Determinants of Adoption, Behavioral Intention, and Actual Usage of QR Code Payment Systems Among Retail-Micro Businesses in the City of Batac, Philippines

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ABSTRACT

This study examined the determinants of adoption, behavioral intention, and actual usage of digital Quick Response (QR) code payment systems among retail-micro enterprises in the City of Batac, Philippines. Anchored on the Technology Acceptance Model (TAM), Diffusion of Innovation (DOI) theory, and Unified Theory of Acceptance and Use of Technology 2 (UTAUT2), the study categorized influencing factors into technological, economic/financial, and external dimensions. A quantitative descriptive research design was employed, with data collected from 318 retail-micro business owners using a structured questionnaire. Descriptive statistical tools, particularly mean scores, were used to analyze the data.

The findings revealed that the determinants of adoption were generally moderate, indicating that respondents were receptive but not strongly influenced to adopt QR code payment systems. Technological factors obtained the highest mean, suggesting that ease of use, usefulness, and compatibility were not major barriers. However, economic/financial factors emerged as key constraints due to cost concerns and uncertainty regarding financial benefits. External factors were also moderately favorable, although customer demand remained insufficient to drive adoption.

Behavioral intention was moderate, reflecting openness to adopting QR code payments in the future. In contrast, actual usage was low, indicating that QR code payment systems were only occasionally used and not yet integrated into routine business operations. This highlights a significant intention–behavior gap among retail-micro businesses.

The study concludes that while retail-micro businesses demonstrate readiness to adopt QR code payment systems, economic concerns and limited customer demand hinder actual usage. The findings provide a basis for developing targeted strategies, including financial support mechanisms, awareness programs, and customer adoption initiatives, to enhance digital payment adoption and promote financial inclusion at the local level.

Keywords: QR Code Payments, Retail-Micro Enterprises, Digital Payments

INTRODUCTION

Payment system in different countries was reshaped due to the rapid advancement of financial technology (fintech). And one of the advancements in this area is the adoption of QR code payment system. QR code payment systems facilitate digital transactions through two-dimensional barcodes that are scanned using mobile devices and processed via digital wallets or banking applications. This method provides a fast, convenient, and contactless payment option, widely utilized across markets and transportation sectors (Stripe, Inc., 2025; Radage, 2024; Unicorn Payment, 2023). Typically, QR codes encode merchant account information and, in some cases, transaction amounts, allowing payment details to be automatically populated once scanned, requiring only user confirmation to complete the transaction (Stripe, Inc., 2025; Unicorn Payment, 2023).

Some countries in the Asia like Japan, China, and India embraced and integrated QR code payment system to support the cashless economies, to enhance cash border interoperability, and strong financial inclusion (Santodiaz,2024). In the Philippines, the Bangko Sentral ng Pilipinas (BSP) has actively promoting cash-lite economy wherein it aims to improve transactions while expanding financial inclusion up to the grassroot level (Bangko Sentral ng Pilipinas, 2020; Viktor, 2025; Bangko Sentral ng Pilipinas, 2025).

Recent data indicate that digital retail payments accounted for 57.4% of total transaction volume in 2024, surpassing the national target. Similarly, digital payments represented 59.0% of the total retail transaction value, highlighting the growing adoption of digital financial services in the country (Bangko Sentral ng Pilipinas, 2024). Programs such as Paleng-QR Ph Plus have significantly contributed to this upward trend (Remolona et al., 2024).

At the local level, Laoag City adopted the Paleng-QR Ph Plus Program in April 2024, followed by the City of Batac in October 2025.

While these developments reflect increasing digital transformation in Ilocos Norte, they also underscore the need to examine the specific factors influencing adoption among retail-micro businesses. Notably, limited research has explored localized adoption experiences in this region, creating a gap in understanding context-specific challenges and opportunities.

To address this gap, this study draws on established theoretical frameworks, including the Technology Acceptance Model (TAM), Diffusion of Innovation (DOI) theory, and the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2). These frameworks emphasize factors such as perceived usefulness, ease of use, social influence, facilitating conditions, and behavioral intention. In this study, these determinants are categorized into three dimensions: technological, economic/financial, and external factors.

Furthermore, the study aligns with key United Nations Sustainable Development Goals (SDGs), particularly SDG 8 (Decent Work and Economic Growth), SDG 9 (Industry, Innovation, and Infrastructure), SDG 10 (Reduced Inequalities), and SDG 11 (Sustainable Cities and Communities). By promoting digital payment adoption among micro-retail businesses, the study contributes to financial inclusion, economic resilience, and equitable access to digital financial services.

Despite the recognized benefits of QR code payment systems, many retail-micro businesses remain hesitant or unprepared to adopt such technologies. Additionally, there is a lack of a comprehensive framework that simultaneously examines adoption factors, behavioral intention, and actual usage. Existing studies often focus on technological acceptance or institutional perspectives, with limited attention to grassroots-level experiences. This gap restricts the ability of local government units and financial institutions to design effective, context-specific interventions.

Therefore, this study was conducted to examine the determinants of adoption, behavioral intention, and actual usage of QR code payment systems among micro-retail businesses in the City of Batac, providing a basis for developing strategies to enhance digital payment adoption.

Study Objectives

General Objective

This study determined the determinants of adoption, behavioral intention, and actual usage of digital Quick Response (QR) code payment systems among micro-retail businesses in the City of Batac.

Specific Objectives

What are the factors affecting the adoption of digital QR code payment systems among micro-retail businesses in the City of Batac in terms of:

1.1. technological factors
1.2. economic/financial factors; and
1.3. external factors?

1. What is the behavioral intention of micro-retail business owners to use digital QR code payment systems?
2. What is the actual usage behavior of digital QR code payment systems among micro-retail businesses?

REVIEW OF RELATED LITERATURE

The rapid advancement of financial technology (fintech) has significantly transformed traditional payment systems, accelerating the global shift from cash-based transactions to digital payment platforms. Among these innovations, Quick Response (QR) code payment systems have emerged as a widely adopted solution due to their convenience, accessibility, and cost-efficiency (Santosdiaz, 2024; Stripe, Inc., 2025). QR code payments enable users to conduct transactions through mobile devices by scanning machine-readable codes, thereby reducing reliance on physical cash and enhancing transaction efficiency (Unicorn Payment, 2023; Radage, 2024).

Across Asia, QR code payment systems have become a dominant component of digital finance, driven by increasing smartphone penetration, fintech innovation, and strong government support (Santosdiaz, 2024). Countries such as China, India, and those in Southeast Asia have successfully integrated QR-based payments to promote financial inclusion and support cashless economies.

In the Philippine context, the Bangko Sentral ng Pilipinas (BSP) has actively promoted digital payments through initiatives such as the National Retail Payment System (NRPS), the Digital Payments Transformation Roadmap (DPTR), and the Paleng-QR Ph Plus Program (Bangko Sentral ng Pilipinas, 2020; Bangko Sentral ng Pilipinas, 2025; Viktor, 2025). These initiatives aim to improve interoperability, expand financial inclusion, and encourage micro and small enterprises to adopt digital financial services. Recent reports indicate that digital payments accounted for more than half of total retail transactions in the country, reflecting a growing shift toward a cash-lite economy (Bangko Sentral ng Pilipinas, 2024).

The adoption of QR code payment systems has been widely examined using established theoretical frameworks such as the Technology Acceptance Model (TAM), Diffusion of Innovation (DOI) theory, and the Unified Theory of Acceptance and Use of Technology (UTAUT2). The Technology Acceptance Model (TAM) posits that perceived usefulness and perceived ease of use are primary determinants of technology adoption (Davis, 1989). Studies have shown that when users perceive digital payment systems as beneficial and easy to use, they are more likely to develop positive attitudes and intentions toward adoption (Venkatesh & Davis, 2000). This aligns with the findings of the present study, where technological factors such as ease of use, usefulness, and compatibility received relatively high mean scores.

The Diffusion of Innovation (DOI) theory explains how innovations spread within a social system by emphasizing attributes such as relative advantage, compatibility, complexity, trialability, and observability (Rogers, 2003). Research indicates that innovations perceived as advantageous and compatible with existing practices are more likely to be adopted (Rogers, 2003). In the context of QR code payments, observability and trialability are particularly important, as businesses are more inclined to adopt technologies they have seen successfully implemented by others. The present study supports this, as respondents recognized observable benefits but still expressed some concerns about system complexity.

The Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) further expand the analysis by incorporating factors such as performance expectancy, effort expectancy, social influence, facilitating conditions, price value, and habit (Venkatesh et al., 2012). Prior studies have highlighted that economic considerations, particularly cost and perceived financial benefits, significantly influence adoption decisions among small and micro enterprises (Oliveira et al., 2016). This is consistent with the findings of the present study, where economic/financial factors received the lowest composite mean, indicating that cost concerns remain a major barrier. In addition, the uncertainty of return of cost concerns the business owners as this current study shows.

External factors also play a crucial role in technology adoption. Government support, infrastructure availability, peer influence, and trust in service providers have been identified as key drivers of digital payment adoption (Gupta & Arora, 2020). However, customer demand is equally critical, as businesses are less likely to adopt digital payment systems if their customers do not actively use or request them (Liébana-Cabanillas et al., 2014). This is reflected in the present study, where customer demand and usage were relatively low despite positive external conditions.

Behavioral intention is widely recognized as a strong predictor of actual system usage (Ajzen, 1991; Venkatesh et al., 2012). However, several studies have identified an "intention–behavior gap," where positive intention does not necessarily lead to actual adoption (Sheeran, 2002). This gap is particularly evident in digital payment adoption, where users may express willingness but fail to integrate the technology into routine practice due to habit, perceived risks, or lack of incentives (Slade et al., 2015).

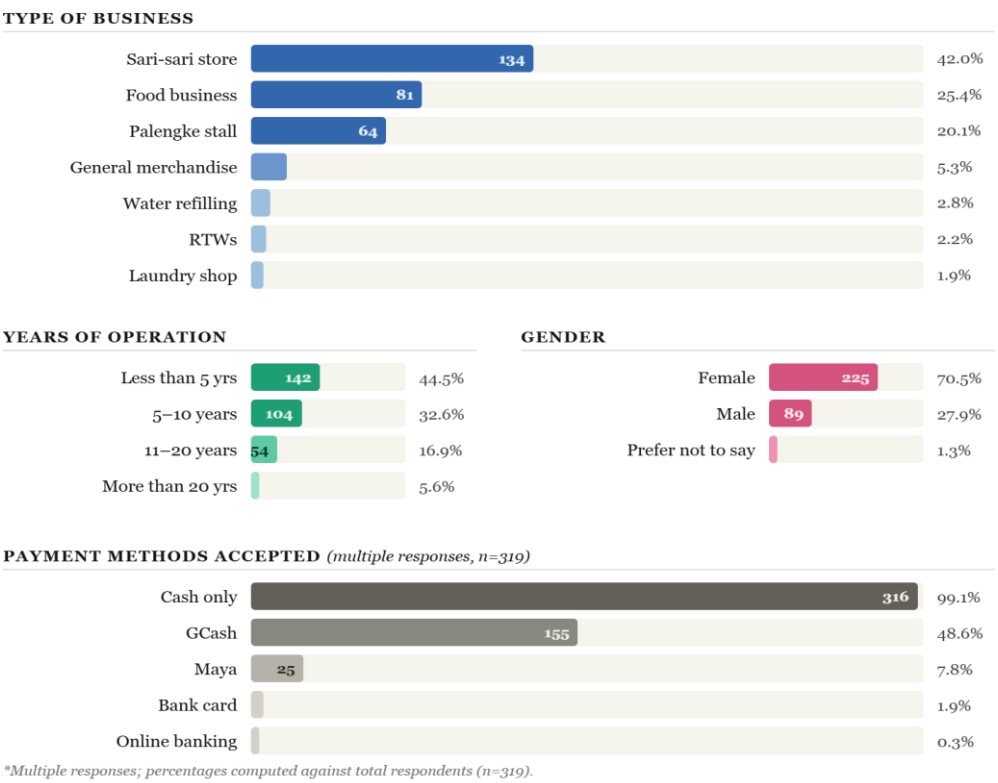
METHODOLOGY

This study employed a descriptive research design to examine the determinants of adoption, behavioral intention, and actual usage of QR code payment systems among micro-retail businesses in the City of Batac. The design was appropriate as it enabled the systematic description and analysis of factors influencing adoption, as well as the assessment of behavioral intention and actual usage patterns. Additionally, the study aimed to develop a proposed framework to enhance QR code payment system adoption, although the framework was not implemented.

The study was conducted in the City of Batac, Ilocos Norte, an educational and agricultural center with a growing number of micro-retail businesses such as sari-sari stores, food stalls, and service-oriented enterprises. The population consisted of registered micro-retail businesses in the city, with records indicating approximately 1,568 MSMEs. Using Slovin's formula with a 5% margin of error at a 90% confidence level, a sample size of 318 respondents was determined.

The study gathered data from 319 micro-retail business owners in Batac City, representing a diverse cross-section of small business types, operational histories, gender identities, and payment system practices.

In terms of business type, sari-sari stores dominated the sample at 42.0% (n=134), reflecting their ubiquity in Philippine barangay-level commerce. Food businesses ranked second at 25.4% (n=81), followed by palengke stalls at 20.1% (n=64). The remaining respondents operated general merchandise stores, water refilling stations, RTW (ready-to-wear) shops, and laundry shops. Most businesses were relatively young — 44.5% had been operating for less than 5 years, and another 32.6% for 5–10 years, meaning over three-quarters of the sample were in their first decade of operation. Female owners comprised a strong majority at 70.5%, with male owners at 27.9% and 1.3% preferring not to disclose. On payment methods, cash remained nearly universal (99.1%), while GCash showed meaningful but partial penetration at 48.6%. Maya, bank cards, and online banking had very limited uptake.



A structured questionnaire was utilized as the primary data collection instrument. The instrument consisted of three main sections: (1) factors affecting adoption (technology, economic/financial, and external factors), (2) behavioral intention, and (3) actual usage behavior. Responses were measured using a seven-point Likert scale. Reverse-coded items were included and adjusted during analysis to ensure accuracy. The instrument was designed to generate quantitative data suitable for descriptive statistical analysis.

Data collection was conducted from February to May 2026. Ethical clearance was obtained prior to data gathering, and necessary permissions were secured from local authorities and market administrators. Respondents provided informed consent, and anonymity and confidentiality were strictly maintained. The study possessed minimal risk to participants, as the research questions were non-sensitive and non-intrusive. This study was also conducted with full transparency and independence to ensure the absence of any conflict of interest. Measures were taken to ensure respondents were not subjected to embarrassment, discomfort, or harm Questionnaires were distributed personally, with assistance provided when necessary to ensure accurate responses. Completed questionnaires were collected, encoded, and stored securely for analysis.

Data were analyzed using statistical software (SPSS/PSPP), employing descriptive statistics such as mean scores to determine the level of influence, intention, and usage behavior. These statistical tools ensured the accuracy, reliability, and consistency of the findings.

RESULTS AND DISCUSSION

The results presented in Table 1 indicate that the factors influencing the adoption of digital QR code payment systems among micro-retail businesses in the City of Batac are generally moderate, with an overall mean of 4.16, which falls under the “Neutral” descriptive interpretation. This suggests that while respondents demonstrate a favorable inclination toward QR code payment systems, these factors are not yet strong enough to significantly influence their adoption decisions.

Among the three categories, the technology factor obtained the highest composite mean of 4.22, indicating that respondents perceive QR code payment systems as easy to understand, useful, and compatible with their existing business operations. Respondents also recognize the observable benefits and the ability to test the system prior to full implementation. However, the item indicating that QR code setup may be complicated (mean = 3.88) reflects some lingering concerns regarding initial implementation, although these concerns are not strongly pronounced.

In terms of economic and financial factors, the composite mean of 4.09 reflects moderate agreement but also highlights underlying hesitation. While respondents acknowledge the potential benefits of QR code payments—such as increased sales and improved operational efficiency—they remain concerned about the costs associated with adoption and are uncertain whether these systems can substantially reduce expenses. This suggests that financial considerations serve as a key constraint in the adoption process.

Meanwhile, external factors yielded a composite mean of 4.18, indicating that environmental influences—such as government support, peer recommendations, access to infrastructure, and trust in service providers—contribute positively to adoption. However, relatively lower ratings for customer demand and actual usage suggest that market-driven pressure remains insufficient to strongly encourage adoption.

Overall, the findings indicate that retail-micro businesses in the City of Batac are in a stage of consideration rather than full adoption. Although technological readiness and external support are evident, economic uncertainty and limited customer demand continue to hinder stronger adoption behavior. These results imply that increasing awareness of financial benefits, strengthening customer usage, and providing cost-related support mechanisms may enhance the adoption of QR code payment systems among micro-retail businesses.

Table1. Factors Influencing the Adoption of QR Code Payment System

Factors Affecting Adoption	Mean	DI
A. Technology Factor		
1. I believe digital QR code payment systems are easy to understand.	4.38	N
2. I believe learning how to use QR code payments would be easy for my business.	4.35	N
3. (R) QR code setup seems too complicated for my small store.	3.88	N
4. I think QR code payments would be useful in my daily business transactions.	4.28	N
5. I believe QR code payments could improve the efficiency of my business operations.	4.21	N
6. I think QR code payments would be compatible with the way I currently run my business.	4.23	N
7. I believe QR code payments are more convenient than cash transactions.	4.18	N
8. I have seen other businesses benefit from using QR code payments.	4.19	N
9. I believe the advantages of QR code payments are clear and observable.	4.28	N
10. I can easily test QR payments without full commitment (e.g., trial).	4.18	N
11. Using QR code payments would be fun or enjoyable for my transactions.	4.23	N
Composite Mean	**4.22**	N
B. Economic/Financial Factor		N
12. I am concerned about the costs involved in adopting QR code payment systems.	4.19	N
13. I believe the benefits of QR code payments would outweigh the costs.	4.14	N
14. I believe QR code payments could help increase my sales or number of customers.	4.15	N
15. I am willing to invest in basic requirements (such as smartphone or registration) to use QR code payments.	4.20	N
16. (R) QR payments would reduce my cash handling and change-making costs.	3.78	N
Composite Mean	**4.09**	N
C. External Factor		N
17. I would adopt QR code payment systems because of customer demand.	4.09	N
18. I would adopt QR code payment systems based on suggestions from fellow merchants.	4.25	N
19. I believe government or local authorities (e.g., BSP QR Ph) encourage the use of QR code payment systems.	4.28	N
20. I have access to the necessary facilities (internet connection, smartphone) to use QR code payments.	4.25	N
21. I believe adequate guidance or support is available for businesses adopting QR code payments.	4.20	N
22. I trust QR payment providers (e.g., GCash, Maya) will protect my business data.	4.23	N
23. (R) My regular customers already prefer or use QR payments.	3.92	N
Composite Mean	**4.18**	N
Overall Mean	**4.16**	N

The results presented in Table 2 indicate that the behavioral intention of retail-micro business owners in the City of Batac to use digital QR code payment systems is generally moderate, with an overall mean of 4.27, which falls under the “Neutral” descriptive interpretation. This suggests that while respondents demonstrate a positive inclination toward adopting QR code payment systems, their intention is not yet strong enough to indicate full readiness for adoption.

Among the indicators, the highest mean scores were recorded for the intention to use QR code payment systems in the future (4.63) and the plan to accept QR code payments from customers (4.60), both of which fall under the "Slightly Agree" category. These findings reflect a moderate level of willingness among respondents to adopt the technology in their business operations. Similarly, respondents expressed moderate intention to recommend QR code payments to other micro-enterprise owners (4.44), encourage customers to use such systems (4.42), and increase their usage in the future (4.43), indicating a generally favorable perception of the technology's potential benefits.

However, several indicators—such as expecting to use QR code payments regularly (4.41), relying on them as a primary payment method (4.34), and continuing their use even when cash remains available (4.35)—fall within the "Neutral" range. This suggests that although respondents are open to adoption, QR code payment systems are not yet viewed as essential or dominant transaction methods in their businesses. Furthermore, the reversed item, "I prefer cash over digital QR code payments for business transactions," obtained a mean of 2.70, indicating a marginal level of agreement and implying that a portion of respondents still maintain a preference for cash-based transactions.

Overall, the findings reveal that retail-micro business owners in Batac City exhibit a moderate level of behavioral intention toward adopting digital QR code payment systems. While there is clear interest and initial willingness to adopt, the absence of strong commitment suggests that businesses remain in a transitional stage between awareness and full adoption. Strengthening this intention may require increasing awareness of practical benefits, enhance user confidence, and address persistent preferences for traditional cash transactions.

Table 2. Behavioral Intention of Retail-Micro Business Owner

Behavioral Intent	**Mean**	**DI**
1. I intend to use digital QR code payment systems in my retail business in the future.	4.63	SA
2. I plan to accept QR code payments from customers.	4.60	SA
3. I expect to use digital QR code payment systems regularly in my daily business operations.	4.41	N
4. I will encourage customers to use QR code payments when making purchases.	4.42	N
5. I intend to increase my use of digital QR code payment systems in my store.	4.43	N
6. (R) I prefer cash over digital QR code payments for business transactions.	2.70	SD
7. I am willing to rely on QR code payment systems as a major payment method in my business.	4.34	N
8. I intend to use digital QR code payments to improve transaction efficiency in my store.	4.36	N
9. I plan to continue using QR code payment systems even if cash payments are still available.	4.35	N
10. I intend to recommend digital QR code payment systems to other micro-enterprise owners in Batac City.	4.44	N
Overall Mean	**4.27**	**N**

The results presented in Table 3 indicate that the actual usage behavior of digital QR code payment systems among micro-retail businesses in the City of Batac is generally low, with an overall mean of 3.16, which falls under the "Occasionally" descriptive interpretation. This suggests that while some businesses have adopted QR code payment systems, their usage remains limited and infrequent, and the technology has not yet been fully integrated into routine business operations.

A closer examination of the indicators shows that most items fall within the "Occasionally" range, including accepting QR code payments (3.11), using them for customer transactions (3.04), offering them as a payment option (2.96), and integrating them into daily operations (2.92). Similarly, reliance on QR code payment systems (2.96), consistent usage (2.87), and routine application in business processes (2.91) all reflect low levels of engagement. These findings indicate that, although QR code payment systems are available to some businesses, they are not yet utilized as a regular or dependable method of transaction.

Notably, the reversed item, "I complete most sales transactions without using digital QR code payments," obtained a high mean of 4.77, which falls under the "Often" category. This further reinforces that the majority of transactions are still conducted without QR code systems, highlighting the continued dominance of traditional payment methods, particularly cash.

Overall, the findings reveal a clear gap between the moderate behavioral intention to adopt QR code payment systems and their actual usage in practice. While micro-retail business owners demonstrate openness and willingness to adopt digital payment technologies, this has not yet translated into consistent implementation. This discrepancy may be attributed to financial concerns, limited customer demand, and persistent reliance on cash transactions. Therefore, increasing actual usage may require targeted interventions such as financial incentives, user training, and initiatives that promote customer adoption to encourage more frequent and sustained use of QR code payment systems.

Table 3. Actual Usage Behavior of Digital QR Code Payment System

Actual Usage Behavior	**Mean**	**DI**
I accept payments through digital QR code payment systems in my retail business.	3.11	OC
I use digital QR code payment systems for customer transactions.	3.04	OC
I use digital QR code payments regularly in my store.	2.93	OC
(R) I complete most sales transactions without using digital QR code payments.	4.77	OF
I actively offer digital QR code payment options to my customers.	2.96	OC
I process customer payments using digital QR code systems during daily business operations.	2.92	OC
I use digital QR code payment systems alongside cash and other payment methods.	3.11	OC
I rely on digital QR code payment systems for business transactions.	2.96	OC
I consistently use digital QR code payment systems in my retail operations.	2.87	OC
I use digital QR code payments as part of my routine payment process in my business.	2.91	OC
Overall Mean	**3.16**	OC

CONCLUSION

In conclusion, the findings revealed that the factors influencing adoption—technological, economic/financial, and external—were generally moderate, indicating that while retail-micro business owners are receptive to QR code payment systems, these factors are not sufficiently strong to drive full adoption.

Among the determinants, technological factors emerged as the most favorable, suggesting that QR code payment systems are perceived as easy to use, useful, and compatible with existing business operations. External factors, including government support, infrastructure availability, and peer influence, also contributed positively. However, economic and financial considerations were identified as key constraints, as business owners expressed concerns about costs and uncertainty regarding financial benefits.

Furthermore, the study found that behavioral intention to adopt QR code payment systems was moderate, reflecting openness among micro-retail business owners. However, actual usage remained low, indicating that QR code payments are only occasionally used and have not yet become a routine part of business transactions. This disparity highlights the presence of an intention–behavior gap, where favorable perceptions and willingness do not translate into consistent usage.

Overall, the findings suggest that retail-micro businesses in the City of Batac are in a transitional stage between awareness and full adoption of QR code payment systems. While technological readiness and external support are present, economic constraints and limited customer demand continue to hinder widespread usage. Addressing these barriers through targeted interventions—such as financial incentives, capacity-building initiatives, and efforts to increase customer adoption—may help bridge the gap between intention and actual usage and promote the broader adoption of digital payment systems.

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