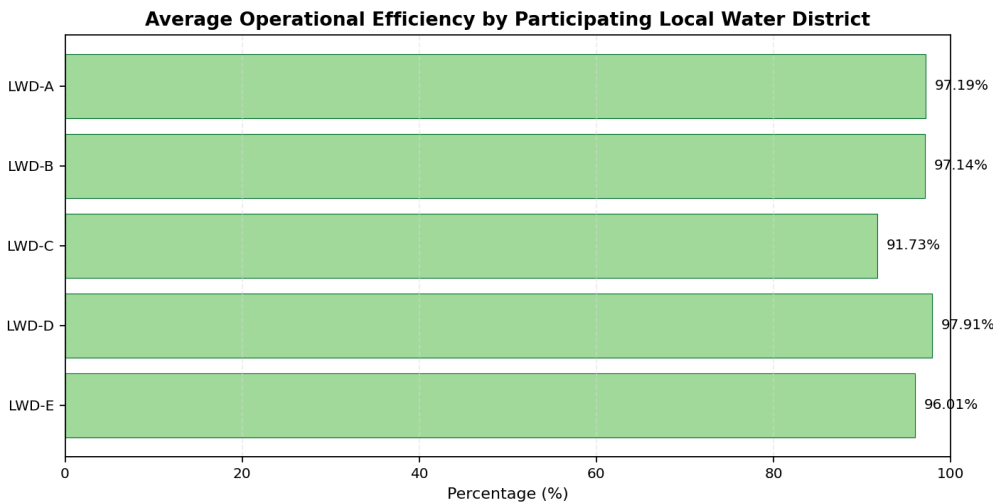


Figure 4. Bar graph of average operational efficiency by participating Local Water District

Figure 5 shows that LWD-A recorded the highest average accuracy of collection at 94.43%, followed closely by LWD-B at 94.14%. LWD-D recorded 88.30%, LWD-C recorded 82.29%, and LWD-E recorded the lowest average accuracy at 68.07%. The differences across districts show that accuracy of collection depended on more than the existence of payment channels. It also depended on the correctness of customer-entered payment details, the availability of proof of payment, the speed of posting, reconciliation procedures, and internal controls.

This finding supports studies on digital payment challenges showing that electronic transactions may encounter technical, operational, and user-related errors when systems are not fully integrated or when customers enter incomplete or incorrect information (Khando et al., 2022). It also supports the need for stronger internal controls, validation procedures, and data reconciliation in public utility collection systems (Murrar et al., 2024; Sausi et al., 2021).

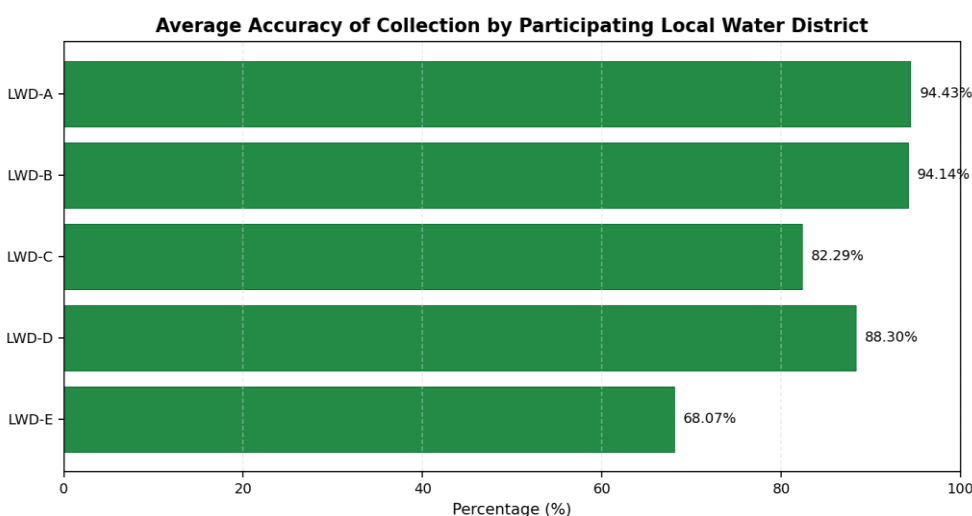


Figure 5. Bar graph of average accuracy of collection by participating Local Water District

Average Quarterly Distribution of Paying Customers by Manual and Electronic Payment Systems

Figure 6 presents the average quarterly distribution of paying customers by manual and electronic payment systems. This record was based on LWD-A only because it was the participating Local Water District that provided usable customer-count records classified by payment system. The data were drawn from 2024 to 2025 and were aggregated as quarterly averages. Therefore, the figure should be interpreted as a descriptive record-based indicator for LWD-A and not as a province-wide or customer-level finding for all Local Water Districts in the Province of Cotabato.

The line graph shows that manual payment remained dominant in all quarters, while electronic payment increased gradually. Electronic payment rose from 22.68% in the first quarter of 2024 to 25.35% in the fourth quarter of 2025. In contrast, manual payment decreased from 77.32% to 74.65% during the same period. The 0.2 scale interval was used in each panel to make the quarterly increases and decreases more visible without implying a province-wide effect.

This trend suggests a modest but observable shift toward electronic payment use among LWD-A paying customers. From the perspective of the Technology Acceptance Model, customers may have begun using electronic channels because of perceived usefulness, such as convenience, reduced travel, and access outside the office (Davis, 1989). However, the continued dominance of manual payment indicates that perceived ease of use and facilitating conditions remained uneven. The result also supports Innovation Diffusion Theory because electronic payment adoption appeared gradual rather than immediate, with manual payment continuing to reflect compatibility with established customer habits (Rogers, 2003).

The pattern is also consistent with the literature on financial inclusion and payment digitalization, which emphasizes that cash and digital payments may coexist when customers differ in digital access, trust, affordability, and capability (Bangko Sentral ng Pilipinas, 2022; Demirguc-Kunt et al., 2022; Glindro et al., 2023). Thus, the result supports an inclusive hybrid payment arrangement rather than an abrupt shift to digital only collection.

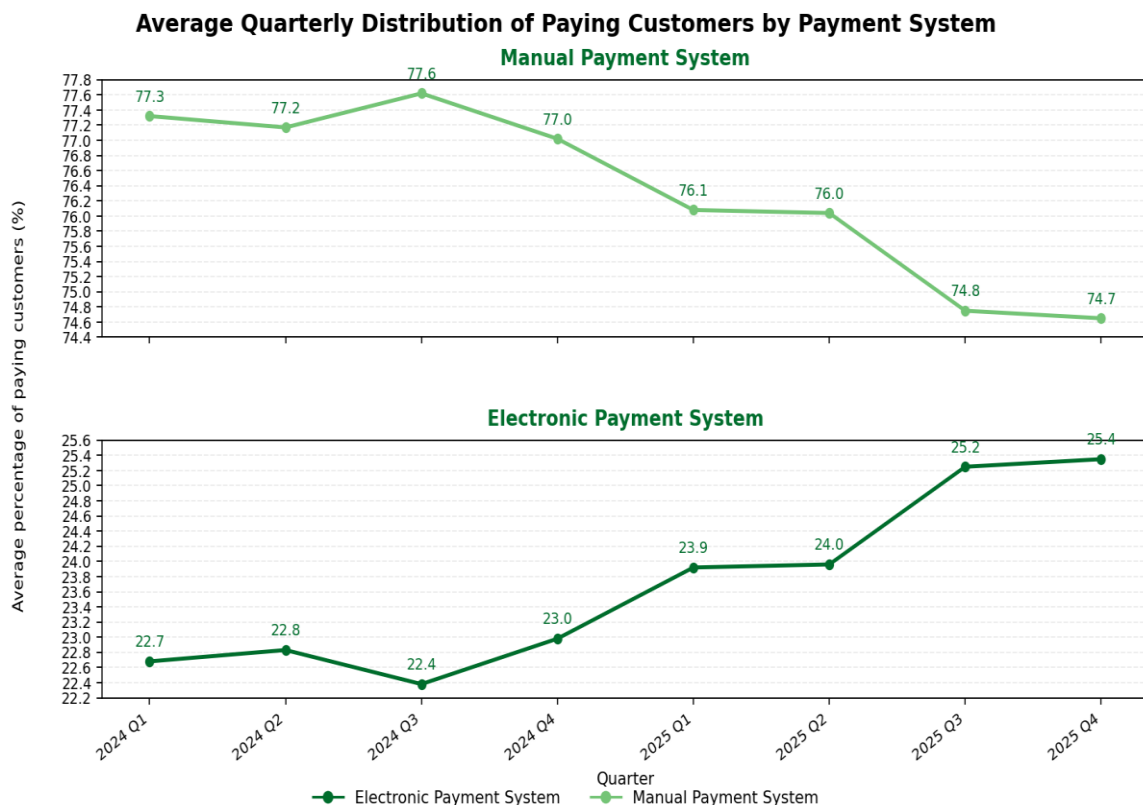


Figure 6. Line graph of average quarterly distribution of paying customers by payment system based on LWD-A records, 2024-2025

Organizational and Technological Challenges

The fourth objective identified organizational and technological challenges affecting the implementation and sustainability of payment systems. Table 2 presents the essential themes generated from Key Informant Interviews and organizational and technological challenge documents. The analysis followed the personnel coding scheme used in the appendices. To protect confidentiality, responses were cited using coded sources such as LWD-A-1, LWD-D-1, or LWD-C-DOC, with n.d. used because the interview and challenge-document responses were unpublished research data.

The first theme was customer readiness, familiarity, and digital literacy. Several responses indicated that customers continued to rely on over-the-counter payment because it was familiar and easier to verify. One challenge document stated, "Not all customers are comfortable using online payment options, so many still opt to pay over the counter" (LWD-C-DOC, n.d.). Another response emphasized that older concessionaires were affected by a "digital literacy gap" and found online portal navigation intimidating (LWD-A-DOC, n.d.). These responses show that electronic payment adoption was not determined by system availability alone; it was also shaped by customer confidence, familiarity, and perceived ease of use.

The second theme was limited access to digital resources and financial inclusion barriers. Some customers lacked stable internet connection, smartphones, bank accounts, or verified e-wallets. One source noted that "not every household owns a smartphone or has a reliable data connection" (LWD-A-DOC, n.d.), while key informants referred to "financial constraints" as a continuing barrier to payment timeliness (LWD-E-1, n.d.; LWD-E-2, n.d.). These responses support the need to protect customers who remain unbanked or digitally excluded.

The third theme was delayed posting, reconciliation, and non-real-time updates. A document source reported that when customers paid through GCash, the main problem was the delay between customer confirmation and the billing-system update (LWD-A-DOC, n.d.). Another source noted "delays in posting and reconciliation of online payments, especially during due dates" (LWD-C-DOC, n.d.). These responses indicate that electronic payments improved access but did not automatically improve collection accuracy when posting and reconciliation remained partly manual.

The fourth theme was transaction errors and proof-of-payment issues. One document source stated that some customers entered incorrect details, which resulted in complaints about non-posting of payments (LWD-C-DOC, n.d.). Another reported that missing proof of payment made verification difficult when customers claimed that they had already paid through intermediaries (LWD-C-DOC, n.d.). These findings show that collection accuracy depended on customer input, proof-of-payment protocols, and validation procedures.

The fifth theme was system reliability and dependence on third-party platforms. One source stated that reliance on Landbank and GCash meant that the district depended on the uptime of external platforms (LWD-A-DOC, n.d.). Another source reported that downtime of collection intermediaries occurred because of system maintenance or updates (LWD-C-DOC, n.d.). These responses indicate that electronic payment systems introduced external dependencies that could affect timeliness, customer satisfaction, and staff workload.

The sixth theme was operational efficiency and workload redistribution. A key informant explained that electronic payments resulted in "no more wasted calls to customer who already paid" (LWD-E-2, n.d.). Another stated that the current payment systems were helpful because cash collections were no longer in bulk, making them easier to manage (LWD-A-3, n.d.). These responses show that electronic payments may reduce front-office workload, but the benefit is weakened when personnel still have to manually check reference numbers and reconcile reports.

The seventh theme was organizational capacity, policy support, and data protection/accountability. One document source noted that expanded payment channels required continuous capacity building, staff training, and internal process adjustments (LWD-D-DOC, n.d.). A key informant further recommended that the district improve system stability and ensure faster technical support to address errors and required adjustments (LWD-D-1, n.d.). These findings show that payment-system modernization is also an administrative and accountability concern because it involves financial records, audit trails, customer data, and data privacy safeguards.

Table 2 Essential themes, core ideas, and interpretation from Key Informant Interviews and organizational/technological challenges data

Essential Themes	Core Ideas	Interpretation
Customer readiness, familiarity, and digital literacy	Customers continued to prefer over-the-counter payment when they were more familiar with face-to-face transactions; some concessionaires lacked confidence in using online portals; customer orientation remained necessary.	Adoption of electronic payment systems was shaped by customer confidence, familiarity, perceived usefulness, and perceived ease of use (Davis, 1989; Venkatesh et al., 2003; Al-Saedi et al., 2020).
Limited access to digital resources and financial inclusion barriers	Some customers lacked stable internet connection, smartphones, bank accounts, or verified e-wallets; financial constraints affected payment timeliness; electronic channels remained inaccessible to some customers.	Uneven digital access limited electronic payment adoption and supports the need for an inclusive hybrid payment arrangement (Bangko Sentral ng Pilipinas, 2022; Demirguc-Kunt et al., 2022).
Delayed posting, reconciliation, and non-real-time updates	Electronic payments were sometimes confirmed by customers before they were reflected in the billing system; staff still manually checked reference numbers and bank statements; delayed posting created penalty adjustments, complaints, and reconciliation concerns.	Electronic payment systems improved access but did not automatically ensure collection accuracy without reliable posting, reconciliation, and system quality (DeLone & McLean, 2003; Sausi et al., 2021).
Transaction errors and proof-of-payment issues	Some customers entered wrong account numbers, names, amounts, or reference details; missing proof of payment made verification difficult; erroneous transactions caused complaints and non-posting concerns.	Collection accuracy depended on customer input, proof of payment, validation procedures, and operational controls (Khando et al., 2022).
System reliability and dependence on third-party platforms	The Local Water Districts depended on banks, e-wallet providers, portals, and collection intermediaries; downtime and system maintenance interrupted posting and customer service; front-line staff handled customer complaints during system interruptions.	Dependence on third-party platforms created risks related to downtime, service continuity, and customer assistance (Daniel et al., 2023; Sarni et al., 2023).
Operational efficiency and workload redistribution	Electronic payments reduced some office transactions and unnecessary customer follow-up; automation improved transaction speed; however, manual verification and reconciliation still shifted work to staff when systems were not fully integrated.	Electronic payment systems improved operational efficiency when supported by process redesign and organizational adaptation (Amankwaa et al., 2024).
Organizational capacity, policy support, and data protection/accountability	Sustaining both manual and electronic payment systems required staff training, internal coordination, monitoring, internal controls, and data privacy safeguards; institutional policies were needed for posting, reconciliation, erroneous transactions, and customer complaints.	Payment-system modernization required clear procedures, trained personnel, internal controls, secure records management, and compliance with data privacy and accountability requirements (Republic Act No. 10173, 2012;

Sausi et al., 2021; Amankwaa et al., 2024).

*Themes were generated from Key Informant Interviews and organizational/technological challenge documents. Coded identifiers were used to protect participants and institutional confidentiality.

Integrated Strategies and Policy Recommendations

The quantitative and qualitative findings indicate that improving collection performance requires more than adding payment channels. The more appropriate direction is a strengthened hybrid payment arrangement supported by customer education, staff training, system integration, reliable posting, reconciliation protocols, coordination with payment partners, and data protection safeguards. Table 3 presents the integrated strategies and policy recommendations based on the findings.

Table 3 Proposed strategies and policy recommendations based on integrated findings

Identified Issue	Basis from Quantitative Findings	Basis from Qualitative Findings	Proposed Strategy or Recommendation
Uneven customer adoption of electronic payment	EPS collections appeared only in later years for some districts	Customers differed in digital literacy and access	Conduct regular customer information drives and step-by-step payment orientation
Delayed posting and reconciliation	Collection ratio declined despite increasing collection amounts	Online payments were sometimes not posted in real time	Improve system integration and establish faster posting/reconciliation protocols
Transaction errors	Accuracy could not be fully measured from available records	Wrong account details, missing proof, overpayment, and underpayment were reported	Use clearer payment instructions, validation reminders, and proof-of-payment protocols
Staff workload and manual verification	Manual and electronic channels coexisted	Personnel still verified reference numbers and payment reports manually	Provide staff training and standardize collection workflows
System downtime and platform dependence	Timeliness varied across years and districts	Third-party platforms had downtime and maintenance issues	Strengthen coordination agreements with payment partners and create contingency procedures
Data privacy and confidentiality	Some LWDs did not release data due to privacy concerns	Sensitive financial records required protection	Maintain coded reporting, aggregate presentation, secure storage, and data-sharing protocols

*Recommendations were based on integrated quantitative and qualitative findings. Coded reporting was retained to protect institutional confidentiality.

Overall Discussion of Findings

Overall, the findings show that payment-system performance in the participating Local Water Districts was socio-technical. Manual systems supported inclusivity, cash based access, and direct verification. Electronic systems supported convenience, wider payment access, and potential efficiency. However, both payment

systems required effective organizational mechanisms, including accurate posting, timely reconciliation, trained personnel, customer guidance, internal controls, and data privacy safeguards.

The study also shows that collection performance should be assessed through multiple indicators. LWD-B had the largest billing and collection volume, LWD-D had the strongest collection growth and operational efficiency, LWD-E had the highest timeliness, and LWD-A had the highest accuracy of collection. These differences confirm that one district may perform strongly in one dimension but not in all dimensions. Therefore, collection performance should not be interpreted only through revenue volume; it should also include timeliness, accuracy, and operational efficiency.

The LWD-A quarterly data from 2024 to 2025 also show that electronic payment adoption was increasing, but manual payment remained dominant. This supports the study's conclusion that payment modernization should be gradual and inclusive. An immediate digital-only approach could exclude unbanked customers, customers without stable internet access, and customers with low digital literacy. Therefore, hybrid payment systems should be strengthened as an inclusive public service strategy rather than treated merely as a technological upgrade.

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

This chapter presents the summary, major findings, conclusions, and recommendations of the study. The discussion is aligned with the objectives, methodology, final tables and figures, ethical safeguards, and delimitations of the study. Since only five of the eight Local Water Districts provided approved and usable data, the conclusions and recommendations apply only to the participating coded districts.

Summary

The study analyzed the payment systems and collection performance of Local Water Districts in the Province of Cotabato. It described the payment-system profile of participating districts, assessed collection performance in terms of timeliness of payments, accuracy of collection, and operational efficiency, compared manual and electronic payment systems using available record-based indicators, and proposed strategies and policy recommendations for improving payment-system effectiveness and collection performance.

The study used a mixed-methods research design that was primarily quantitative in orientation, supported by qualitative inquiry. Documentary and secondary records from 2019 to 2025 served as the main quantitative data sources, while Key Informant Interviews and organizational/technological challenge documents explained the conditions affecting payment-system implementation. Qualitative responses were analyzed thematically, and coded identifiers were used to protect participants and participating institutions.

Summary of Findings

For Objective 1, the study found that the participating Local Water Districts continued to use manual or office-based payment systems while gradually adopting electronic and intermediary-based payment options. LWD-A and LWD-B had more developed intermediary or online payment arrangements, while LWD-D and LWD-E adopted e-wallet payments in the later years covered. This showed that electronic payment adoption was present but uneven across the participating districts.

For Objective 2, the study found that collection performance differed by district and by indicator. LWD-B recorded the highest total billing and total collection from 2019 to 2025. LWD-D recorded the highest collection growth at 127.39% and the highest average operational efficiency at 97.91%. LWD-E recorded the highest average timeliness of payments at 86.20%, while LWD-A recorded the highest average accuracy of collection at 94.43%. These differences showed that collection performance was multidimensional and could not be assessed using total collection alone.

For Objective 3, the study found that manual payment systems remained dominant and necessary because they were familiar, accessible, and useful for direct verification. Electronic and intermediary-based payment systems expanded convenience and access but were affected by digital literacy, internet access, customer trust, system

reliability, and posting or reconciliation procedures. The average quarterly distribution of paying customers was based on LWD-A only because it was the participating district that provided usable customer-count data by payment system. Based on the 2024-2025 aggregate quarterly data, electronic payment increased from 22.68% to 25.35%, while manual payment decreased from 77.32% to 74.65%, showing a modest but still limited shift toward electronic payment use.

For Objective 4, the study identified seven essential themes from the Key Informant Interviews and organizational/technological challenge documents: customer readiness, familiarity, and digital literacy; limited access to digital resources and financial inclusion barriers; delayed posting, reconciliation, and non-real-time updates; transaction errors and proof-of-payment issues; system reliability and dependence on third-party platforms; operational efficiency and workload redistribution; and organizational capacity, policy support, and data protection/accountability. These findings supported strategies such as customer information drives, staff training, faster posting and reconciliation, clearer payment instructions, stronger coordination with payment partners, improved system integration, and secure data-handling protocols.

Conclusions

The participating Local Water Districts used both manual and electronic payment systems in their collection operations, but the level of electronic payment adoption differed across districts. Electronic payment channels were already present, but their implementation was not uniform because districts differed in service size, institutional capacity, customer readiness, and payment-system maturity.

Manual payment systems remained necessary because they were compatible with customer habits, accessible to customers with limited digital resources, and useful for direct verification. These channels continued to serve customers who preferred face-to-face transactions, cash payments, and assisted payment processes. Therefore, manual payment systems remained important for inclusion and service accessibility.

Electronic payment systems contributed to collection operations by expanding payment access, reducing the need for travel to payment offices, and supporting customer convenience. However, their effectiveness depended on perceived usefulness, perceived ease of use, system reliability, integration, organizational support, and the ability of customers to access and use digital payment tools. Thus, electronic payment systems were helpful, but their benefits were not automatic.

The increase in total billing, total collection, and revenue-related indicators showed growth in collection volume. However, differences in timeliness, operational efficiency, and accuracy of collection showed that higher revenue volume did not automatically translate into stronger collection quality. Collection performance should therefore be interpreted through multiple indicators rather than through total collection alone.

Payment systems influenced performance through specific mechanisms. Manual systems supported inclusivity, assisted payment, and direct verification, while electronic systems supported convenience and wider payment access. Both systems required reliable posting, reconciliation, customer guidance, staff capacity, internal controls, and data protection to improve timeliness, accuracy, and efficiency.

The descriptive comparison of manual and electronic payment systems described institutional and record-based patterns only. The average quarterly distribution of paying customers was based on LWD-A because it was the district that provided usable customer-count records by payment system from 2024 to 2025. Therefore, the finding did not establish causal, quasi-experimental, inferential, or province-wide customer-level effects between payment-channel use and collection performance.

Organizational and technological challenges limited the full benefits of electronic payment systems. Customer digital literacy, limited internet access, financial constraints, system downtime, delayed posting, transaction errors, manual reconciliation, staff capacity, and data protection concerns affected payment-system performance. These challenges showed that digital payment adoption is both a technological and organizational concern.

The findings were limited to the five participating Local Water Districts with approved and usable records. Because not all eight Local Water Districts in the Province of Cotabato were included, the results should not be generalized to the entire province without caution.

A hybrid payment system was the most appropriate arrangement for the participating Local Water Districts. This arrangement should remain inclusive by protecting unbanked clients, customers without stable internet access, and customers with low digital literacy. In this way, payment modernization can improve efficiency without unintentionally excluding vulnerable customer groups.

Recommendations

The recommendations of the study were drawn from the integrated quantitative and qualitative findings. Since the participating Local Water Districts continue to use both manual and electronic payment systems, payment modernization should be pursued through a strengthened hybrid payment arrangement rather than through the immediate replacement of manual payment channels. Manual payment systems should remain available because they serve customers who prefer direct verification, cash-based transactions, or assisted payment processes. At the same time, electronic and intermediary-based payment channels should be improved to expand customer convenience, increase payment accessibility, and support more efficient collection operations.

Local Water Districts should maintain a balanced payment system that accommodates both traditional and digital modes of payment. Over-the-counter payment channels should remain available for customers with limited digital literacy, unstable internet access, no bank or e-wallet accounts, or low confidence in online transactions. Electronic payment options should also be strengthened for customers who are ready and willing to use digital platforms. This arrangement can improve collection accessibility without excluding customers who still depend on manual channels.

Management should establish clearer written policies and standard operating procedures for electronic payment posting, validation, reconciliation, unposted payments, missing proof of payment, overpayment, underpayment, erroneous transactions, customer complaints, and data privacy safeguards. Formalized procedures can promote consistency, accountability, and transparency in managing both manual and electronic payment transactions.

Billing, collection, accounting, and information technology personnel should be provided with regular capacity-building activities. Training should focus on electronic payment monitoring, reconciliation procedures, customer assistance, proof-of-payment validation, data privacy, cybersecurity awareness, and internal control measures. Strengthening personnel capacity is necessary because payment-system performance depends not only on technology but also on the competence of staff who manage, validate, and reconcile transactions.

Customer support activities should be strengthened through regular information drives. These activities should explain how to use electronic payment systems correctly, how to enter accurate account or reference details, how to save proof of payment, and how to verify whether a transaction has been successfully posted. Clear customer guidance can reduce transaction errors, improve confidence in digital channels, and encourage gradual adoption of electronic payment systems.

System and technology improvements should be prioritized to reduce posting delays and manual reconciliation. Local Water Districts should work toward closer integration between payment platforms and billing or accounting systems. Coordination with banks, e-wallet providers, payment centers, and collection intermediaries should also be strengthened to address delayed posting, downtime, incorrect transaction details, and reconciliation difficulties.

Policymakers and regulatory bodies should support the digital transformation of Local Water Districts through technical assistance, capacity development, cybersecurity guidance, data protection standards, financial monitoring systems, and inclusive payment policies. Such support should ensure that unbanked customers, customers with low digital literacy, and customers with limited internet access remain accommodated in public utility payment services.

Future researchers should expand the scope of the study by including direct customer or concessionaire perspectives. Customer-level surveys or interviews may examine adoption, satisfaction, trust, convenience, barriers, and willingness to use electronic payment systems. Similar studies may also include all Local Water Districts in the province or compare districts in different provinces to provide broader evidence on payment-system performance.

Policy Directions

Based on the integrated findings, payment system modernization in Local Water Districts should go beyond the simple addition of more payment channels. It should be pursued as a comprehensive institutional reform that strengthens organizational readiness, customer readiness, system integration, accountability, staff capacity, data protection, and consumer protection. Digital payment adoption should therefore be treated not merely as a technological upgrade but as an inclusive public service strategy that improves efficiency while protecting customers who still depend on assisted, cash-based, or manual payment arrangements (Bangko Sentral ng Pilipinas, 2022; World Bank, 2024).

Local Water Districts should adopt a clear electronic payment management policy that defines the procedures for payment posting, validation, and reconciliation. This policy should specify how electronic payments are received, verified, recorded, and matched with customer accounts. A written policy is necessary to ensure that payment transactions are handled consistently across billing, collection, accounting, and information technology units. It will also help reduce confusion among personnel and promote accountability in handling both manual and electronic payment records.

Standard operating procedures should be established for unposted payments, delayed posting, erroneous transactions, and customer complaints. Since the findings showed that delayed posting, wrong account details, missing proof of payment, overpayment, underpayment, and reconciliation issues may affect collection accuracy, Local Water Districts should have clear procedures for resolving these cases. These procedures should identify the responsible personnel, required documents, verification steps, expected processing time, and communication process with the customer. This will help protect both the institution and the concessionaires from unresolved payment concerns.

Customer education programs on digital payment use should be institutionalized. Local Water Districts should regularly conduct information drives, orientation activities, printed reminders, and online advisories explaining how customers can properly use electronic payment systems. These programs should teach customers how to enter correct account details, save proof of payment, verify successful transactions, and report payment concerns. Customer education is important because electronic payment adoption depends not only on the availability of digital channels but also on customer confidence, awareness, and digital literacy.

Personnel handling manual and electronic payment systems should undergo regular training. Billing, collection, accounting, customer service, and information technology personnel should be trained on payment validation, reconciliation, electronic payment monitoring, customer assistance, data privacy, cybersecurity awareness, and internal control procedures. Since payment-system performance depends heavily on personnel capability, regular training will help ensure that staff can manage both traditional and digital transactions accurately, efficiently, and professionally.

Coordination with third-party payment partners should be strengthened to reduce system downtime, delayed posting, and reconciliation problems. Local Water Districts should maintain active communication with banks, e-wallet providers, payment centers, online portals, and collection intermediaries. Agreements or coordination mechanisms should clearly define posting timelines, reporting procedures, system-maintenance advisories, technical support channels, and complaint-resolution processes. Stronger coordination will help improve system reliability and reduce customer dissatisfaction caused by delayed or unposted payments.

Data privacy and confidentiality measures for financial and customer records should also be strengthened. Since payment systems involve sensitive customer information, financial records, transaction references, and institutional data, Local Water Districts should ensure secure storage, restricted access, coded reporting, proper

documentation, and compliance with data protection requirements. Strengthening confidentiality safeguards will protect customer trust and reduce risks related to unauthorized disclosure or misuse of payment-related information.

System integration between electronic payment platforms and billing or accounting systems should be improved gradually. Local Water Districts should work toward reducing manual checking, manual encoding, and separate reconciliation processes. While full automation may not be immediately possible for all districts, gradual improvements in system linkage, reporting formats, transaction tracking, and real-time or faster posting can help improve timeliness, accuracy of collection, and operational efficiency.

Finally, Local Water Districts should continue protecting unbanked clients, customers with limited internet access, and customers with low digital literacy. Manual and assisted payment channels should remain available while electronic payment systems are being improved. Clear instructions, customer assistance, help desks, and over-the-counter options should be maintained so that digital transformation will not exclude vulnerable customers. In this way, payment-system modernization can promote efficiency, accessibility, and accountability while preserving fairness and inclusiveness in public utility service delivery.

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