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Research Article

Digital Empowerment through Community Orientation: Evaluating Consumer Adoption of a Municipal Waterworks Service Application

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Abstract
This study examines the impact of a community-based digital orientation program implemented by the College of Computer Studies of Central Philippine State University (CPSU) San Carlos Campus in partnership with the local government unit of the Municipality of Calatrava, Negros Occidental, Philippines. The initiative involved the development and deployment of a municipal waterworks service application designed to improve service delivery and address inefficiencies associated with manual processes. The program aimed to equip consumers with the knowledge and skills necessary to effectively utilize the application. A descriptive research design was employed, with data collected from 55 waterworks consumers in Barangay San Isidro who participated in the orientation. A structured questionnaire was used to assess awareness, digital confidence, ease of use, application's usefulness, and consumers' intention to use. Descriptive statistical tools, including weighted mean and ranking, were applied in the analysis. Findings revealed very high levels across all variables, indicating strong positive perceptions of the application. The usefulness of the developed application emerged as the most influential factor, underscoring the importance of practical benefits in driving adoption. The results further highlight the role of structured orientation in enhancing user readiness and engagement. Overall, the study demonstrates that extension programs can effectively bridge the gap between technological innovation and community utilization, promoting digital inclusion and improved public service delivery.

Keywords
Community orientation; Digital empowerment, Digitalization; E-Government, ICT

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Ethics Statement
This study was conducted in accordance with ethical standards.

INTRODUCTION

Across the world, digital transformation is reshaping how citizens engage with essential public services, including water utilities. Smart cities increasingly rely on mobile applications, intelligent metering systems, and artificial intelligence to improve operational efficiency and strengthen environmental sustainability. At the heart of these innovations is digital literacy—the capacity of individuals to access, understand, and use digital tools with confidence and purpose. When people possess these competencies, technology becomes more than a convenience; it becomes a bridge that connects households to services that are more responsive, transparent, and sustainable (Boyle et al., 2013; Carretero et al., 2017; Hussain & Phulpoto, 2024; Koop et al., 2021; Okonta & Vukovic, 2024; Silva, 2026).

In local communities, this transformation is experienced in practical and deeply personal ways. Water consumers are increasingly introduced to mobile applications that allow them to view bills, monitor consumption, and communicate with service providers in real time. Yet the willingness to adopt these tools often depends on users' digital skills, confidence, perceptions of usefulness, and the quality of the application's design. For some households, these technologies offer empowerment and convenience; for others, they may present uncertainty and hesitation. Effective digital platforms must therefore be intuitive, inclusive, and aligned with the needs of everyday users (An et al., 2022; Harahap et al., 2024; Hou et al., 2020; Kapesa & Marufu, 2025; Sukma & Leelasantitham, 2022a, 2022b; Koop et al., 2021).

Although previous studies have explored digital readiness, self-directed learning, e-government adoption, and the factors that influence citizens' use of digital services, limited research has specifically examined how digital literacy affects the adoption of mobile applications for water district services. Existing literature provides important insights into technological acceptance and sustainable water management, yet the direct relationship between consumers' digital competencies and their adoption of water utility applications remains insufficiently tested. This gap leaves public utility providers with limited evidence on how to design strategies that encourage broader consumer participation in digital service delivery (Adiyono et al., 2025; Aljafari, 2021; Chen & Aklikokou, 2020; Eid et al., 2021; Paulus et al., 2022; Silva, 2024).

This study is significant because it highlights the human dimension of technological progress in a service that touches every household. By examining the relationship between digital literacy and mobile application adoption among water consumers, the study offers evidence that can guide utility providers in creating more accessible systems, improving digital education, and strengthening consumer engagement. The findings may support data-informed decisions that enhance both operational efficiency and public trust. More importantly, the study contributes to a vision of digital transformation where technology empowers citizens to participate confidently in the stewardship of one of society's most essential resources (Çelik, 2025; Koman et al., 2024; Maldonado Benitez et al., 2025; Wickenberg et al., 2022).

METHODOLOGY

Design

This study employed a descriptive research design to evaluate the level of digital empowerment among consumers following a community orientation on a municipal waterworks service application. The descriptive approach is appropriate for this study as it focuses on describing the current status of consumers' perceptions and readiness to adopt the application after exposure to the orientation program.

Participants

The respondents of the study were consumers of the municipal waterworks system from Barangay San Isidro, Municipality of Calatrava, who participated in the community orientation on the use of the developed waterworks service application. Barangay San Isidro was selected as the primary site for data collection as it was one of the target communities of the extension program implemented by the College of Computer Studies. A total of fifty-five (55) consumers served as the respondents of the study. These participants were selected using a purposive sampling technique, wherein only individuals who attended the orientation and were identified as active waterworks consumers were included.

Instrument

The study utilized a researcher-developed questionnaire designed to measure digital empowerment and consumer adoption of the waterworks service application. The instrument consisted of parts which include the constructs of Awareness of the Waterworks Application, Digital Confidence, Ease of Use, Usefulness and Intention to Use. To ensure that the instrument was easily understood by the respondents, the questionnaire was translated into Bisaya (Cebuano), the local language commonly used in the community. The use of both English and Bisaya versions of the questionnaire enhanced the reliability of responses and ensured inclusivity, particularly for respondents who are more comfortable using the local language. Each item in the questionnaire was measured using a five-point Likert scale to capture the respondents' level of agreement. The scale was structured and presented in Table 1:

Table 1
Five-Point Likert Scale Used in the Study

Scale	Interpretation
5	Strongly Agree
4	Agree
3	Neutral
2	Disagree
1	Strongly Disagree

Note. A five-point Likert scale was used to measure respondents' perceptions regarding awareness, digital confidence, ease of use, perceived usefulness, and intention to use the municipal waterworks service application.

Validation and Reliability of the Instrument

The questionnaire was subjected to content validation by a panel of experts composed of specialists in information technology, research, and public service systems. The experts evaluated the relevance, clarity, and appropriateness of each item. A Content Validity Index (CVI) was computed to determine the validity of the instrument. Items that did not meet the acceptable level were revised accordingly. A pilot test was conducted among a group of respondents similar to the target participants. The reliability of the instrument was determined using Cronbach's Alpha, with a value of 0.84.

Data Collection

The data gathering process commenced with securing permission from the local government unit (LGU) of the Municipality of Calatrava and the municipal waterworks department to conduct the study within Barangay San Isidro. Upon approval, a community orientation was organized and conducted by the researchers as part of the extension program, wherein the waterworks service application was introduced to the consumers. The orientation included a demonstration of the application's features, functions, and procedures for use to ensure that participants gained sufficient understanding of the system. Immediately following the orientation, the researcher distributed the questionnaires to the participants. The purpose of the study was explained, and respondents were guided on how to properly accomplish the instrument, particularly the translated Bisaya version to ensure clarity and accurate responses. Adequate time was given for the respondents to complete the questionnaire, after which all accomplished forms were collected on the same day to ensure completeness and reliability of the data. The gathered data were then organized, tabulated, and prepared for statistical analysis.

Ethical considerations

This study was conducted with strict adherence to ethical research standards. Participants were fully informed about the purpose of the study, the voluntary nature of their involvement, and the confidentiality of their responses. Informed consent was obtained from all respondents prior to data collection, and all personal data were treated with utmost confidentiality.

Analysis

The data collected from the respondents were analyzed using appropriate descriptive statistical tools to provide a clear and systematic interpretation of consumer perceptions toward the municipal waterworks service application. To evaluate the level of digital empowerment and consumer adoption, the weighted mean was utilized. The computed mean values were interpreted using a five-point Likert scale to ensure consistency in interpretation.

Table 2
Mean Range Interpretation for the Five-Point Likert Scale

Mean Range	Interpretation
4.21–5.00	Strongly Agree
3.41–4.20	Agree
2.61–3.40	Neutral
1.81–2.60	Disagree
1.00–1.80	Strongly Disagree

Note. Mean scores were interpreted based on the indicated ranges to determine the level of agreement of the respondents.

In addition, the standard deviation was computed to measure the variability of responses, indicating the degree of agreement or dispersion among respondents' answers. Furthermore, ranking was employed to determine which factors obtained the highest level of perception among the respondents. By arranging the computed mean scores in descending order, the study will able to identify the most influential factors contributing to consumer adoption of the application.

RESULTS AND DISCUSSION

The results indicate that respondents have a very high level of awareness of the application following the orientation. This suggests that the orientation effectively conveyed the purpose, features, and benefits of the system(Paulus et al., 2022). Awareness is a critical first step in digital empowerment, as individuals must first understand a technology before they can adopt it. This supports findings that structured orientation programs significantly enhance user awareness and readiness to engage with digital platforms (Hussain & Phulpoto, 2024).

Table 3
Level of Consumers' Awareness of the Application

Item	M	SD	Interpretation
The orientation helped me understand the purpose of the waterworks application.	4.45	0.60	Strongly Agree
I am now aware of the services that can be accessed through the application.	4.40	0.65	Strongly Agree
I understand the benefits of using the application for water service transactions.	4.38	0.70	Strongly Agree
The orientation clearly explained the features of the application.	4.30	0.72	Strongly Agree
I know how consumers can access or install the application.	4.50	0.55	Strongly Agree
Overall	4.41	0.64	Strongly Agree

The respondents demonstrated a very high level of digital confidence, suggesting that the community orientation effectively enhanced their ability to use the waterworks service application. Positive initial experiences, such as the hands-on orientation, likely contributed to this confidence, aligning with (An et al., 2022) findings that successful engagement with

technology encourages further use, particularly among older adults. Users who gain confidence from meaningful interactions are more motivated to explore their devices and adopt additional digital services. This indicates that the orientation not only supported immediate use of the application but also fostered broader digital engagement within the community.

Table 4
Level of Consumers' Digital Confidence in Using the Application

Item	M	SD	Interpretation
I feel confident using mobile applications for water service-related transactions.	4.20	0.75	Strongly Agree
I believe I can easily learn how to use the waterworks application.	4.35	0.68	Strongly Agree
I am comfortable using digital tools to access public services.	4.18	0.70	Strongly Agree
I feel capable of navigating the features of the application.	4.25	0.66	Strongly Agree
The orientation increased my confidence in using digital services.	4.40	0.60	Strongly Agree
Overall	4.28	0.68	Strongly Agree

The respondents perceived the waterworks service application as very easy to use, indicating that the system's design is intuitive and user-friendly. This high rating suggests that the orientation and the application's interface successfully facilitated consumers' interaction with the system. These findings align with Harahap et al. (2024), who emphasized that user-centered interface design and intuitive functionality enhance usability and encourage stronger user engagement. In the context of this study, the application's clear layout and simple navigation likely contributed to respondents' comfort and willingness to use it. User-centered design, coupled with practical orientation, not only simplifies learning but also motivates users to adopt the system consistently, reinforcing the importance of designing digital services with the end-user in mind (Chen & Aklikokou, 2020).

Table 5
Consumers' Perceived Ease of Use of the Application

Item	M	SD	Interpretation
The waterworks application appears easy to use.	4.32	0.65	Strongly Agree
The interface of the application is clear and understandable.	4.28	0.67	Strongly Agree
The steps required to use the application seem simple.	4.30	0.70	Strongly Agree
Learning to operate the application would be easy for me.	4.35	0.60	Strongly Agree
I believe most consumers can easily learn to use the application.	4.25	0.68	Strongly Agree
Overall	4.30	0.66	Strongly Agree

The results revealed that the usefulness of the application to the consumers obtained one of the highest ratings, indicating that respondents strongly recognize the application's ability to improve the efficiency and convenience of water service transactions. This suggests that the application effectively addresses common challenges associated with manual processes, making it a valuable tool for consumers. These findings are supported by (Hou et al., 2020), who emphasized the importance of ensuring the usefulness and ease of use of mobile government applications to enhance their acceptance and utilization. When users perceive that a system provides tangible benefits, such as saving time and reducing effort, it not only increases adoption but also contributes to improved government service performance and operational efficiency. Moreover, the study aligns with the findings of (Chen & Aklikokou, 2020), which indicate that perceived usefulness significantly influences users' behavioral intention to adopt e-government services. Chen further highlights that perceived usefulness, along with ease of use, plays a mediating role in strengthening the impact of factors such as trust and social influence on technology adoption. In the context of this study, the high level of perceived usefulness suggests that consumers are more likely to embrace the application as part of their regular transactions. Overall, the strong perception of usefulness underscores the importance of developing digital applications that directly address users' needs. When consumers recognize clear and practical benefits, they are more inclined to adopt and continuously use the system, reinforcing the role of usefulness as a key driver of digital service acceptance.

Table 6
Consumers' Perceived Usefulness of the Application

Item	M	SD	Interpretation
The application can make water service transactions more convenient.	4.50	0.58	Strongly Agree
The application can help consumers access information about their water services.	4.48	0.60	Strongly Agree
The application can reduce the need to visit the waterworks office.	4.55	0.55	Strongly Agree
The application can improve communication between consumers and the waterworks office.	4.42	0.62	Strongly Agree
The application can make water service management more efficient.	4.50	0.57	Strongly Agree
Overall	4.49	0.58	Strongly Agree

The findings revealed a very high level of behavioral intention to use the waterworks service application, indicating that respondents are highly willing to adopt and utilize the system in their future transactions. This suggests that the community orientation, along with the application's design and functionality, successfully encouraged consumer readiness and

acceptance of the digital service. These results are supported by (Eid et al., 2021), whose study identified that users' intention to use mobile government applications is influenced by key determinants such as attitude toward use, perceived ease of use, and perceived usefulness. Furthermore, perceived usefulness and ease of use significantly shape user attitudes, which in turn affect their intention to adopt the system. This aligns with the findings of the present study, where both perceived ease of use and perceived usefulness received high ratings, indicating that consumers found the application both easy to operate and beneficial for their needs. Similarly, (Chen & Aklikokou, 2020) emphasized that behavioral intention to use e-government services is significantly influenced by perceived usefulness and perceived ease of use. The study further suggests that focusing on these fundamental factors can enhance the acceptance and adoption of digital government services among citizens. In this context, the high intention to use observed among respondents reflects the effectiveness of the application in meeting user expectations and delivering practical value. Overall, the strong behavioral intention to use the application indicates that consumers are not only satisfied with its features but are also prepared to integrate it into their regular transactions. This highlights the importance of combining user-friendly design with functional benefits to promote sustained adoption of digital public services.

Table 7
Consumers' Intention to Use the Application

Item	M	SD	Interpretation
I intend to use the waterworks application for my future transactions.	4.45	0.60	Strongly Agree
I am willing to use the application regularly for water services.	4.40	0.65	Strongly Agree
I would recommend the application to other consumers.	4.50	0.55	Strongly Agree
I support the use of digital applications for municipal services.	4.48	0.58	Strongly Agree
I believe the application will benefit the community.	4.55	0.52	Strongly Agree
Overall	4.48	0.58	Strongly Agree

The summary of results presented in Figure 1 reveals that all evaluated factors obtained a very high level of perception, indicating that the respondents positively evaluated the waterworks service application following the community orientation. Among the variables, perceived usefulness ranked first, suggesting that consumers place the greatest importance on the practical benefits of the application, such as convenience, efficiency, and reduced need for physical transactions. This implies that when users clearly recognize the value of a system in addressing their needs, they are more likely to accept and adopt it. The second-highest factor, behavioral intention to use, reflects the respondents' strong willingness to utilize the application in future transactions. This finding indicates that the system, combined with the orientation, successfully influenced consumer readiness and acceptance. The high ranking of intention to use further suggests that positive perceptions of the system translate into a greater likelihood of actual usage. Awareness, which ranked third, highlights the effectiveness of the orientation program in informing consumers about the application's features and functions. This suggests that providing adequate information and guidance is essential in preparing users for digital adoption. Without sufficient awareness, even well-designed systems may remain underutilized. Meanwhile, perceived ease of use ranked fourth, indicating that respondents found the application generally easy to understand and operate. This supports the idea that user-friendly design contributes to a positive user experience, although it may not be the primary factor influencing adoption compared to perceived benefits. Lastly, digital confidence ranked fifth, although still interpreted as very high. This suggests that while respondents feel capable of using the application, confidence may develop progressively through continued use and experience. It also implies that initial exposure through orientation is effective, but sustained engagement may further strengthen users' confidence in utilizing digital systems. These findings align with previous studies which emphasize that users are more likely to adopt digital services when they perceive them as beneficial, easy to use, and relevant to their daily needs (Adiyono et al., 2025; Paulus et al., 2022).

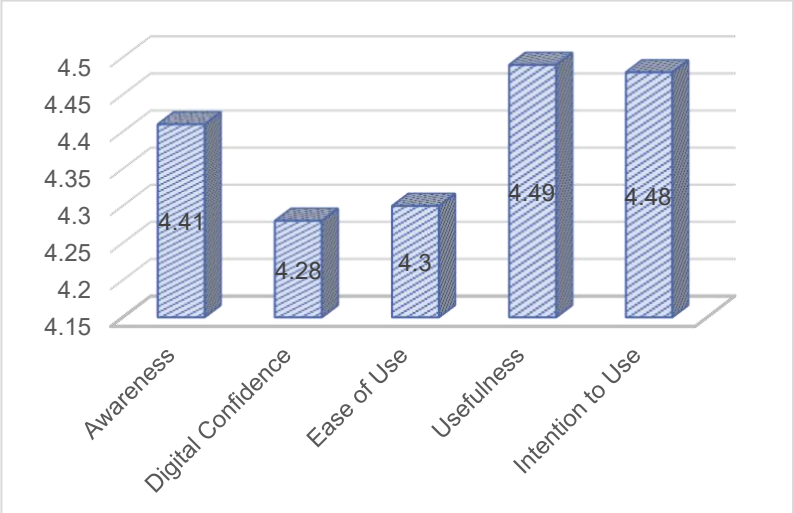

Figure 1. Summary of Factors based on the adoption of the waterworks service application

Conclusion and Recommendations

The findings underscore the importance of aligning technological solutions with user readiness through guided exposure and practical demonstration through orientation. Rather than relying solely on system deployment, the study highlights that user engagement is significantly strengthened when individuals are provided with opportunities to understand and experience the technology in a structured setting. The results suggest that adoption is primarily driven by users' recognition of the application's relevance to their daily needs, supported by a clear understanding of its functions and a generally positive interaction experience. The orientation served not only as a means of information dissemination but also as an enabling mechanism that reduced uncertainty and encouraged active participation. While users demonstrated readiness to engage with the system, the findings also imply that sustained usage will depend on continuous interaction, system reliability, and ongoing support. The study also highlights the broader value of the extension program as a mechanism for bridging the gap between technological innovation and community utilization. The initiative demonstrates how academic institutions can play an active role in supporting local government digitalization efforts by not only developing systems but also facilitating their adoption at the community level. Overall, the study contributes to the understanding that digital empowerment in community settings is a gradual and supported process. It reinforces the idea that effective adoption of digital public services is achieved not only through functional system design but also through deliberate efforts to prepare and involve users in the transition toward digital platforms.

It is recommended that local government units and partner institutions institutionalize community orientation as a regular component of digital service implementation to ensure continuous user engagement and inclusion. Strengthening collaboration with academic institutions can further enhance the development and deployment of technology-driven solutions that address community needs. Efforts should also focus on improving system functionality while maintaining user-friendly design, alongside establishing accessible support mechanisms to sustain user confidence. Additionally, similar extension initiatives may be expanded to other communities to promote wider digital inclusion and maximize the social impact of technology-based interventions.

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