Analyzing Factors Influencing Continued QR Payment Use: A Study of the Japan's Post-Government Campaigns

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ABSTRACT

In this research, we have studied and tested the relationship between confirmation of expectations, perceived usefulness, satisfaction, and continuation behavior of users regarding QR-based payment services in Japan. Understanding continuation behavior is important because user retention is crucial rather than just adoption for developing the sustainable systems; therefore, every business requires to analyze the consumers experiences and fulfill their expectations. Therefore, this study aimed to clarify the motivation behind the continuous use of QR code payment services after their initial adoption, accompanied by large-scale government promotional campaigns. A hypothetical model was developed based on the IS Contiunace model derived from the Expectation Confirmation Model (Bhattacharjee, 2001) and tested using data collected from 461 valid responses of active Japanese users through the Freeasy24 online service used for the questionnaire survey. Structural Equation Modeling (SEM) with SPSS Amos 30 was applied to analyze the relationships among the variables. The original IS Continuance model was not supported by Japanese users' data on QR code payment services because the fitness of the model was poor. However, The modified results revealed that the confirmation of users' expectations positively influenced the perceived usefulness of QR code payment services, satisfaction, and continuity intention. However, perceived usefulness did not influence either satisfaction or continuity intention in the context of Japan's QR code payment service.

The results suggest that the confirmation of expectations has a significant positive influence on perceived usefulness, satisfaction, and intention to continue using QR

payments. Interestingly, perceived usefulness was not found to significantly affect either satisfaction or continuity intention, suggesting that long-term use may be less driven by functional utility and more driven by emotional responses to unmet or met expectations. These findings provide practical insights for QR code payment providers by highlighting the importance of managing user expectations and minimizing dissatisfaction. The limitations and recommendations of this study are also discussed. Further improvements on model and questionnaire design were required to enhance the reliability of the collected data and the goodness of fit of the model.

Keywords: QR code payments, Continued use, Satisfaction, Expectation confirmation model, Structural equation modeling, Digital transformation

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- QR code : Quick Response code

- QRPS : Quick Response Payment Service

- METI : Ministry of Economy, Trade and Industry

- SAT : Satisfaction

- IS : Information System

- ECM : Expectation Confirmation Model

CHAPTER 1 INTRODUCTION

This chapter introduces the research topic of QR code (barcode) payment services in Japan, focusing on the factors that influence continued usage beyond initial adoption. It provides an overview of Japan's cashless payment landscape, examines the impact of government initiatives on QR payment adoption, and highlights the importance of understanding user behavior in the post-incentive period. This chapter establishes the research problem, clarifies the purpose of the study, and outlines the significance of investigating continued usage patterns in Japan's unique digital payment ecosystem. This chapter also discusses the problems associated with payment services and the importance of understanding users' expectations, their satisfaction levels and system's usability in maximizing the benefits of cashless payment systems.

1.1 Research Background

Over the past decade, the global financial landscape has undergone a transformative shift toward digital payment solutions over the past decade. Among these innovations, Quick Response (QR) code payments have emerged as a particularly significant development, offering accessibility, simplicity, and smartphone compatibility that has redefined consumer payment behaviors worldwide. Initially gaining prominence in China and subsequently spreading across Asia, QR code payments have fundamentally altered how consumers conduct transactions and how businesses engage with their customers (Shimizu, 2019).

Japan presents a particularly intriguing case study on this global trend. Despite being home to leading technological innovations and internationally recognized tech companies, Japan has historically maintained a cash-centric society with deeply rooted cultural preferences for physical currency. This resistance to cashless payment adoption persisted until recent years when a confluence of economic, policy-driven, and social factors began to influence a gradual but significant transformation in payment behaviors.

The pivotal moment in Japan's evolution of cashless payments came with the Japanese government's strategic intervention through the "Cashless Vision" initiative launched by the Ministry of Economy, Trade and Industry (METI) in 2019. According to BIS statistics, the cashless ratio of Japan is considerably lower than 40 percent or more in other developed countries such as the United States, the United Kingdom, and Singapore. Therefore, this comprehensive policy framework aimed to increase the cashless payment ratio from 24% before 2018 to 40% of the household final consumption expenditure by 2025, with an ambitious long-term target of 80%. To accelerate this transition, the government implemented a large-scale point reward campaign coinciding with the consumption tax hike in October 2019, the Myna point campaign (2020-2023), directly incentivizing consumers to adopt QR code payment services such as PayPay, LINE Pay, and Rakuten Pay through cashback rewards and loyalty points.

The results of this intervention are remarkable. According to METI 経済産業省 商務サービスグループキャッシュレス推進 (2025) data, Japan's cashless payment ratio increased from 24% in 2018 to 29.7 percent in 2020, 32.5 ％ in 2021,

36% in 2022, 39.3% in 2023 and 42.8% of final household consumption expenditure in 2024, surpassing the 2025 target ahead of schedule. During this period, QR code payment transactions experienced substantial growth, with the total value of store spending expanding from 165 billion yen and 52 million cases in 2018 to 18.7 trillion yen and 1.15 billion cases in 2024, while the number of active users grew from 3.55 million in 2018 to 87 million users by the end of 2024 according to the Payments Japan Association (2025). This shows that 70% of the Japanese population (124 million) are active users of QR payments. This dramatic expansion demonstrates the effectiveness of government-backed incentives in driving initial adoption.

Interestingly, while the growth in active user numbers peaked at 17.8 million by the end of 2020 and has shown a declining trend since then, the value of store spending and transaction frequency has continued to increase consistently throughout the year and can also increase in the future. This pattern suggests that although new user acquisition may have plateaued, existing users are deepening their engagement with QR code payment services, indicating the maturation of usage patterns rather than market saturation.

As mentioned, the widespread adoption of QR code payments in Japan can be attributed to initiatives such as the 2019 consumption tax hike and subsequent government-led promotional campaigns. These efforts, aimed at encouraging consumers to use QR code payments via smartphones, provided incentives that increased both user engagement and merchant acceptance (fee exemptions) of the payment method. As a result, many consumers began to recognize the convenience

and practicality of QR code payments through first-hand experiences. Even though these incentives were limited for a certain duration and some merchants were less inclined to accept QR code payments because of the costs involved, which resulted in several small private businesses and stores accepting only cash payment methods (Shimizu, 2019), the amount of money spent in stores and the number of store transactions continued to increase. However, the reason for this behavior remains underexplored in existing literature.

Therefore, this research seeks to explore and clarify the reasons behind the continued use of QR code payment services by incorporating continuation factors-satisfaction, perceived usefulness, and expectation confirmation-to offer a comprehensive understanding of user behavior in a maturing digital payment environment in the Japanese context.

1.2 Problem Awareness

While the initial adoption of digital systems is crucial, long-term success depends on users' sustained engagement over time (Bhattacherjee, 2001). In payment technology contexts, encouraging first-time usage represents only the beginning of a longer journey toward establishing habitual usage patterns that justify system investments and realize intended benefits.

Although QR code payment systems have achieved significant penetration in Japan's daily transaction landscape, there remains a critical gap in understanding the mechanisms that drive continued usage beyond the initial adoption phases. This knowledge gap is particularly significant given the unique context of Japan's post-

government incentive environment, where users must now rely on intrinsic motivations rather than external rewards to maintain their payment behaviors.

The theoretical foundation for understanding this phenomenon draws from established behavioral models of technology adoption and continued usage. The Technology Acceptance Model (TAM), proposed by Davis (1989) suggests that user acceptance is primarily determined by perceived usefulness and perceived ease of use. However, TAM focuses primarily on initial adoption rather than continued usage behavior. To understand post-adoption behavior, Expectation Confirmation Theory (ECT) provides a more relevant framework, incorporating concepts of user expectations, satisfaction, and confirmation of initial expectations as drivers of continued system use.

This theoretical gap is particularly relevant in the context of QR code payments, where the transition from government-incentivized usage to voluntary continued usage represents a fundamental shift in user motivation. As Fujiki (2022) noted, the reduction in cash usage costs due to widespread cashless payment adoption may be overestimated, and the relationship between cashless payment availability and actual cash usage reduction remains unclear. This suggests that continued QR code payment usage cannot be explained solely by rational economic factors but requires examination of psychological and experiential elements.

The sustainability challenge is further complicated by Japan's diverse payment ecosystem and the cultural context of its cash preferences. Unlike markets in which digital payments replace cash directly, Japanese consumers must choose among

multiple viable payment options, making continued QR code usage dependent on perceived value propositions that extend beyond temporary financial incentives.

Understanding these continuation mechanisms is essential for payment service providers, policymakers, and businesses seeking to maximize the strategic value of digital payment investments. Without such an understanding, there is a risk that QR code payment systems may experience declining usage rates, potentially undermining Japan's broader cashless societal objectives.

1.3 Purpose

This study aims to identify and analyze the key factors that motivate Japanese consumers to continue using QR payment services beyond the initial adoption phase, particularly in the post-government incentive period. Specifically, this study examines how confirmation of user expectations, perceived usefulness, and satisfaction influence continued usage decisions.

By investigating these relationships, this research will provides evidence-based insights into the psychological and behavioral mechanisms that sustain QR payment usage in Japan's unique digital payment context. The findings will contribute to understanding how digital payment systems can achieve long-term sustainability and user retention without relying on external incentives.

1.4 Brief Summary

The widespread adoption of cashless payment systems represents a significant transformation in business transaction methods across the developed countries.

However, adoption alone does not guarantee long-term success; sustainable implementation requires understanding the factors that drive continued usage beyond the initial novelty or incentive periods.

In the context of QR code payments, the assumption that government-backed promotional campaigns alone can create lasting behavioral changes has proven insufficient. While such campaigns effectively stimulate initial adoption rates, they do not address the underlying psychological and experiential factors that determine whether users will maintain their payment behaviors after the incentives disappear. The continued growth in transaction values and frequency, despite the plateau in new user acquisition, suggests that individual user experiences with QR payment services exhibit significant diversity in terms of perceived convenience, usefulness, and satisfaction levels.

This study aims to address this critical gap by examining post-incentive usage patterns of QR payment services in Japan. The research focuses on three key determinants of continued usage: confirmation of user expectations, perceived usefulness, and user satisfaction. By analyzing these relationships, this study provides empirical evidence for understanding how QR code payment systems can achieve sustainable user engagement in Japan's competitive digital payment landscape.

1.5 Chapter Structure

This study follows a structured framework designed to provide a comprehensive analysis of continued QR code payment usage in Japan.

Chapter 1 provides a foundational overview, including the research background, problem identification, and study objectives necessary for understanding the research context. **Chapter 2** presents a comprehensive literature review examining the existing research on digital payment adoption, continuation theories, and user behavior in payment systems, identifying gaps that this study addresses. **Chapter 3** articulates the research questions derived from the literature review and problem analysis. **Chapter 4** describes the research methodology, including the theoretical framework, data collection procedures, and analytical approaches employed in this study. **Chapter 5** details the data collection process and the participant characteristics. **Chapter 6** presents the analytical findings and statistical results that address the research question. **Chapter 7** discusses the implications of the findings and connects the results to the existing literature and theoretical frameworks. It examines the practical contributions and implications of the research on industry and policy applications. **Chapter8** provides concluding remarks, summarizes key findings, acknowledges limitations, and suggests directions for future research.

CHAPTER 2 LITERATURE REVIEW

2.1 QR Code Payment

Quick Response (QR) code has a black and white grid arrangement and is usually used to store information that can be read by a smartphone (Gao et al., 2018). Jasmadi (2018) explained that a Quick Response Code is a two-dimensional code that can store special data so that it is easy to read using a QR Code Reader. Initially used in the automotive industry, but is currently widely used in the world of Information Technology, to store data such as web addresses, e-mail, contacts, and payments.

According to the Wikipedia,   QR code payment is a mobile payment method in which payment is performed by scanning a QR code from a mobile app. This is an alternative to the transfer of electronic funds at the point of sale, using a payment terminal. This avoids many of the infrastructures traditionally associated with electronic payments such as payment cards, payment networks, payment terminals, and merchant accounts. Individuals use a QR code-based payment apps on their smartphones or compatible devices to scan a two-dimensional barcode displayed by a merchant (or a merchant scans a code on a user's device) to process a transaction. QR code payment systems, introduced as alternatives to credit cards and cash, rely on scanning a QR code generated by either the merchant or the consumer's mobile app. This technology does not require contact between the device and the point-of-sale (POS) terminal, making it appealing in the context of the COVID-19 pandemic, where touchless transactions became a norm. This

method has proven particularly effective in the retail, transportation, and service industries, offering a contactless and convenient way to pay.

According to a study by Das (2025), the global usage of QR codes has skyrocketed in recent years, with no signs of slowing down. QR code scans across 50 countries have increased exponentially by 57% by 2025, and are projected to increase further by 22%. It also states that nearly 36.40% of mobile phone users in Europe scan at least one QR code per week. Meanwhile, approximately 50% of consumers in China scan QR codes for various purposes more than once a week because of the ease of use, cost-effectiveness, and versatality of QR code payments. This increasing adoption of QR codes is closely related to the rising ownership of mobile phones and the Internet (Das, 2025). According to the findings of LEWIS Research (2024), Most consumers (68%) have used QR codes at least once in the last year. Gen Z (83%) and Millennial (81%) are more likely than older generations to use the technology. In fact, half of Gen Z (49%) and millennial (51%) consumers use QR codes at least once a week. Consumers are divided based on the benefits of QR codes are to their daily lives. About half (47%) said that QR codes were useful, and one-third (32%) said they were valuable. Few say that they are enjoyable or educational, and few say that they are difficult or time-consuming to use. Overall, it seems that consumers view QR codes as a utilitarian technology – not something that is particularly enjoyable but, at the same time, not something that hinders their daily life. The usage pattern of QR code payment systems can vary based on countries and their cultural preferences.

2.2 QR Code Payment in Japan

The antecedents of QR Code Payment Services in Japan are closely linked to the nation's technological innovation and evolving consumer behavior. QR codes were invented in 1994 by Masahiro Hara from the Japanese company Denso Wave, which was initially used to track automotive parts in manufacturing (a subsidiary of Toyota). Their ability to store large amounts of data and scan quickly makes them versatile for various uses beyond industry. By 2002, QR codes became widespread among the Japanese public, largely because of the introduction of mobile phones equipped with QR code readers, enabling easy access to websites and promotions (DENSO WAVE INCORPORATED, 2014).

The concept of using QR codes for payments began to take shape in the early 2000s, but it was not until the mid-2010s that QR code payment systems gained significant traction. LINE Pay, launched in 2014, was among the first major QR code payment services in Japan. The real turning point came in 2018 and 2019, when new entrants such as PayPay and d Barai entered the market, and the Japanese government actively promoted cashless payments. This promotion included a nationwide reward program coinciding with a consumption tax hike, incentivizing both consumers and merchants to adopt QR code payments and support their expansion (Hayashi, 2019).

According to the Payments Japan Association (2025), there are 14 Major QR Payment Service Providers in Japan have introduced the QR code-based payment apps:

Table 1. Major QR Payment Service Providers in Japan

• AEON Financial Services Co., Ltd. (AEON Pay) • Fukuoka Bank, Inc. (YOKA! Pay)

• AEON Financial Services Co., Ltd. (AEON Pay)	• Fukuoka Bank, Inc. (YOKA! Pay)
• NTT DOCOMO Co., Ltd. (d-payment)	• PayPay Inc. (PayPay)
• Okinawa Bank, Ltd. (OKI Pay)	• Mizuho Bank (J-Coin Pay)
• KDDI Corporation (au PAY)	• Merpay Co., Ltd.
• Commoney Co., Ltd.	• Japan Post Bank Co., Ltd. (Japan Post Pay)
• Net Protections Inc. (atone)	• LINE Pay Inc. (LINE Pay)
• FamiPay Co., Ltd.	• Rakuten Payment Co., Ltd. (Rakuten Pay)

QR code payments surpassed electronic money in Japan and became the second most popular method for cashless payments. According to Statista, nearly 9.36 billion barcode and QR code payments were made at both online and physical stores in Japan in 2023 and 943.6 million in June 2024. Japan's monthly active users (MAUs) of barcode and QR code payment services increased from 3.55 million users at the end of December 2018 to 87 million in December 2024. According to the payment association, The value of store spending and the number of store transactions in Japan expanded rapidly from 165 billion yen and 52 million cases in 2018 to 18.7 trillion yen and 1.15 billion cases in 2024, respectively and is projected to reach 19.76 trillion Japanese Yen by 2026. Pay Pay with 56.6 million registered users, is among the largest QR code payment providers, along with Rakuten Pay and Dbarai.

According to the survery on the use of settlement and financial services (July 2024), the percentage of QR code payment that the customers usually use is 47.6% where Pay Pay is in first place at 66.3%, followed by rakuten pay at 35.3%, and d payment at 27.5%. Figure 1 was taken from the website of the Ministry of Economy, Trade and Industry of Japan (METI), 2025.

Changes in the breakdown of cashless payments and ratios

(兆円)	暦年	2017	2018	2019	2020	2021	2022	2023	2024
キャッシュレス(CL)合計	決済額	64.7	73.5	81.9	85.8	95.0	111.0	126.7	141.0
	比率	21.3%	24.1%	26.8%	29.7%	32.5%	36.0%	39.3%	42.8%
①クレジット	決済額	58.4	66.7	73.4	74.5	81.0	93.8	105.7	116.9
	CL内割合	90.2%	90.7%	89.7%	86.8%	85.3%	84.5%	83.5%	82.9%
②デビット	決済額	1.1	1.3	1.7	2.2	2.7	3.2	3.7	4.4
	CL内割合	1.7%	1.8%	2.1%	2.5%	2.8%	2.9%	2.9%	3.1%
③電子マネー	決済額	5.2	5.5	5.8	6.0	6.0	6.1	6.4	6.2
	CL内割合	8.0%	7.5%	7.0%	7.0%	6.3%	5.5%	5.1%	4.4%
④コード決済	決済額	-	0.2	1.0	3.2	5.3	7.9	10.9	13.5
	CL内割合	-	0.2%	1.2%	3.7%	5.6%	7.1%	8.6%	9.6%
民間最終消費支出	額	303.3	305.2	305.8	288.6	292.0	308.5	322.4	329.8

Figure 1. Changes in cashless payments and ratios of Japan

In Japan's unique payment landscape, people have many options beyond cash and credit cards, such as train IC cards (Suica, Pasmo), mobile wallets (Apple Pay), and QR code payments. In such an environment, people decide what to use based on things like how much value they feel they receive, how satisfied they are, how easy it is to use, and in what platform they are used to with. This means that QR code payments do not replace other methods but add another choice to an already diversified payment system.

According to the Fujiki (2022), younger generations are generally more comfortable using smartphone-based payments, while older people often stick to cash or IC cards because they are familiar and reliable and show demographic

diversity among users. Additionally, QR code payments are more common in cities where digital technology is more developed. These contextual dynamics suggest that continued usage cannot be solely explained by initial convenience or reward benefits but must be explored through deeper psychological and behavioral lenses.

2.3 Government Initiatives and Promotional Campaigns

Japan's government has implemented several comprehensive promotional campaigns to accelerate cashless payment adoption, the most significant being the Point Reward Program (PRP) launched from October 2019 to June 2020. This program was designed to mitigate the impact of the consumption tax increase from 8% to 10% while advancing the government's "Cashless Vision" formulated by METI in April 2018, which aimed to increase cashless payment ratios to 40% by 2025 and to 80% in the future. The PRP offered consumers a 5% discount for purchases at independent small- and medium-sized registered retail shops and a 2% discount at franchise chains, with rewards available exclusively for cashless payment methods including credit cards, debit cards, QR code payments, and e-money.

The program's design included comprehensive support for merchants, with the government providing 100% subsidies for new payment terminals and registers (two-thirds government and one-third service providers) and capping merchant fees at 3.25% with a 1.08% government subsidy. Payment service providers receive 50% government subsidies for additional costs incurred to join the program, creating a multi-stakeholder incentive structure. Additionally, new payment providers aggressively compete for market share through reward campaigns, an

initial phase of zero merchant fees, and offer interoperability with bank accounts, convenience store payments, loyalty programs, and integration with e-commerce, making them a convenient alternative to traditional payment methods. With over 1.15 million participating stores out of 2 million eligible businesses and a government allocation of ¥775.3 billion, the program successfully increased cashless payment usage by 9-12% in participating stores (more than 940,000 shop), with effects persisting beyond the program's conclusion.

Following the PRP, Japan continued its promotional efforts through the MyNa Point (My Number Point) campaigns (2020-2023), designed to accelerate the adoption of the My Number Card (Japan's national ID card) and promote the use of cashless payments. The campaigns provided direct financial incentives (points/cashback) to residents who completed specific actions, with the dual goals of boosting digital payment adoption and integrating My Number Card into everyday life. The first phase (2020-2021) provided up to 5,000 yen in points for linking My Number Cards to cashless payment methods, while the second phase (2022-2023) expanded rewards to 20,000 yen for the integration of various digital services. Additionally, local and regional governments implemented their own cashback campaigns, often in partnership with payment providers and as part of the COVID-19 economic recovery efforts.

Japan's government program differs from incentive schemes examined in other studies in several respects. For instance, Ching and Hayashi (2010) and Carb′o-Valverde and Li˜nares-Zegarra (2011) examined the impact of point reward programs implemented by card issuers, but not the government. The purpose of the

point reward program by card issuers is to promote a brand. In contrast, Japan's program offered the same rewards to all card issuers and providers of other cashless payment services to promote cashless payments throughout the economy. Meanwhile, the study by Jonker et al. (2017) focused on a nationwide campaign in the Netherlands to promote debit card usage; however, it did not provide financial incentives. While this campaign may have led consumers and businesses to switch to cashless payments based on the expectation that everyone else would be switching, it is likely to be less effective than Japan's program, which provided financial incentives.

2.4 Prior research

2.4.1 Past research on Consumer Adoption and Usage Patterns in Japanese context

After the introduction of government campaigns, several studies have examined the effectiveness of cashless payment systems before, during, and after using this system to understand user experience. Fujiki (2022) states that the reduction in the cost of using cash due to the widespread use of cashless payments is overestimated and that the use of cashless payments is unlikely to reduce the frequency of cash payments. Therefore, this study also seeks to answer of why users increased cashless payment usage after the PRP and COVID-19 pandemic, which is our major concern in this study.

Another study by Fujiki (2023) stated that more than 50% of the respondents reduced cash pay and appreciated fast and widely accepted cashless payments,

social distancing reasons influenced by the government point reward program, and the COVID-19 pandemic. Fujiki (2023) shows that if there had been no COVID-19 cases in Japan, the ratio of cash use would be higher than that of the cashless payment system.

On the other hand, Sasaki and Ueda (2024) reveal that the campaigns had a lasting effect (higher by at least 1%) on the number of people using QR code payments despite the temporary increase in spending. This study concludes that while the immediate financial incentives play a critical role in initial adoption, other factors may influence the long-term use of QR payments in Japan. This shows that there is still a lack of understanding of why Japanese users continue to use cashless payment systems after their initial adoption.

The study of Amoroso (2024) stated that perceived value, perceived enjoyment, and privacy have a positive impact on consumer attitude, and security concerns turn negative toward continuance intention in using mobile wallet apps in Japan. This suggests that enhancing the perceived value and perceived enjoyment, overcoming the security issue and privacy concerns, and continuing to minimize the perceived risk can improve Japanese consumer attitudes toward continuing the mobile wallet apps. According to the 2023 Infcurion Consumer Payment Trend Survey covering 20,000 people aged 16-69 across the country, QR code payment applications have played a pivotal role in transforming consumer payment behavior in Japan. The convenience and simplicity of presenting or scanning a code with a smartphone has contributed to their rapid adoption, driving an impactful change in Japan's cashless payment market structure.

Research on financial literacy and ePayment adoption in Japan has revealed that higher financial literacy is positively associated with a higher likelihood of adopting and using ePayment services. Risk aversion is negatively associated with adoption and usage, whereas herd behavior is positively correlated with ePayment. This suggests that cultural and behavioral factors play crucial roles in Japanese consumers' choice of payment methods.

2.4.2 User Continuance Behavior in Information Systems

Continued use of information systems" refers to the sustained engagement of users with a particular software, application, or digital platform after their initial adoption or first experience with it. It is about ensuring that once an organization (or individual) starts using an information system (IS), they continue to derive value from it and integrate it into their routine operations and tasks, rather than abandoning or using it inefficiently. Continuance term has been examined variously as "implementation" (Zmud 1982), " incorporation" (Kwon and Zmud 1987), and "routinization" (Cooper and Zmud 1990) in IS implementation research which acknowledge the existence of a post-acceptance stage when IS use transcends concious behavior and becomes part of normal routine activity (Bhattacherjee, 2001).

This concept is crucial because initial acceptance is an important first step toward realizing IT/IS success, and continued usage is more critical in ensuring the long-term viability of technological innovations (Bhattacherjee, 2001; Premkumar and Bhattacherjee, 2008). Moreover, continued usage is a capstone for subsequent performance improvement from IT/IS usage. However, inappropriate and

ineffective long-term use of IT/IS often contributes to corporate failure (DeLone and McLean, 1992; Lyytinen and Hirschheim, 1987). Hence, understanding how and why individuals continue to use technologies remains a critical issue for technology management researchers and practitioners (Bell 2004).

A study by Park et al. (2017) (mobile payment in South Korea), emphasized the importance of perceived usefulness and found a significant effect of inertia on the continuous use intention. A study of mobile payment continuance by Franque et al. (2021) demonstrated that information quality and service quality are important predictors of use and confirmation, and consequently, use and confirmation are important predictors of satisfaction, individual performance, and perceived usefulness. Satisfaction, use, and individual performance are important predictors of continuance intention to use m-payments. One study of Cheng (2009) linked user satisfaction and perceived usefulness; self-efficacy, system service support, and social pressure are significant factors that affect continued usage of technology. Another study of A. B. Ifada; Z. Abidin, 2022 examined the factors that affect the continued intention to use QR code m-payments in Indonesia. Perceived usefulness, effort expectancy, and perceived risk have negative effect and trust, social influence and satisfaction have positive effect on continuance intention

Another mobile payment study of Sudan by Sleiman et al. (2022), states that satisfaction is a strong determinant of future intention along with performance expectancy, expectancy confirmation, effort expectancy, social influence, facilitating conditions, and habits. Sudanese users believe that this will help them enhance their performance and make transactions more satisfactory.

Furthermore, a study of Venkatesh et al. (2011) extend a two-stage IS continuance model by incorporating UTAUT in e-government technologies. The results support the expanded model that provides an understanding of the changes in the pre-usage beliefs with additional UTAUT constructs beyond perceived usefulness are important in explaining the intervening variables-disconfirmation, attitude, and satisfaction-and ultimately result in IS continuance intention. Trust plays a key role in individuals' pre- and post-usage attitudes and satisfaction in the IS usage.

2.5 Theoretical Foundations From Acceptance to Continuance: The Post-Adoption Paradigm

Technology Acceptance Model, proposed by Davis (1989), serves as a foundational framework for understanding user acceptance of new technologies. TAM predicts the acceptance and use of a new technology or system by its users, explaining their intended use primarily through two key constructs: perceived usefulness and perceived ease of use. The model has been continuously studied and evolved into Technology Acceptance Model 2 (TAM2) and the Unified Theory of Acceptance and Use of Technology (UTAUT), with applications extending to e-commerce contexts. These frameworks are valuable for understanding how users initially engage with technology, Venkatesh et al. (2003). However, they fall short of explaining what sustains their usage over time.

Ajzen (1985) proposed the Theory of Planned Behavior/Reasoned Action, suggesting that behavior is determined by intentions, attitudes, and subjective norms. This theoretical foundation provides crucial insights into why consumers

accept QR code payments using smartphones, emphasizing the role of behavioral intentions as predictors of actual usage behavior.

While initial acceptance models focus on pre-adoption factors, understanding their continued use requires different theoretical approaches. Bhattacherjee (2001) developed the Expectation-Confirmation Model (ECM) for information systems continuance, arguing that users' continuance intention is determined by their satisfaction with IS use and the perceived usefulness of continued IS use. This model represents a significant shift from acceptance-focused to continuance-focused research. The model demonstrates that user satisfaction is influenced by the confirmation of expectations from prior IS use and perceived usefulness, while post-acceptance perceived usefulness influences users' confirmation levels. The ECM addresses a critical gap in technology adoption research.

Recent research has extended the ECM to the mobile payment context. Singh (2020) developed an integrated model combining the ECM and UTAUT to explain users' post-adoption behavior towards mobile payment systems, including performance expectancy, effort expectancy, satisfaction, confirmation, and continuance intention. Their findings revealed that satisfaction had the highest impact on continuance intention, followed by trust, with the integrated model accounting for 51.7% of the variance in continuance intention. Another study by Rusydi et al. (2024) suggested that system quality affects satisfaction and attitude. This is because, a good system quality can increase the efficiency and effectiveness of system use by users, which in turn will increase user satisfaction. Furthermore,

satisfaction and attitude significantly influenced the continuance usage intention of QR code payments in Indonesia.

2.6 Research Gap

Despite extensive research on cashless payment adoption during government campaigns in Japan, significant gaps remain in understanding post-campaign continuance behavior.

Theoretical Gap: While previous studies have examined initial adoption factors and immediate campaign effectiveness (Fujiki, 2022, 2023; Sasaki & Ueda, 2024), there is limited application of established IS continuance models, particularly the Expectation-Confirmation Model (ECM), to QR code payment services in the Japanese context.

Contextual Gap: Research specific to QR code payment continuance in Japan remains severely limited. A CiNii database search revealed only 35 papers on cashless payments and just one paper specifically addressing QR code payment continuation as of June 2025, highlighting the scarcity of academic understanding in this crucial sector.

Behavioral Gap: Existing studies focus predominantly on financial incentives and adoption drivers but fail to explain the sustained usage patterns observed after government campaigns ended. The transition from acceptance to continuance behavior in QR payment systems remains underexplored, particularly regarding user satisfaction, expectation confirmation, and perceived usefulness in long-term usage scenarios.

This study addresses these gaps by applying the ECM framework as an analytical lens to understand the key drivers influencing continued QR payment usage in post-campaign Japan.

CHAPTER 3 RESEARCH QUESTION

The research questions addressed to answer this research gap are as follows:

General Question:

Why are QR code payment services that continuously use smartphones in Japan?

Main Question:

How do confirmation of expectation, perceived usefulness, and satisfaction factors influence users' intention to continue QR payment services?

CHAPTER 4 RESEARCH METHODOLOGY

This chapter details the research methodology employed to investigate the motivators behind the continued use of QR code-based payment services in Japan, following the conclusions of government-led promotional campaigns. It outlines the formulated hypotheses and the proposed research model using a quantitative research approach. The methodology encompasses the development and deployment of both a screening questionnaire and main questionnaire, along with procedures for data screening and subsequent modeling analysis to interpret the findings.

4.1 Research Model

This study adopted the Expectation Confirmation Model for Information System continuance (ECM-ISC) developed by Bhattacharjee (2001) as a theoretical framework for examining the continued usage of QR code payment services. This model is considered a post-acceptance model, an extended model of technology acceptance that adapts the Expectation Confirmation Theory (ECT) from the consumer behavior literature (Oliver, 1980) to distinguish between acceptance and continuance behaviors (Bhattacharjee, 2001). This theory explains how users continue to use information systems over time. It focuses on the role of perceived usefulness, confirmation of expectations, and user satisfaction in predicting continued IS use.

According to the model, users form initial expectations before using any information system or technology. After actual use, they evaluate its performance, which leads to confirmation (when performance meets or exceeds expectations) or disconfirmation (when expectations do not meet). This confirmation affects perceived usefulness—the user's belief that the system helps achieve their desired outcomes—and satisfaction, which is the emotional response to the usage experience. Finnaly, we determine the users' intention to continue using the system. This model has been widely applied in various areas such as e-commerce, mobile applications, and digital services (Bhattacharjee, 2001). Compared to pre-adoption models, such as the Technology Acceptance Model (TAM) and IS Continuance model (ECM-ISC), are more suitable for understanding sustained usage behavior and the factors influencing long-term user engagement with information systems.

In this study, we define continuance intention to use the QRPS as one's intention to continue using the QRPS till now. This study aims to cover the periods in which users continuously used the QRPS after they initially adopted it. The hypothesis model examines the relationship between a few key drivers, such as confirmation of expectations, perceived usefulness, satisfaction, and continued usage of QR code payment services in Japan. In the context of QRPS, using QRPS is voluntary, where the user has the freedom to decide whether he or she will utilize this service and is beneficial in assessing how user satisfaction is formed based on the confirmation of initial expectations and perceived usefulness to shape their continued use of QRP services.
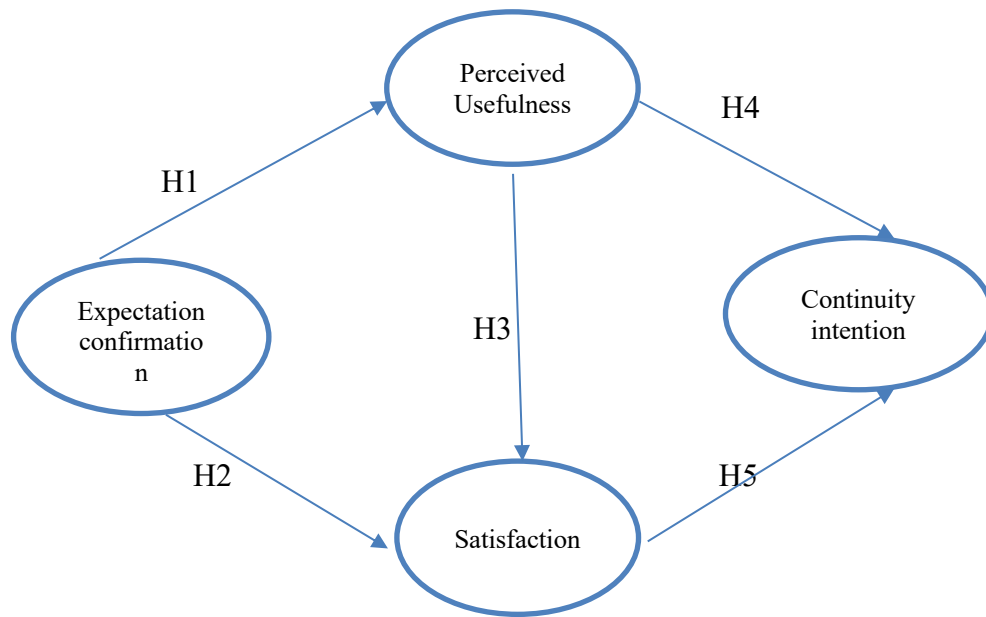
Figure 2. Hypothetical Model

4.2 Hypothesis

Five hypotheses were formulated for this study based on the theoretical framework developed by Bhattacherjee (2001) to understand the continued usage terms of information systems (QR code payment services). Their studies suggest that users' continuance intention for any information system is influenced by their satisfaction and the perceived usefulness of continued usage. Satisfaction results when expectations from prior use of information systems and perceived usefulness are fulfilled.

4.2.1 Confirmation of Expectation

It is defined as a user's evaluation where users compare their actual experience with the new products, services or information technology against their initial expectations. Here, expectation is the initial stage in which users form expectations about a system before using it, often based on marketing instruments or prior experience with similar systems. In the QR code payment service context, if the service works as expected, that is positive confirmation. However, if it does not fulfill the user's expectations, its confirmation is negative (Oghuma et al., 2016).

According to the cognitive dissonance theory, (Bhattacherjee, 2001; Festinger, 1957), users may experience cognitive dissonance if their pre-acceptance usefulness is not met during their actual use. To reduce this, QRPS users may try to adjust their usefulness perception to be more grounded in reality. Confirmation increases the perception of usefulness while disconfirmation reduces the perception (Thong et al., 2006). Therefore, in the context of QRPS context, users will continuously adjust their expectations to meet the reality. To support this, previous research also explains that the fulfilment of confirmation positively influences the perception of the usefulness of information systems (Franque et al., 2021; Bhattacherjee and Premkumar, 2004). With the reference to the above study, we developed a hypothesis that is suitable for the QR code payment services in the Japanese context.

Hypothesis 1: Confirmation of expectations (C) has a positive effect on perceived usefulness (PU).

Previous research has found that the fulfilment of expectations is positively related to satisfaction (Bhattacherjee and Premkumar, 2004; Bhattacherjee, 2001; Thong et al., 2006; Venkatesh et al., 2011). When the actual experience meets or exceeds the initial expectation, confirmation leads to user satisfaction, because the expected benefits of IS use are achieved. On the other hand, if the actual experience falls below the initial expectation, dissatisfaction occurs due to failure to achieve the expectation. As described as above, QRPS users also compare their actual experience of QRPS use with their initial expectations. If their expectations are fulfilled, they are satisfied with the QRPS use. Based on this, we propose the following hypotheses:

Hypothesis 2: Confirmation of expectations has a positive effect on satisfaction (S).

4.2.2 Perceived Usefulness

In the ECM, post-consumption expectation is represented by ex-post perceived usefulness. This is the extent to which a user starts to understand the benefits of using information systems (Davis, 1989). This relates to the performance aspects of IS use (Bhattacherjee & Premkumar, 2004; Venkatesh et al., 2011). When users perceive the benefits of system utilization, a sustainable relationship is strengthened. Earlier research shows that the perceived usefulness of an information system has a positive relationship with its continuance use intention of information systems (Bhattacherjee, 2001; Bhattacherjee and Premkumar, 2004; Franque et al., 2021) and satisfaction (Bhattacherjee, 2001; Mouakket, 2015). The more benefits users expect to gain from QR code payment service use, the more satisfied they will be and the likelihood that they will continue using QR code payment services.

Hypothesis 3: Perceived Usefulness has a positive effect on user's satisfaction.

Hypothesis 4: Perceived Usefulness has a positive effect on the continuous usage intention of the QRPS (CI).

4.2.3 Satisfaction

User satisfaction is 'the affective attitude towards a particular computer application by an end user who interacts with the applications directly' (Doll et al. 1998). Satisfaction refers to 'the summary psychological state resulting when the emotion surrounding disconfirmed expectations is coupled with the consumer's prior feelings about the consumption experience' (Oliver, 1981). It measures how well expectations are met or exceeded, leading to a positive evaluation of their interactions. It is a key determinant of post-adoption behavior and is often linked to customer satisfaction and retention (Mouakket, 2015). Satisfaction influences IS use, system success (Bhattacherjee, 2001; DeLone and McLean, 1992), and attitudes toward technology (Bhattacherjee and Premkumar, 2004). With the various digital payment services available on the market, satisfaction can be a salient factor for users to decide to continue the QRPS use. A dissatisfied user can easily switch to another alternative at a lower switching cost (Deng et al., 2010). Only satisfied users choose to continue using the QRPS. The more satisfied the users are, the higher the chance that they will continue using the QRPS. Therefore;

Hypothesis 5: User satisfaction has a positive effect on the continuous usage intention of the QRPS.

4.3 Quantitative Method

To conduct empirical research and examine the proposed research model, a positivist approach, along with a deductive method (hypothetico-deductive method), was employed. The hypothetico-deductive method is a circular process that begins with the existing theory to build testable hypotheses, design an experiment by operationalizing variables (i.e., identifying variables to manipulate and measure through group assignments), and conduct an empirical study based on experimentation. Ultimately, the findings are used to help inform theories and contribute to the literature (Park et al.,2020). In this study, a positivist approach was chosen because it prioritizes objectivity and seeks to minimize the influence of researcher bias.

This study employs a quantitative research method using an online survey questionnaire to collect data from a sample of 2000 users in Japan. Quantitative research involves the use of statistical methods to quantify relationships, pattern and trends within the data to establish cause and effect relationships or test hypothesis with minimum researcher's biasness (Lim,W.M.,2024). This method is important for generalizing to a wider population. This study adopted the probability sampling method, specifically simple random sampling, in which every possible sample of the population has an equal chance of being selected. A critical analysis of existing literature, as well as creative thinking, was conducted to achieve the goal of this research. Interviews with Japanese users were performed to understand the user behavior and issues more deeply and to learn why users behave or think in a certain way. Moreover, statistical analysis was performed to test the user's post-

adoption behavior and measure the satisfaction level in the QRPS usage context using IBM SPSS AMOS 28 and Descriptive Statistics.

4.4 Quantitative Survey Method

This study employed a comprehensive questionnaire survey to investigate user perceptions and continued intentions regarding QR Code Payment Services (QRPS) in Japan. We chose this survey method because it is the most suitable method to achieve the goal of this study to identify influential factors and evaluate the proposed hypotheses related to QRPS continuance. This study also seeks to create generalizable findings and draw conclusions that can be applied to a broader population of the Japanese market. Using this method, a large sample size increases the generalizabilty of the outcomes. The target participants of this survey were active users of QR Code Payment Services (barcode-based payment services) across Japan. To reach a broad and representative audience, the survey was conducted by the iBridge Corporation, a leading Japanese survey implementation company with 13 million registered members. The questionnaire was deployed via their proprietary survey platform, Freeasy 24, and was distributed online to their monitor members. This strategic choice of platform and provider aimed to minimize sampling and selection biases while remaining cost-effective for academic research. The survey questions were primarily written in Japanese to ensure the clarity and understandability of the respondents, which helped to enhance the accuracy of their responses.

4.4.1 Creating Screening questionnaire

Preliminary screening was conducted on January 28, 2025, before the primary survey was distributed. This preliminary survey covered a sample size of 2,000 individuals from across Japan, aiming to introduce of potential respondents suitable for the main study. These 5 questions were formulated based on report by 経済産業省商務サービスグループキャッシュレス推進 (2024) which provides valuable data and knowledge regarding the status of QR code payment in past and recent scenarios to understand the user behavior.

The screening survey included the following five questions.

Question 1: "Are you currently using QR code payment via smartphone (e.g., PayPay, auPay, Rakuten Pay, d-Barai, Line Pay, etc.) in Japan?"

If yes, please answer the following questions.

Question 2: " When did you start using QR code payments?

Question 3: "Please tell us the reasons why you started using QR code payment at the time you answered in Q2?"

Question 4: How often do you use QR code payments?

Question 5: Which QR code payment app do you most frequently use in Japan?

Based on the responses to these questions, individuals who were active users (an individuals who regularly engage with and utilize the QRPS and have a high user engagement score. They are often tracked on a daily, weekly, or monthly basis.) and aligned with the focus of this study were selected and additionally invited to participate in the comprehensive survey. 1260 respondents indicated that they were current users and had previous experience with the QRPS.

4.4.2 Creating main questionnaire

The survey was structured into two primary segments.

Demographic and Descriptive Section: This initial section of the questionnaire was designed to gather fundamental information about survey respondents and their engagement with QR Code Payment Services (QRPS). Along with the standard demographic variables such as gender, age, occupation, and geographical location, this section specifically sought to characterize the respondents' usage patterns of the QRPS by inquiring about their frequency, duration of usage, and so on.

Factors and Perceptions Section: This segment delved into the core variables of the research model, featuring 14 questions adapted from Bhattaacherjee's (2001) established research. These questions aimed to measure perceptions across four pivotal variables: confirmation of expectations (three questions), perceived usefulnesss (four questions), and satisfaction (four questions). An additional three questions specifically targeted respondents' perceptions of their continued intention to utilize the QRPS (Appendix). All questions in this section utilized a nominal scale approach with a 7-point Likert scale, ranging from "Strongly Disagree" to "Strongly Agree." All the questionnaires were designed in Japanese language to make them understandable for Japanese users and we carefully adapted questions from previous research to align with the study's objectives while preserving their original meaning.

Table 2. Main Questionnaire for QR code payment behavior

Factor	Questions
Confirmation of Expectation	C1: QRコード決済を使ってみると、それ以前に思っていたものよりも良かった。 C2: 支払機能以外の機能も含めたQRコード決済システムのサービスは、思っていたものよりも良かった。 C3: QRコード決済システムに対して期待していることのほとんどのことが実現されている。
Perceived usefulness	PU1: QRコード決済を使用することで、家計の管理がやりやすくなる。 PU2: QRコード決済を使用することで、支払作業の生産性が向上する。 PU3: QRコード決済を使用することで、家計管理を実施することの効果が向上する。 PU4: QRコード決済は支払管理に役立つ。
Satisfaction	SAT1: QRコード決済システムを使用経験は、満足したものである。 SAT2: QRコード決済システムを使用するときは、気分が良い。 SAT3: QRコード決済システムを使用するときは、期待通りにスムーズに物事が進む。 SAT4: QRコード決済システムを使用経験は、快適なものである。
Continuity intention	CI1: QRコード決済システムの使用を継続するつもりである。 CI2: QRコード決済システムを現金やクレジットカード支払いよりも優先して使用したいと思う。 CI3: 可能であれば、QRコード決済システムの使用をやめたい。

The main survey was administered on January 29, 2025, to 1,260 QR code payment users, focusing on their intentions for continued use. In total, 501 responses were received. To ensure data quality, the survey administrator used an AI-based fraud-response elimination service. This service was designed to collect 120% of the target sample size and automatically filter out "short-lining" and "straight-lining" responses that were deemed fraudulent. It is important to note that this service has a limitation: if fraudulent responses exceed 20% of the collected data, it may not be possible to eliminate all of them.

Following the initial data collection, a manual data-cleaning process was undertaken. Visual inspection of the obtained survey data revealed a significant number of straight-lining responses, indicating potential fraudulent or inattentive submissions. Consequently, responses for which more than 80% of the options selected were identical were excluded from the analysis, as they were considered highly suspicious of being fraudulent. After rigorous data cleaning, the final analysis was conducted using 461 valid respondent entries.

Table 3. Sample characteristic (N=461)

Characteristics			
1.Gender 2.Address	Male Female 47 prefectures in Japan	5.Age	15 years old and above
3.Occupation	Employee Student Part-time Housewife Unemployed	6.Starting year of QRPS usage	Before 2018 2018 2019 2020 2021 2022 2023 2024
4.Annual income	Less than 1 million 1 million < 5 million 5 million <10 million 10 million <15 million 15 million <20 million Over 20 million	7.QRPS usage frequency	Almost everyday Several times a week Once in a week Once in a month Once in few month

4.5 Data Analysis

IBM SPSS Amos and Microsoft Excel applications program were used for modelling analysis. The IBM SPSS Amos software program was used to implement structural equation modelling – Confirmatory Factor Analysis (SEM-CFA) to obtain the satisfaction factor score. The model employed in this study is a hypothesis about the relationship between certain factors used to measure the influential factors that drive continued QRPS usage intention, such as: confirmation of expectations, perceived usefulness, and satisfaction.

CHAPTER 5 DATA COLLECTION

5.1 Demographic Distribution

5.1.1 Age

Among the respondents, it was found that 24.1% (111 individuals) fell within the age range of 55 to 64 years old. Additionally, 19.7% of the respondents were between the ages of 65 and 74, 18.4% were between the ages of 45-54, 13.2% were between the ages of 35-44 (Figure 3). The analysis of user age reveals that the majority of QRPS users belong to a strong middle-aged and senior representation.
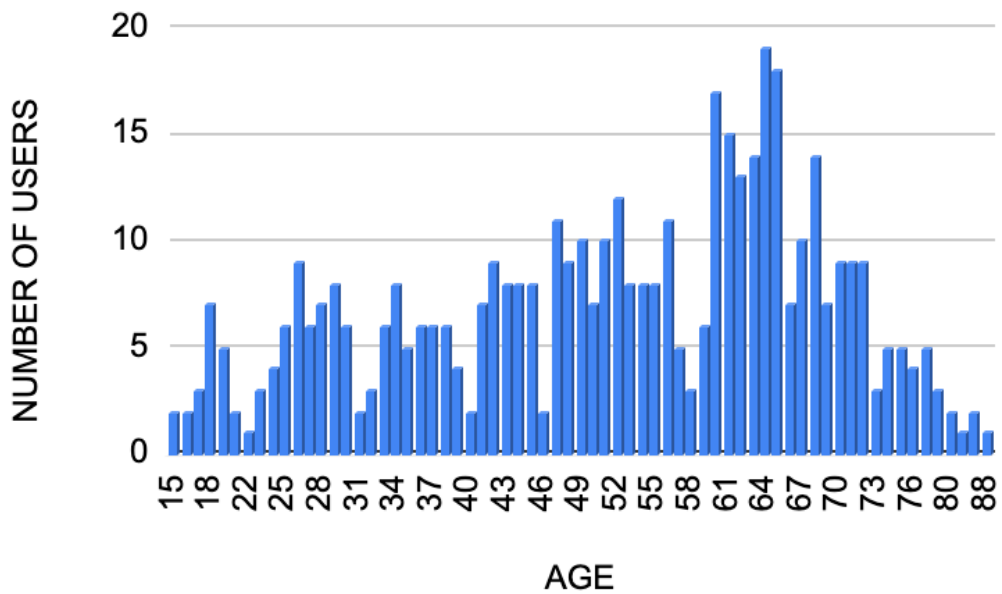
Figure 3. Bar diagram of QRPS user's Age (n= 461)

5.1.2 Gender

Of the 461 respondents, approximately 51.6% (238) were female, while 48.4% (223) were male (Figure 4). This gender distribution suggests a marginal preference for the QRPS among female users. One potential explanation for this observation is that QRPS offers a convenient solution that may be particularly advantageous for female individuals.
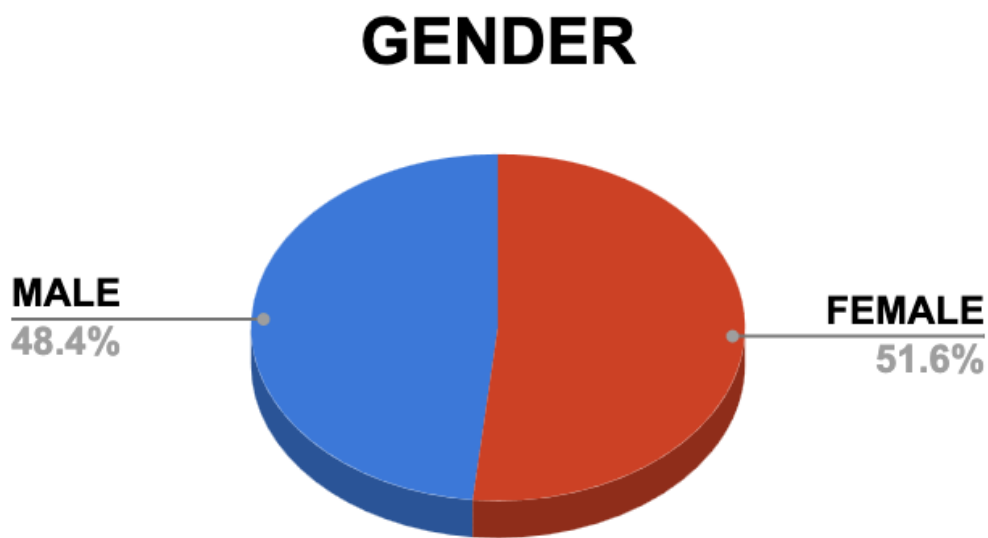
Figure 4. Pie chart of QRPS user's gender (n= 461)

5.1.3 Occupation

Looking at the occupations of the respondents, 36% were identified as company employees, forming the largest group of QR payment service users. Other notable segments included part-time (14.3%) and unemployed (16.5%) workers. Students comprised 4.3% of the users, while self-employed individuals accounted for 5%.

Smaller proportions were observed for freelancers (2.2%), managers (1.5%), and civil servants/doctors (1.5%) (Figure 5).

This distribution suggests that a significant portion of QRPS users are company employees who likely value the convenience and efficiency of QR code payments for their daily transactions. The notable percentage of part-time workers and unemployed individuals also indicates that the QRPS appeals across various employment statuses, potentially due to its accessibility and ease of use regardless of a fixed work schedule.

OCCUPATON

Label	Value
Freelance work	2.2%
Student	4.3%
Housewife	15.8%
Managers/Officers	1.5%
Part-time job	14.3%
Civil servants (excl...	2.2%
Doctors/medical pe...	1.5%
Company employe...	6.7%
Self-employed	5.0%
Unemployed	16.5%
Company employe...	29.3%
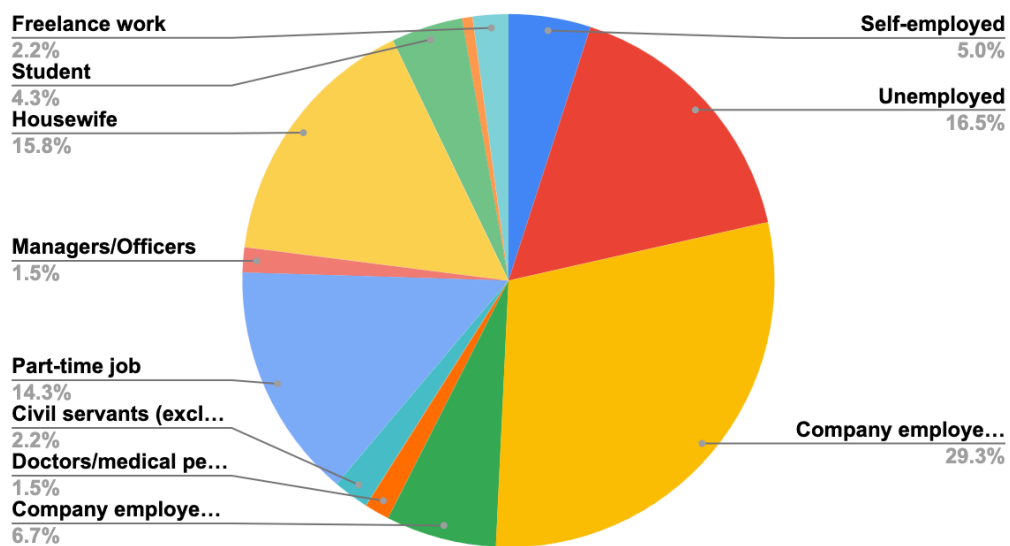
Figure 5. Pie chart of QRPS user's Occupation (n= 461)

5.1.4 Prefecture

The data show a clear concentration of QR code payment service (QRPS) users in Japan's major urban centers. Notably, 14.3% of the respondents were from Tokyo,

and 11.3% were from Kanagawa. Saitama and Osaka accounted for 7.8% and 7.4%, respectively. We also saw 4.8% each from Aichi and Hyogo prefectures.

Combined, these prefectures represented over half of all the responses (Figure 6). This strong presence in metropolitan areas, such as Tokyo, Kanagawa, and Osaka, is not surprising. These regions are densely populated and typically have a broader and more established network of businesses that accept the QRPS. This greater accessibility and availability of QRPS options in urban environments naturally leads to higher adoption, and consequently, a larger representation among our survey respondents.

PREFECTURE
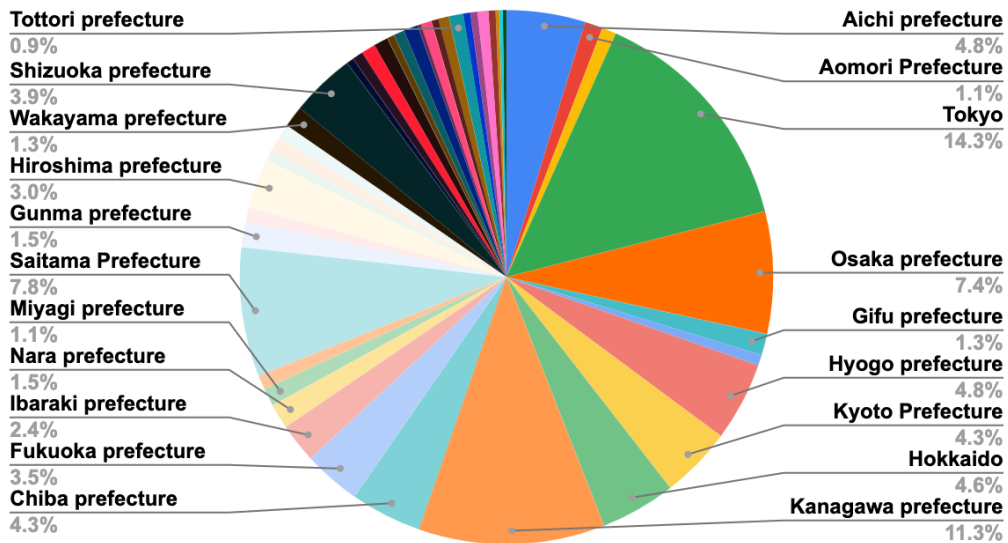
Figure 6. Pie chart of QRPS user's location- Prefecture (n= 461)

5.1.5 Annual Income

In the context of QR code payment service users in Japan, the largest segment of users falls within the ¥3 million to ¥4 million (14.1%) income bracket, closely followed by those earning between ¥2 million and ¥3 million (12.8%). This suggests that QR payment services are widely adopted by individuals within the middle-to-lower-middle income range in Japan. While a substantial portion (11.1%) earned between ¥4 million and ¥5 million, and another 10.4% earned between ¥5 million and ¥6 million, indicating a strong presence among stable, working-class households, it is worth noting that the very high-income bracket, over ¥20 million, constitutes a significantly smaller percentage of just 2.2% (Figure 7).

This distribution aligns with the general drive in Japan towards a more cashless society and the widespread availability and ease of use of QR code payments such as PayPay, Rakuten Pay, and d Payment, making them a practical and attractive option for daily transactions across a broad economic spectrum. The data suggest that these services are particularly resonant with the average Japanese consumer, for whom efficient and convenient payment methods can help manage daily expenses.

ANNUAL INCOME

Over 20 Million(M) 2.2%
Less than 1M 5.9%
9M to less than 10M 5.0%
8M to less than 9M 5.4%
7M to less than 8M 8.0%
6M to less than 7M 7.2%
5M to less than 6M 10.4%
4M to less than 5M 11.1%

1M to less than 2M 6.7%
10M to less than 12M 7.4%
12M to less than 15 M 2.6%
15M to less than 18M 1.1%
2M to less than 3 M 12.8%
3M to less than 4 M 14.1%
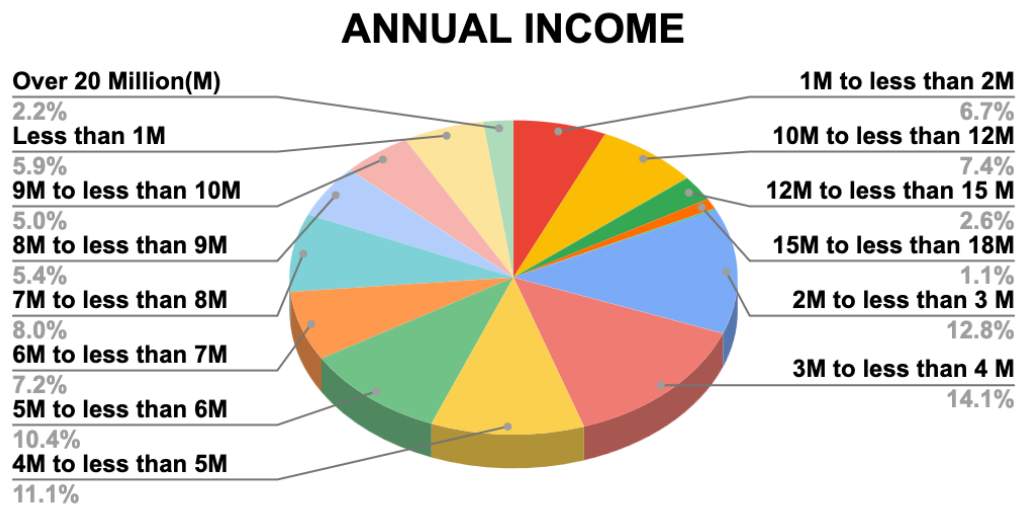
Figure 7. Pie chart of QRPS user's Annual income (n= 461)

5.2 QR Payment Service in Japan and The Profiles of Respondents

5.2.1 Starting year of using QR Payment Service

In Japan, the adoption of QR code payment services (QRPS) has significantly accelerated, particularly influenced by major government initiatives. According to figure (8), while 21.7% of respondents have been using the QRPS for over five years, indicating an early adopter base, the most substantial growth occurred more recently, with 47% reporting usage for one to three years. This surge can be contextualized by the launch of large government campaigns, such as the My Number Point Reward Program and other point-back initiatives, which incentivized cashless transactions and specifically promoted QR code payments by offering significant rebates.

Data (Figure 8) show a steady increase in new users: 10.6% before 2018, followed by 8.2% in 2018, 9.1% in 2019, and a notable increase to 21.7% in 2020,

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likely boosted by both campaigns and a broader push for contactless payments due to the COVID-19 pandemic. Adoption continued with 15.8% in 2021, 16.3% in 2022, 11.5% in 2023, and 6.7% in 2024, demonstrating that these campaigns, coupled with the inherent convenience of QRPS fostered a lasting shift in payment habits among Japanese consumers.

Starting year of using QR payment

2024 6.7%
2023 11.5%
2022 16.3%
2021 15.8%

Before 2018 10.6%
2018 8.2%
2019 9.1%
2020 21.7%
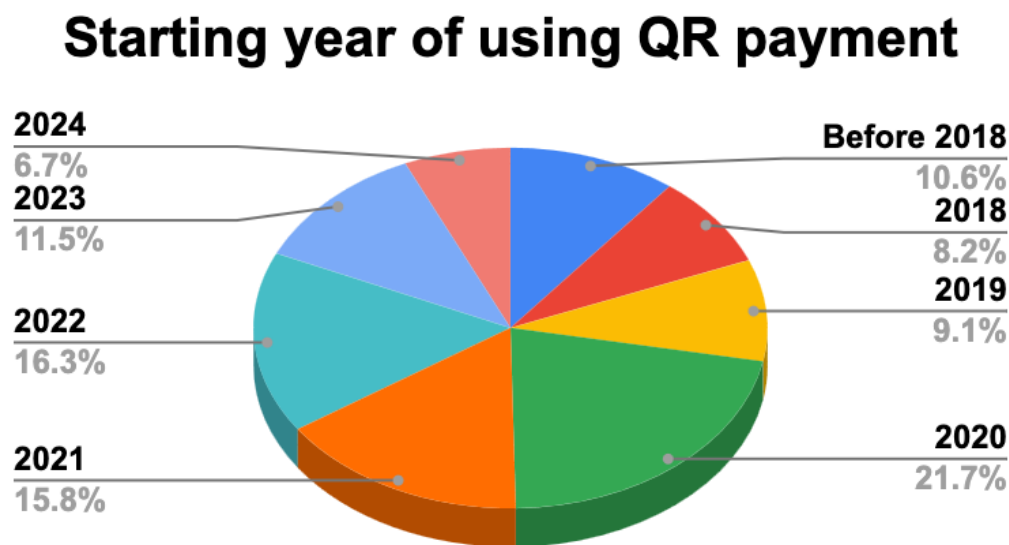
Figure 8. Pie chart of Starting year of using QRPS (n= 461)

5.2.2 QRPS usage Frequency

In response to the question regarding the frequency of QRPS usage, a substantial 39.7% of respondents (figure 9) reported using QRPS "several times a week," highlighting a strong integration into their routine transactions. Close behind, 22.8% utilize it "once a week," further emphasizing its regular, frequent use by many. "Almost everyday" usage was reported by 11.1%, indicating a segment of highly reliant users. Meanwhile, 26.4% (18.2% "once a month" and 8.2% "once

in a few months") use it less frequently, perhaps for specific purchases or as a secondary payment method, but still acknowledge its presence and utility.

This consistent engagement across various frequencies suggests that QR code payments are no longer just a novel option, but a firmly established and preferred method for a substantial segment of the Japanese population, moving the nation closer to its cashless society goals.

Frequency of using QR Payment

Once in few month
8.2%

Almost everyday
11.1%

Once a month
18.2%

Several times a week
39.7%

Once a week
22.8%
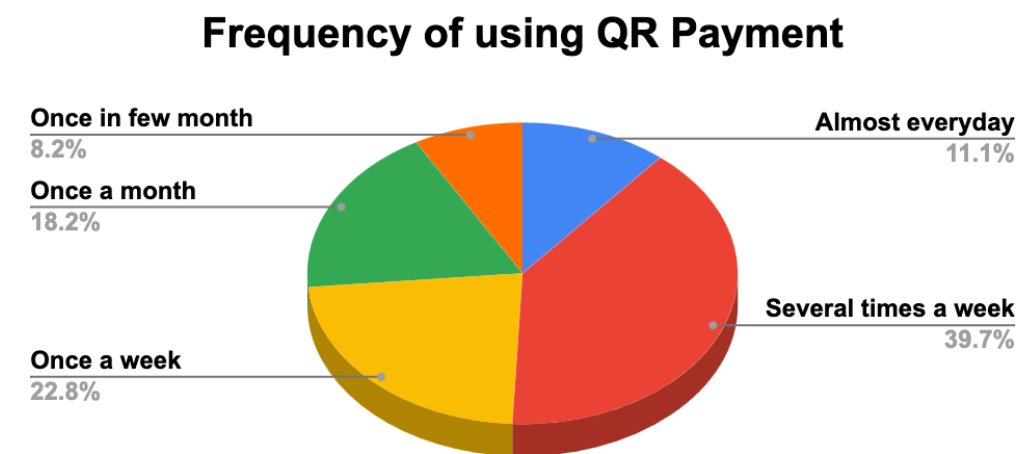
Figure 9. Pie chart of Frequency of using QRPS (n= 461)

5.2.3 Reason to start QRPS

In Japan's evolving cashless landscape, the primary drivers for adopting QR-based payment services are heavily influenced by cashbacks and discounts, accounting for nearly one-third of users (29.2%), reflecting a strong consumer inclination towards value and savings. Convenience also plays a significant role, attracting 18.5% of users who appreciate the ease of scanning a code with their smartphones and the speed of transactions. Furthermore, while a sense of curiosity

(16.5%) and the allure of a new method (10.9%) initially drew some users, these factors are often amplified by aggressive campaigns (14.2%) run by major players, such as PayPay, which has become a common place in Japan. Recommendations (8.3%) from peers also contributed, while a small percentage (2.4%) cited other reasons for their initial adoption (Figure 10).

These data strongly indicate that direct financial incentives remain the most compelling reason for Japanese consumers, but the social aspect and desire to try novel technologies (by seeing their benefits) also influence Japanese consumers' shift towards QR payments.

Figure 10. Pie chart of Reason to start using QRPS (n= 461)

5.2.4 Frequently used QRPS app

In the competitive landscape of QR code payment services in Japan, PayPay clearly dominates, with a remarkable 53.6% of respondents indicating it as their most frequently used application (Figure 11). This aligns with its strong market

presence and its widespread acceptance across numerous establishments. Following PayPay, Rakuten Pay secured a significant second place at 20%, leveraging the extensive Rakuten ecosystem and its popular point program. d 払い (d Barai), offered by NTT Docomo, comes in third at 14.8%, likely benefiting from its integration with the mobile carrier's user base. au Pay, from KDDI, captures 8.9% of the usage, while the remaining 2.6% is distributed among various other less frequently used applications.

These data underscore PayPay's leading position as a ubiquitous payment method for daily transactions in Japan, with Rakuten Pay and d Barai holding substantial shares because of their strong affiliation and loyalty programs.
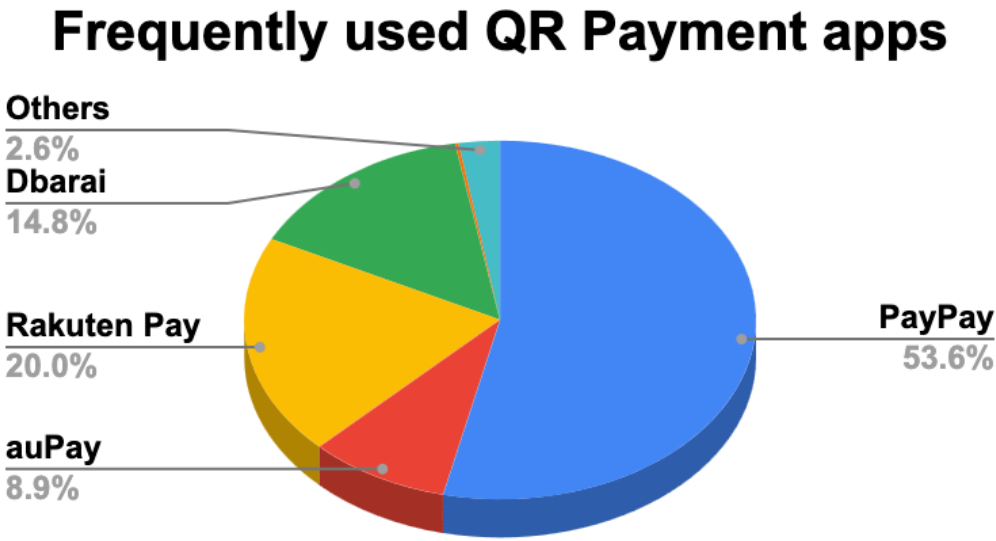

Figure 11. Pie chart of Frequently used QR payment apps (n= 461)

5.3 Descriptive data distribution

In Section 2 of the questionnaire, participants who were users of QR code payment services (QRPS) were asked to provide their opinions and experiences regarding the five variables mentioned earlier. Each variable was accompanied by 3-8 questions tailored to specific scenarios related to that variable. Due to the nature of the Japanese language, it was necessary to present the questions in detail while ensuring ease of understanding. This was crucial to prevent participants from getting confused or abandoning the questionnaire midway, as not everyone possesses patience or willingness to engage with a lengthy survey. The risk of participant dissatisfaction or incomplete surveys could undermine the overall quality of the research.

Therefore, this step of understanding and translating the questions from English to Japanese, while referencing previous studies, presents a challenging and time-consuming task. The aim was to strike a balance between providing sufficient detail and maintaining clarity, ensuring that participants could answer the questions comfortably and contribute to the completion of the questionnaire.

5.3.1 Confirmation of Expectation

Looking at confirmation, This data reveals Strong Positive Expectation Confirmation (CI1), The most striking finding is that 68.1% of users found QR code payment better than expected when they first tried it (10.8% strongly agree + 25.4% slightly agree + 31.9% agree). Only 5.4% had negative experiences that fell short of their expectations. This suggests that initial skepticism or conservative

preconceived notions were largely overcome by actual usage experience, which is crucial for continued adoption. Moderate Satisfaction with Extended Features (CI2): Regarding additional functions beyond basic payment, 64.4% found the service better than expected, although the distribution showed slightly more neutral responses (28.6%) compared to CI1(Figure 12).

This indicates that while users appreciate extra features, the core payment functionality remains the primary driver of positive expectations. Room for Improvement in Comprehensive Performance (CI3) - The overall system performance shows the most conservative pattern, with 50.6% agreeing that it meets expectations, but a notably high 38.4% remaining neutral. This suggests that, while users do not view the system negatively, there is significant room for enhancement to fully meet comprehensive expectations.

For continued usage, the strong expectation confirmation in CI1 creates a favorable foundation, as users who experience better-than-expected initial interactions are more likely to persist with the technology. In addition, feature development opportunity, a moderate response to CI2, suggests that while additional features are appreciated, they may not be the primary factor driving continued usage. The focus should remain on core payment reliability and ease of use. Furthermore, the need for system optimization – a high neutral response in CI3- indicates that users are not fully convinced that the system comprehensively meets their needs. This represents the greatest opportunity for improvement in driving long-term adoption.
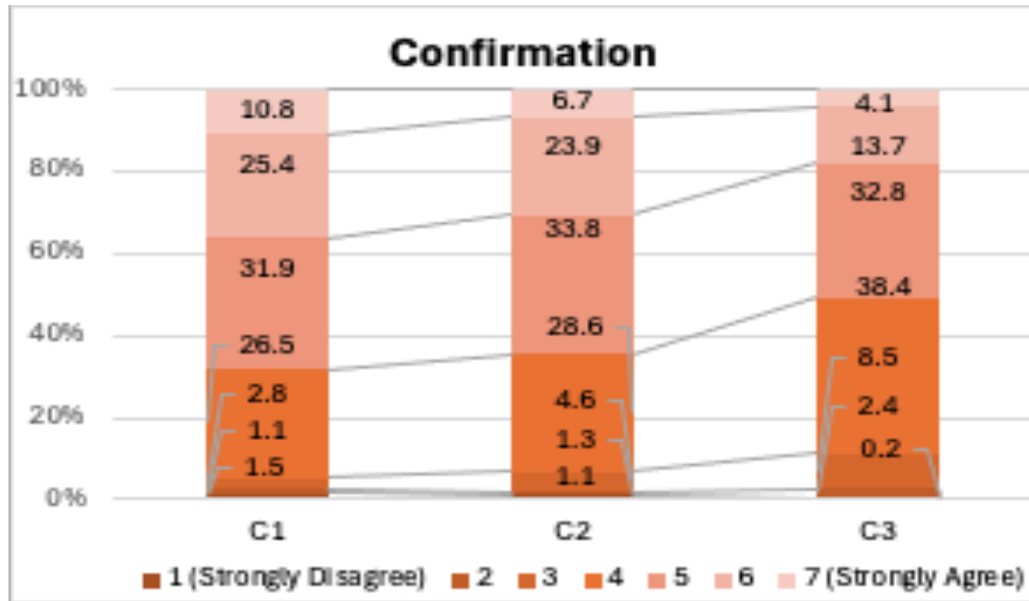
Figure 12. Confirmation of Expectation

5.3.2 Perceived Usefulness

For perceived usefulness, the data indicate a high perceived usefulness in terms of payment operation productivity. Over 63% of users (10.8% strongly agree, 23.4% slightly agree, and 29.1% agree) believed that using QR code payments improves the productivity of payment operations (PU2) (figure 13). This aligns with the well-known benefits of cashless payments, such as speed, reduced need for physical cash, and streamlined transactions, which are particularly valued in Japan's fast-paced social environment. This strong positive sentiment suggests that the operational efficiency offered by the QRPS is a significant driver of sustained adoption.

However, the perceived usefulness of household finance management is less decisive. For "Using QR code payment makes it easier to manage your household finances" (PU1) and "Using QR code payment will improve the effectiveness of

managing your household finances" (PU3), a large number of respondents (48.4%
and 45.8%, respectively) remained neutral. While a combined 31.7% (PU1) and
32.9% (PU3) expressed some level of agreement, a notable proportion disagreed or
slightly disagreed. This mixed response suggests that while QRPS simplifies the act
of payment, users may not yet fully leverage its potential for comprehensive
financial tracking or find a significant improvement over their existing methods for
managing household budgets. This highlights an area in which service providers
can further educate users or integrate more robust personal finance management
features to enhance perceived usefulness. Overall, despite some neutrality on
finance management aspects, a combined 46.2% (6.3% strongly agree, 15.6%
slightly agree, and 24.3% agree) still find QR code payments "useful for managing
payments" (PU4), reinforcing their general utility in day-to-day transactions.
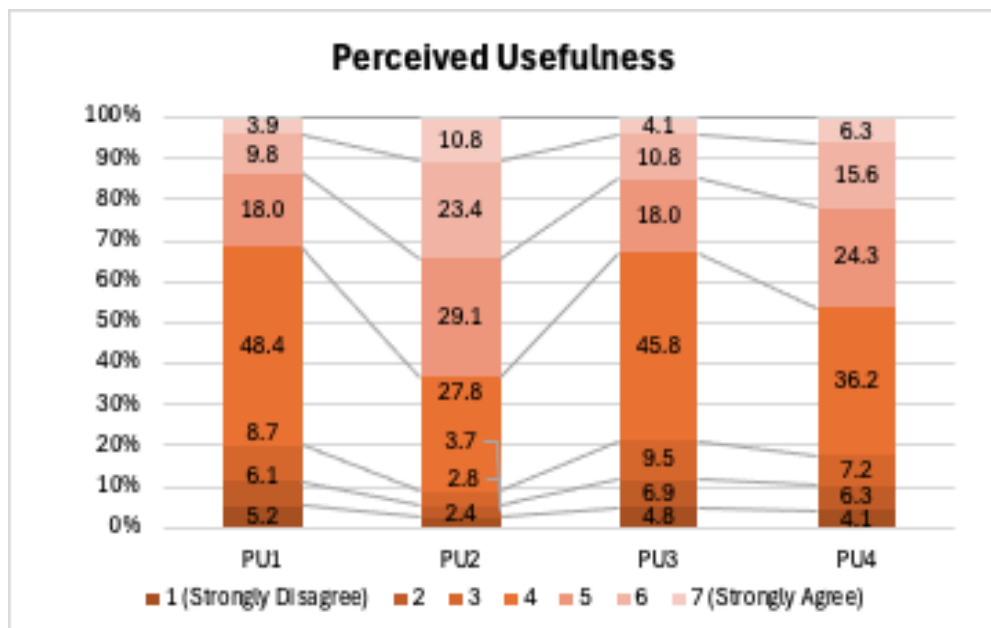

Figure 13. Perceived Usefulness

5.3.3 Satisfaction

Regarding satisfaction, the data revealed a predominantly positive user satisfaction landscape for QR code payment systems in Japan following government campaigns. Across all four satisfaction measures, the combined positive responses (strongly agree, slightly agree, and agree) consistently outweigh the negative responses by a substantial margin. SAT1 shows the highest overall satisfaction with 79.2% of users expressing positive sentiments about their QR code payment experience, SAT3 demonstrates strong operational satisfaction (72.8%) agreeing that the system functions as smoothly as expected. This suggests that the post-campaign implementation successfully delivered on user expectations regarding the system reliability and overall experience quality.

However, the data (Figure 14) also revealed important nuances in users' emotional engagement with the technology. SAT2, which measures users' emotional response ("I feel good when I use the QR code payment system"), shows a markedly different pattern with 48.4% of respondents remaining neutral and only 38.8% expressing positive feelings. This indicates that while users find the system functionally satisfactory and reliable, there is a significant emotional detachment from the payment method. High neutrality suggests that QR code payments may be perceived more as a utilitarian tool rather than an engaging or emotionally rewarding experience, which could impact long-term adoption and advocacy.

The relatively low levels of strong disagreement across all measures (ranging from 0.2% to 4.1%) indicate that the QR payment system has not created significant user frustration or dissatisfaction. The pleasant experience measure (SAT4) showed

70.2% positive responses with only 24.7% neutral, suggesting that while users may not feel emotionally connected to the system, they find it pleasant to use. This satisfaction profile suggests that government campaigns have been effective in establishing a functional and acceptable payment infrastructure, although room remains for improvement in creating more engaging user experiences that could drive stronger emotional attachment and potentially higher continued usage rates.
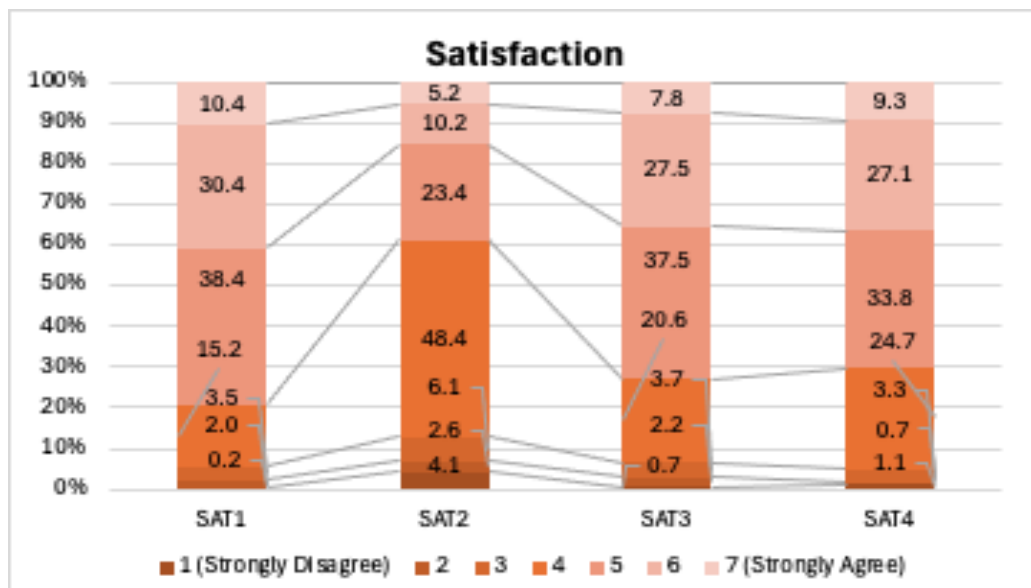
Figure 14. Satisfaction

5.3.4 Continued Usage Intention

The data revealed a strong positive sentiment toward QR code payment system continuance among Japanese users following government promotional campaigns. The most compelling indicator was CI1, where an overwhelming 93.7% of respondents expressed intent to continue using QR code payments (74.4% strongly agree, 19.3% slightly agree), with virtually no opposition (only 0.4% disagree). This suggests that the initial adoption experiences were largely positive and created

sustainable usage patterns. The reverse-coded CI3 further reinforces this trend, with 79.9% (45.8% strongly agree, 21.7% slightly agree, and 12.4% agree)of users indicating that they would not want to stop using QR code payment systems, demonstrating a strong retention potential even when framed negatively (Figure 15).

However, (Figure 15) the data also reveals important nuances in user preferences and adoption depth. While continuance intention is high, CI2 shows more moderate enthusiasm for QR codes as a preferred payment method over traditional options, with only 55.9% (19.3% strongly agree, 21% slightly agree, 15.6% agree) preferring QR payments to cash or credit cards and a notable 28.2% remaining neutral. This suggests that while users are willing to continue using QR code systems, many may view them as complementary rather than as replacement payment methods. The substantial neutral response in CI2 indicates that a significant portion of users may be situational adopters who use QR codes when convenient but have not fully integrated them as their primary payment preference, highlighting the need for continued value proposition development beyond initial government-campaign-driven adoption.
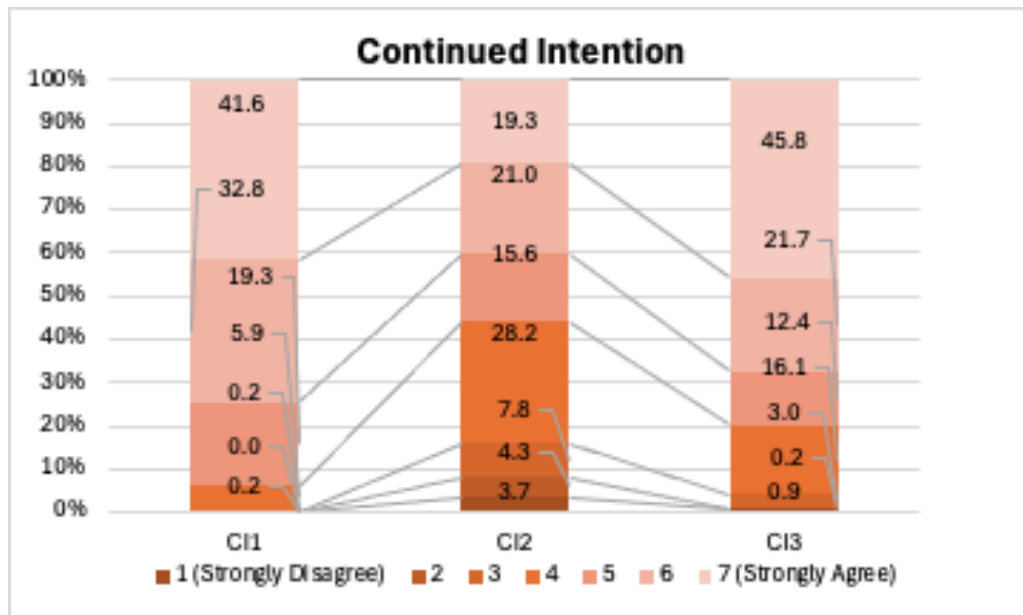
Figure 15. Continued Usage Intention

CHAPTER 6 ANALYSIS

6.1 Overview

This section details the analytical approach employed to examine the data collected from 461 the valid respondents, adhering to the methodology established in Chapter 4. The initial screening process confirmed the validity and suitability of all the gathered data for robust analysis. This chapter comprehensively presents the quantitative analysis conducted, beginning with an explanation of the survey questions and the descriptive statistics derived from the responses. Subsequent subsections detail the analytical procedures, including the research software utilized, the formulation and testing of the hypotheses, and the presentation of the results of the model. This will encompass descriptive statistics to characterize the sample and key variables, a measurement model analysis to assess the reliability and validity of the constructs, a structural analysis to test the hypothesized relationships between variables, and a summary of hypothesis verification to conclude the findings.

6.1.1 Research Software Requirements

Quantitative data collected from the questionnaire survey were carefully cleaned and screened using Microsoft Excel. Descriptive statistics, including means, standard deviations, and factor averages, were computed to summarize the data and provide reliable knowledge. Regression analysis was used to examine the relationship between dependent and independent variables. These analyses help researchers to identify patterns, trends, and potential associations within data,

allowing for insights into how changes in one variable might be related to changes in another. It is crucial to understand these relationships and make predictions among variables.

This analysis was completed using IBM SPSS Amos 30 software for covariance-based structural equation modelling (SEM) using Maximum Likelihood Estimation, an advanced statistical software that streamlines complex analysis and provides comprehensive output for a nuanced interpretation of findings. SEM is used to analyze the relationships between observed variables and latent constructs and combines factor analysis and multiple regression analysis to evaluate and estimate the complex theoretical models. The software enables researchers to test complex theoretical models, assess model fit, and simultaneously examine both direct and indirect relationships between variables.

The choice of IBM SPSS Amos 30 was chosen based on its robust capabilities in handling complex multivariate analysis, its user-friendly interface for model specification and modification, and its comprehensive diagnostic tools for assessing model validity. The software provides various fit indices and modification suggestions that ensure the reliability and validity of statistical findings, making it an appropriate tool for rigorous academic research. The main analysis involved a two-step approach as recommended by Anderson and Gerbing (1988). First, confirmatory factor analysis (CFA) was performed to assess the validity and reliability of the measurement model. This step ensures that the observed variables adequately represent their respective latent constructs. Second, structural equation modeling was employed to test the hypothesized relationships between the

constructs in the proposed theoretical model. Model fit was evaluated using multiple goodness-of-fit indices and modifications were made when necessary to achieve an acceptable model fit.

6.1.2 Descriptive Statistics

Table 4 provides descriptive statistics for the observed variables. Descriptive statistics serve as fundamental tools in research to summarize, organize, and present data in meaningful ways. The mean represents the average value of a dataset, calculated by summing all values and dividing by the number of observations, thus providing a central tendency measure. The standard deviation measures the spread or variability of data points around the mean, with lower values indicating data points clustered closely around the average, whereas higher values suggest greater dispersion.

Skewness indicates the asymmetry of the data distribution (negative values suggest left-skewed distributions, positive values indicate right-skewed distributions), and kurtosis measures the "peakedness" or flatness of the distribution compared to a normal distribution. Threshold for skewness is -1.96 ~ +1.96 and for kurtosis is -7 ~ +7. The normality of the data was evaluated by assessing the Skewness and Kurtosis measures (Table 4).

Descriptive statistics from the QR code payment system study (Table 4) revealed important patterns of user attitudes and experiences across four key dimensions: continuance intention, perceived usefulness, confirmation of expectations, and satisfaction. The data show that users have the strongest intention to continue using

QR code systems (CI1 mean = 6.09, SD = 0.95), indicating a high likelihood of retention with relatively low variability among respondents.

Table 4. Mean, Standard Deviations of all measures

Latent variable	Observed variable	Mean	Standard Deviation	Skewness	Kurtosis
Perceived Usefulness	Ease on payment management	4.13	1.30	-.279	.578
	Productivity	4.92	1.31	-.596	.637
	Effectiveness	4.14	1.33	-.231	.354
	Overall utility	4.42	1.39	-.386	.147
Confirmation of Expectation	Exceeds expectation on payment	5.06	1.18	-.526	.907
	Exceed expectation on functionality	4.91	1.12	-.420	.740
	Meets expectation overall	4.59	1.05	.055	.281
Satisfaction	Satisfaction	5.22	1.08	-.598	.764
	Positive feeling	4.35	1.23	-.323	1.180
	Smoothness	5.06	1.11	-.604	.890
	Pleasure	5.08	1.12	-.482	.884
Continuance intention	Continuance	6.09	0.95	-.946	1.044
	Preference	4.88	1.59	-.438	-.406
	Discontinuance	2.13	1.31	-1.020	.422

Conversely, users show moderate preference for QR codes over traditional payment methods (CI2 mean = 4.88, SD = 1.60) and strong resistance to discontinuing usage (CI3 mean = 2.13, SD = 1.32), although these measures showed greater variability in responses. The perceived usefulness scores cluster around the moderate range (means 4.13-4.92), suggesting that users find QR payments somewhat beneficial, while satisfaction measures (means 4.35-5.22) indicate generally positive user experiences.

The confirmation and satisfaction constructs demonstrate interesting patterns, with users reporting that QR payment systems exceed their payment expectations (C1 mean = 5.06) more than functionality expectations (C2 mean = 4.91), while the overall system performance meets expectations well (C3 mean = 4.59). The relatively low standard deviations across most measures (0.95-1.60) suggest reasonable consensus among users, although some constructs, such as CI2 and PU4, show higher variability, indicating more diverse opinions about preferences and overall utility perceptions.

The Skewness values ranged from -1.020 (CI3) to 0.055 (C3), while the kurtosis values ranged from -0.596 (PU2) to 1.180 (SAT2). It is important to note that all these values fall within the acceptable range of -1.96 to +1.96 for Skewness and -7 to +7 for kurtosis, as suggested by Hair et al. (2010). Thus, it can be concluded that the dataset exhibits a normal distribution.

Table 5: Inter-item correlations of all measures

	CI1	CI2	CI3	PU1	PU2	PU3	PU4	C1	C2	C3	SAT1	SAT3	SAT5	SAT7
CI1	1													
CI2	0.49	1												
CI3	0.66	0.44	1											
PU1	0.29	0.33	0.22	1										
PU2	0.40	0.44	0.35	0.52	1									
PU3	0.26	0.38	0.21	0.80	0.59	1								
PU4	0.32	0.38	0.24	0.77	0.56	0.82	1							
C1	0.45	0.51	0.40	0.55	0.59	0.56	0.59	1						
C2	0.41	0.46	0.36	0.50	0.55	0.54	0.57	0.75	1					
C3	0.38	0.38	0.32	0.49	0.48	0.52	0.53	0.54	0.56	1				
SAT1	0.52	0.49	0.48	0.44	0.54	0.46	0.50	0.63	0.59	0.63	1			
SAT3	0.28	0.29	0.20	0.52	0.49	0.54	0.55	0.50	0.54	0.52	0.53	1		
SAT5	0.41	0.34	0.34	0.42	0.52	0.42	0.43	0.50	0.52	0.52	0.64	0.56	1	
SAT7	0.42	0.39	0.36	0.41	0.53	0.43	0.45	0.56	0.56	0.55	0.66	0.58	0.77	1

Note. r = 1, very high correlation, .50< r < .75 = strong correlation, .25< r < .50 = moderate correlation (14. Reversed coded -)

Multicollinearity occurs when two or more predictor variables in a multiple regression model are highly correlated with each other. High multicollinearity can make it difficult to determine the individual impact of each predictor on the response variable, inflate the standard errors of the regression coefficients, and make the coefficients unstable. Therefore, Variance Inflation Factor (VIF) is a crucial metric in regression analysis used to detect and quantify the severity of **multicollinearity**. According to Hair et al.(2019) Variance inflation factor (VIF) is often used to evaluate the formative collinearity of indicators. A VIF value of 5 or more indicates a critical collinearity problem among indicators formatively measured constructs. VIF values lower than 3-5 can also occur collinearity problems. Ideally, the VIF value should be close to 3 and lower. According to Hair et al.(2019) R Square measures the variance, which is described in each endogenous construct and is therefore a measure of the explanatory power of the model (Shmueli and Kopius, 2011). The R Square ranges from 0 to 1, with higher values indicating greater explanatory power. As a guideline, R Square values of 0.75, 0.50 and 0.25 can be considered substantial, moderate, and weak (Henseler et al., 2009; Hair et al., 2011).

According to Table 6, The VIF values for expectations confirmation (2.89), satisfaction (2.43), and perceived usefulness (2.19) all fall within the acceptable range below 3, indicating no multicollinearity issues among the constructs and confirming that the model's structural relationships are reliable and the constructs are sufficiently distinct for meaningful interpretation of the path coefficients in the Japanese QR code payment context. The R-square values also demonstrate that the

model achieves moderate to substantial explanatory power across all dependent variables, with expectations confirmation showing substantial explanatory power ($R^2 = 0.65$), while satisfaction ($R^2 = 0.59$) and perceived usefulness ($R^2 = 0.54$) both demonstrate moderate explanatory power.

Table 6: Multicollinearity assessment through VIF

Dependent variables	R square	VIF
Expectations confirmation	0.65	2.89
Perceived usefulness	0.54	2.19
Satisfaction	0.59	2.43

6.1.3 Measurement Model Analysis

Measurement model analysis, primarily conducted through Confirmatory Factor Analysis (CFA), is a fundamental statistical procedure in Structural Equation Modeling (SEM), ensuring that the observed variables (indicators) adequately represent their intended latent constructs. The measurement model specifies the relationships between observed variables and their underlying theoretical constructs, providing a rigorous framework for validating the measurement quality of research instruments. Unlike exploratory factor analysis, CFA is theory-driven and tests specific hypotheses about the factor structure, making it particularly valuable for confirming the theoretically derived measurement models. CFA was used to evaluate the overall model fit of the factor measurement model. The three influential factors comprised the independent variables (confirmation of

expectation, perceived usefulness, and satisfaction), and the continuance use intention made up the dependent variables used to determine the reason behind continued usage of QRPS by Japanese users after the government campaigns were obtained by scaling item scores according to standardized factor loading taken out in CFA.

Factor loadings represent the correlation between observed variables and their respective latent constructs, indicating the strength of the relationship. Threshold: ≥ 0.70 (Hair et al., 2019). Loadings below 0.50 are considered weak and may warrant item deletion, while loadings between 0.50-0.70 are acceptable if other reliability measures are satisfactory. Cronbach's Alpha and Composite Reliability were used to evaluate construct reliability ensuring that multiple items designed to measure the same construct yielded consistent results. Cronbach's alpha measures internal consistency reliability. Threshold: less than 0.6 is totally unacceptable, 0.6 to 0.7 is seriously suspect, ≥ 0.70 for acceptable reliability (marginal), with ≥ 0.80 considered good and ≥ 0.90 excellent. Composite Reliability (CR) is an indicator of the extent to which the observed indicators of a construct consistently measure its underlying latent construct. Threshold: ≥ 0.70, acceptable reliability with values above 0.80 indicating good reliability.

Average Variance Extracted (AVE) is a statistical measure used to evaluate the convergent validity of the latent construct. This indicates how much variance in the observed variables is explained by the latent variables measured. Threshold ≥ 0.50, indicating that the construct explains at least 50% of the variance in its indicators. Higher AVE values ≥ 0.60 suggest stronger convergent validity, with > 0.50 score

indicates acceptable convergent validity. Discriminant Validity ensures that each construct is distinct from the other constructs in the model, meaning that they measure different phenomena. The square root of AVE should be greater than the inter-construct correlations, as a rule of thumb for discriminant validity. Satisfying these criteria confirms that the latent constructs are both well-measured and empirically distinct from one another, providing confidence in their use for testing the theoretical relationships in the structural model.

Table 7. Construct Validity for Hypothetical Model

Construct	Item	Factor loading	CA (>0.70)	AVE (>0.50)	√AVE	CR (0 to 1)
Perceived Usefulness	PU1 PU2 PU3 PU4	0.86 0.65 0.91 0.90	0.893	0.7005	0.8370	0.9018
Confirmation	C1 C2 C3	0.85 0.84 0.70	0.829	0.6393	0.7995	0.8405
Satisfaction	SAT1 SAT2 SAT3 SAT4	0.80 0.69 0.83 0.86	0.866	0.6361	0.7979	0.8745
Continuity Intention	CI1 CI2 CI3	0.83 0.62 0.76	0.734	0.5503	0.7416	0.7833

Abbreviations: CR: Composite Reliability; CA: Cronbach's Alpha; AVE: Average Variance Extracted.

The results (Table 6) demonstrate mixed results for reliability and validity assessment. Perceived Usefulness shows excellent psychometric properties with a Cronbach's alpha of 0.893 (well above the 0.70 threshold), Average Variance

Extracted (AVE) of 0.7005 (exceeding the 0.50 requirement), and Composite Reliability (CR) of 0.9018, indicating strong internal consistency and convergent validity. The confirmation and satisfaction constructs met the reliability threshold with Cronbach's alpha values of 0.829 and 0.866, respectively, and their AVE values (0.6393 and 0.6361) exceeded the minimum requirement, suggesting adequate convergent validity. However, Continuity Intention presents reliability concerns with a Cronbach's Alpha of 0.734, which while above 0.70, is relatively low, and an AVE of 0.5503, which barely meets the threshold, indicating potential issues with internal consistency and convergent validity. Therefore, it is important to interpret these results cautiously.

Table 8. Construct Validity for Modified Hypothetical Model

Constructs	Item	Factor loading	CA (>0.70)	AVE (>0.50)	√AVE	CR (0 to 1)
Perceived Usefulness	PU1 PU3 PU4	0.86 0.91 0.90	0.922	0.7925	0.8902	0.9198
Confirmation	C1 C2 C3	0.85 0.84 0.70	0.829	0.6393	0.7995	0.8406
Satisfaction	SAT1 SAT3 SAT4	0.80 0.83 0.86	0.871	0.6895	0.8303	0.8699
Continuity Intention	CI1 CI3	0.83 0.76	0.769	0.6332	0.7957	0.7752

The modified measurement model showed significant improvements in psychometric properties through strategic item removal (Table 7). Perceived

Usefulness was refined by removing PU2 (which had the lowest factor loading of 0.65), resulting in enhanced reliability (CA=0.922) and validity (AVE=0.7925), with all remaining items (PU1, PU3, and PU4) showing strong factor loadings above 0.86. Satisfaction improved by removing SAT2 (factor loading=0.69), leading to better internal consistency (CA=0.871) and convergent validity (AVE=0.6895). Continuity Intention underwent the most substantial modification by removing CI2 (factor loading=0.62), which improved the construct's reliability (CA=0.769) and validity (AVE=0.6332), though it still shows the weakest psychometric properties among all constructs. For discriminant validity, the square root of AVE also greater than the inter-construct correlations. The Confirmation construct remained unchanged, as it already met the acceptable thresholds.

6.1.4 Structural Model Analysis

 Structural model analysis is a powerful multivariate statistical technique that examines relationships between latent constructs (unobserved variables) and their causal pathways in quantitative research. This analysis enables researchers to simultaneously assess multiple dependent relationships, test mediating and moderating effects, and determine the strength and significance of paths between variables, while accounting for measurement error. The results help researchers refine theories, identify key predictors, and make informed decisions about which factors are most critical in influencing outcomes such as user satisfaction and continuity intention in digital payment systems. In quantitative research, structural models serve as the foundation for hypothesis testing, theory validation, and understanding complex phenomena by providing path coefficients, R-squared

values for explained variance, and overall model fit indices that indicate how well the proposed theoretical model represents observed data relationships.

The structural model fit indices presented a mixed evaluation of the adequacy of the proposed model. Marsh and Hocevar (1985) suggested using ratios of CMIN/DF as low as two or as high as five = reasonable fit. The CMIN/DF ratio of 5.584 significantly exceeds the recommended threshold of 5.0, indicating poor model fit and suggesting that the model may be overly complex or misspecified. However, the CFI value of 0.923 approaches the acceptable threshold of 0.90. CFI value of 0.90 or higher is considered acceptable, and 0.95 or higher is considered indicative of a very good fit. The RMSEA of 0.100 substantially exceeds acceptable limits. $RMSEA \leq 0.05$: Excellent fit, $0.05 < RMSEA \leq 0.08$: Acceptable fit, $0.08 < RMSEA \leq 0.10$: Borderline fit, and $RMSEA > 0.10$: Poor fit respectively. The GFI of 0.886 falls below the 0.90 threshold typically considered acceptable, ($GFI \geq 0,9$: reasonable fit; $GFI \geq 0,95$ is considered an excellent fit) further confirming suboptimal model fit.

A structural equation model (SEM) was used to test the proposed hypothesized model (Figure 1). The proposed model shows good correlations between variables in the datasets, but the model fit indices of the path model indicated that it fits poorly, resulting in the original IS Continuance model of ECM not being acceptable in the Japanese QR code payment service context (Table 8). In addition, it was observed that certain factors proposed to be linked with the continued intention of QR code payment services did not exhibit a strong association. As we can see, the red mark indicates (Figure 16) that perceived usefulness did not seem to be a good

moderator to evaluate the satisfaction level of Japanese users and the continuance usage intention effect (-0.01, 0.01) and shows that there is no significant relationship to continued intention. From this finding, we promote another factor measurement model to test by excluding observed variables (PU2, SAT3, CI2) and suggest a modified model (Figure 16) that includes the relationship arrows between the confirmation of the expectations factor and continued intention.

Table 9. Confirmatory Factor Analysis (CFA) model fit for Hypothetical Model

Measure	Estimate Value	Result
CMIN	402.035	-
DF	72	-
CMIN/DF	5.584	Poor fit
CFI	0.923	Acceptable fit
RMSEA	0.100	Poor fit
GFI	0.886	Poor fit

Abbreviations: DF: Degrees of Freedom; CMIN/DF: The ratio of Chi-square statistic to Degrees of Freedom; GFI: Goodness-of-Fit Index; CFI: Comparative Fit Index; RMSEA: Root Mean Square Error of Approximation.
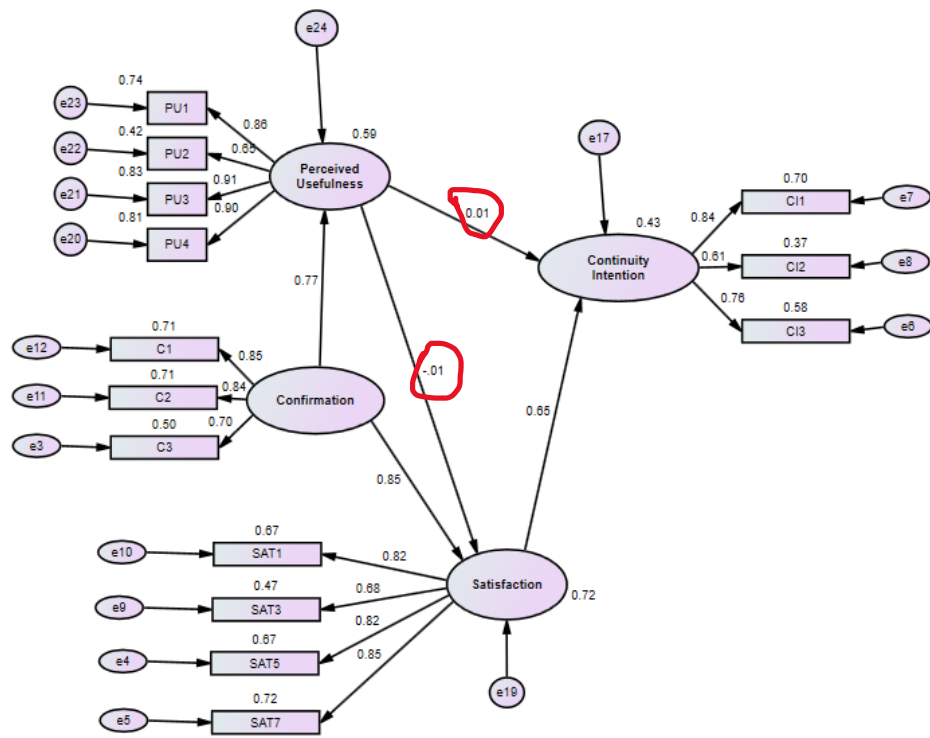
Figure 16. Factor Model Analysis Result for Proposed Hypothetical Model

Furthermore, the revised model (Figure 17), which excluded problematic observed variables (PU2, SAT3, CI2) and introduced a direct relationship between confirmation of expectations and continuity intention, demonstrated substantially improved model fitness. CMIN/DF improved to 4.29 (reasonable fit), CFI increased to 0.964 (good fit), RMSEA decreased to 0.085 (borderline fit), and GFI improved to 0.939 (reasonable fit) (Table 9). These improvements suggest that the modified model better represents the underlying relationships in Japanese users' QR code payment continuation behavior.

Table 10. Confirmatory Factor Analysis (CFA) model fit for Modified Model

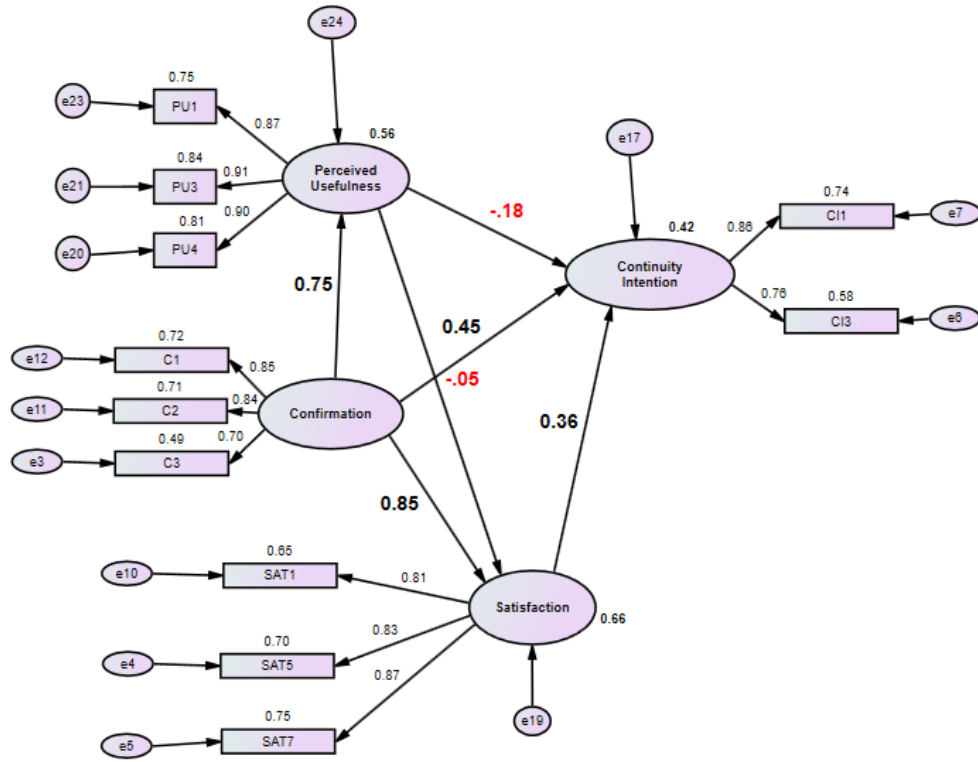| Measure	Estimate Value	Result
CMIN	162.96	Acceptable
DF	38	Acceptable
CMIN/DF	4.29	Reasonable fit
CFI	0.964	Good fit
RMSEA	0.085	Boarderline
GFI	0.939	Reasonable fit

Figure 17. Factor Model Analysis Results for the Modified Model.

6.2 Summary of the Hypothesis Verification

The modified model, which excluded problematic observed variables (PU2, SAT3, and CI2) and introduced a direct relationship between confirmation of expectations

and continuous intention, presents a more nuanced understanding of user behavior. This model also has an acceptable fit. The results revealed interesting changes in hypothesis support. H1 and H2 remained strongly supported with similar coefficients ($\beta = 0.747$ and $\beta = 0.849$ respectively), confirming that expectations confirmation continues to drive both perceived usefulness and satisfaction. The newly introduced direct relationship between confirmation of expectations and continuous usage intention was strongly supported ($\beta = 0.446$, $p < 0.001$), suggesting that Japanese users' continued usage intention is significantly influenced by whether their initial expectations are met, regardless of their perceived usefulness.

Notably, the results revealed important changes in the utility-satisfaction-continuance chain. H3 remained unsupported ($\beta = -0.050$, $p = 0.451$), while H4 was rejected but showed a significant negative relationship ($\beta = -0.185$, $p = 0.019$). This negative relationship between perceived usefulness and continuous usage intention is particularly intriguing in the Japanese context, possibly indicating that users who focus too heavily on functional utility may become more critical or develop higher expectations that are more difficult to satisfy. In addition, higher perceived usefulness might paradoxically reduce continuous usage intention, possibly due to a preference for traditional payment methods or other reasons, despite acknowledging the utility of QR payments.

The strength of the model lies in the satisfaction pathway and the newly introduced direct relationship. H5 remained supported but with a reduced coefficient ($\beta = 0.357$, $p < 0.001$), suggesting that while satisfaction still influences

continuous usage intention, its impact is moderated by the direct effect of expectation confirmation.

These results suggest that, for Japanese QR code payment services, particularly in the context of post-government promotional campaigns, meeting user expectations is more critical than emphasizing functional benefits. This indicates that Japanese users' continuance decisions are more directly influenced by whether the QR payment service meets their initial expectations rather than through cognitive utility assessment or emotional satisfaction alone. Thus, the success of continued usage appears to depend more on delivering promises, fulfilling prior expectations, and maintaining user satisfaction than on convincing users of the service's utility.

Table 11. The results of Hypothesis testing

| Observed Variables			Estimate	S.E.	p-value	Result
Perceived usefulness	<---	Confirmation	.767	.059	***	Supported
Satisfaction	<---	Confirmation	.854	.069	***	Supported
Satisfaction	<---	Perceived usefulness	-.006	.047	.925	Rejected
Continuity intention	<---	Perceived usefulness	.012	.040	.846	Rejected
Continuity intention	<---	Satisfaction	.651	.063	***	Supported
Satisfaction	<---	Satisfaction	.816			
Positive feeling	<---	Satisfaction	.683	.061	***	Supported
Smoothness	<---	Satisfaction	.818	.052	***	Supported
Pleasure	<---	Satisfaction	.849	.052	***	Supported
Payment management	<---	Perceived usefulness	.862	.034	***	Supported
Productivity	<---	Perceived usefulness	.649	.042	***	Supported
Effectiveness	<---	Perceived usefulness	.913	.033	***	Supported
Overall utility	<---	Perceived usefulness	.898			
Expectation on payment	<---	Confirmation	.845			
Expectation on functionality	<---	Confirmation	.841	.044	***	Supported
Overall Expectation	<---	Confirmation	.704	.044	***	Supported
Continuance	<---	Continuity intention	.838			
Preference	<---	Continuity intention	.611	.099	***	Supported
Discontinuance	<---	Continuity intention	.759	.084	***	Supported
Notes. *** p <.001						
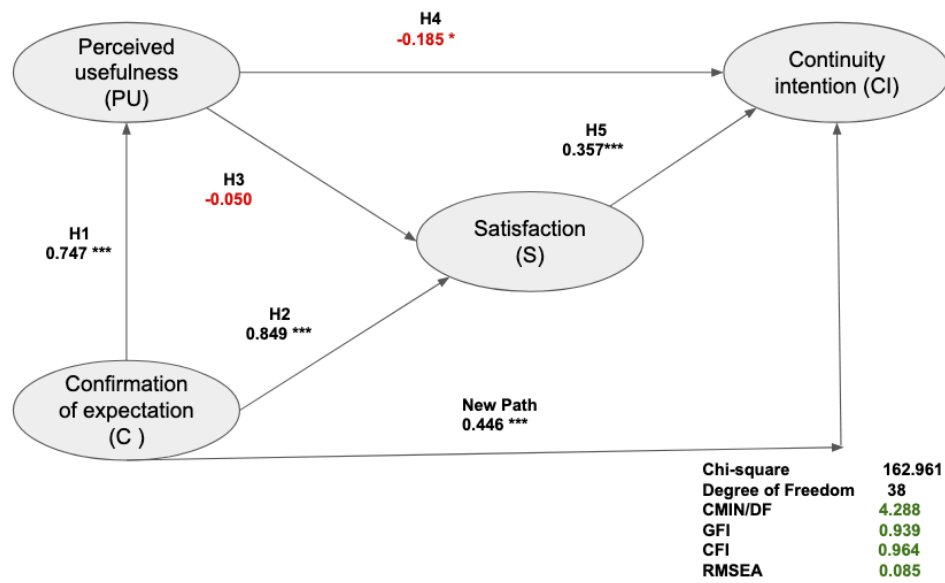
Figure 18. Modified Hypothetical Model

Finally, our findings suggest that confirmation of expectations is a crucial factor in determining the relationship between satisfaction and continued usage intention. In addition, confirmation of expectations itself is the most crucial factor to influencing the continued usage behavior directly (Figure 18). Regarding the coefficient of determination, the combined influence of confirmation of expectation, perceived usefulness, satisfaction and continued usage intention accounted for only 42% of the variance in continued usage intention towards the QRPS (Table 11). This means that while these factors are important, there are still other reasons (58% of the reasons) why Japanese users continue using QR code-based Payment Services, which can also link to the introduction of a new path (confirmation of continued usage intention) where fulfilment of expectations (other expectations) can provide a better understanding of the continued use behavior of the Japanese digital payment market.

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Table 12. The results of Hypothesis after Improvisation testing

Observed Variables			Estimate	S.E.	Pvalue	Result
Perceived usefulness	<---	Confirmation	.747	.059	***	Supported
Satisfaction	<---	Confirmation	.849	.069	***	Supported
Satisfaction	<---	Perceived usefulness	-.050	.046	.451	Not Supported
Continuity intention	<---	Perceived usefulness	-.185	.052	.019*	Rejected
Continuity intention	<---	Satisfaction	.357	.095	***	Supported
Continuity intention	<---	Confirmation	.446	.107	***	Supported
Satisfaction	<---	Satisfaction	.805			
Smoothness	<---	Satisfaction	.835	.054	***	Supported
Pleasure	<---	Satisfaction	.866	.054	***	Supported
Payment management	<---	Perceived usefulness	.868	.034	***	Supported
Effectiveness	<---	Perceived usefulness	.915	.033	***	Supported
Overall utility	<---	Perceived usefulness	.899			
Expectation on payment	<---	Confirmation	.851			
Expectation on functionality	<---	Confirmation	.840	.044	***	Supported
Overall Expectation	<---	Confirmation	.698	.044	***	Supported
Continuance	<---	Continuity intention	.863			
Discontinuance	<---	Continuity intention	.762	.096	***	Supported
Squared multiple correlations (r2): 0.42 Notes. *** p < .001, * p < .05						

CHAPTER 7 DISCUSSION

7.1 General Discussion

This study's findings directly address these research questions. Through the analysis of data collected from active Japanese users of QR code-based payment apps in Japan, we have gained valuable insights into the factors influencing user's intention to use payment apps continuously after their initial adoption in the post-government campaign context.

The results indicate that the fulfilment of prior expectations and higher user's satisfaction levels play crucial roles in determining the continuous usage of QR code-based payment apps in the Japanese context. Although both factors show a positive relationship with continued usage intention directly, the degree of impact is small, and the reasons behind this complex relationship require further investigation. The results show that the continuity of QR code payment usage in Japan is fundamentally driven by the fulfillment of user expectations rather than purely functional considerations. Unlike Western markets (Bhattacherjee, 2001; Park et al., 2017) where convenience and efficiency primarily drive adoption, Japanese consumers appear to prioritize reliability, security, and alignment between promised benefits and actual service delivery. The research findings suggest that when users' initial expectations about QR code payment services are consistently met, they develop stronger intentions to continue using these services, regardless of their perception of the usefulness technology.

Thes results suggest that satisfaction, while important, operates differently in the Japanese context, serving more because of expectation confirmation than as an independent driver of continuity intention. The negative relationship between perceived usefulness and continuity intention indicates that overemphasis on functional attributes may discourage continued usage, possibly because it creates higher expectations that are difficult to satisfy consistently. Users may perceive QR payments as a convenient but non-essential option within a broad ecosystem of available payment methods. This pattern is consistent with Japanese cultural values that emphasize trust, reliability, and long-term relationships, which translate into payment service preferences that prioritize consistent performance over innovation features. These findings provide an answer to the general question of the determinants that influence Japanese users to continuously use QR code payment services.

7.1.1 Discussion of Key Findings

The relationship between confirmation of expectations, perceived usefulness, satisfaction, and continued usage intention factors reveals a unique pattern that diverges from traditional technology acceptance models commonly applied in Western contexts. Expectation Confirmation Theory suggests that continuance intention is strongly predicted by user satisfaction, followed by perceived usefulness, with satisfaction being driven by users' confirmation of expectations (Bhattacherjee, 2001). Research on mobile payment applications has shown that confirmation of expectations significantly influences satisfaction, which in turn affects continuance intentions (Suo et al., 2022).

However, the Japanese context presents a more complex scenario in which the confirmation of expectations directly influences continued usage intention (new path), bypassing traditional mediation through perceived usefulness. This finding aligns with cultural theory suggesting that in high-context cultures like Japan, relationship quality and trust often supersede functional attributes in decision-making processes (Hall, 1976). Japanese users prioritize the reliability and predictability of service delivery over functional benefits, which may reflect cultural preferences for stability and consistency in service relationships, consistent with Japan's high uncertainty avoidance cultural dimension (Hofstede, 2001). This cultural orientation manifests in technology adoption patterns where the fulfillment of expectations becomes more critical than utilitarian benefits, as users seek assurance that the technology will perform consistently without creating unexpected complications or disruptions to their established routines.

Theoretical Explanation for Usefulness Relationships

This study reveals three distinct patterns involving perceived usefulness that require theoretical explanation: (H1) a positive relationship between expectation confirmation and perceived usefulness, (H4) a negative relationship between perceived usefulness and continuance intention, and (H3) an unsupported relationship between perceived usefulness and satisfaction. These interconnected findings suggest a complex mechanism that diverges from traditional technology acceptance models.

The positive relationship between expectation confirmation and perceived usefulness (H1) aligns with cognitive consistency theories (Heider, 1958), where

users who experience expectation confirmation are motivated to maintain cognitive coherence by also perceiving the technology as useful. This relationship is supported by attribution theory (Kelley, 1967), which suggests that when QR code payment services meet users' expectations, they attribute this success to the technology's inherent usefulness, creating a reinforcing cognitive loop. In the Japanese context, this pattern reflects the cultural tendency toward holistic thinking (Nisbett et al., 2001), where positive experiences in one domain (expectation fulfillment) naturally extend to related evaluative dimensions (usefulness perceptions).

The lack of a significant relationship between perceived usefulness and satisfaction (H3) represents another departure from Western technology acceptance models, where usefulness typically predicts satisfaction (Bhattacherjee, 2001). This finding can be explained through cultural values theory (different cultures prioritize distinct sets of values, influencing how individuals perceive and interact with their environment, including technology) (Schwartz, 1992), where Japanese consumers may not derive satisfaction from utilitarian attributes in the same way as Western users. Instead, satisfaction appears to be driven primarily by expectation confirmation (β = 0.849), suggesting that Japanese users evaluate satisfaction through relational criteria rather than functional performance metrics.

Affect infusion model (Forgas, 1995) provides additional theoretical support: in high-context cultures like Japan, emotional responses (satisfaction) are more influenced by contextual factors (expectation fulfillment, service relationship quality) than by discrete functional attributes (usefulness). This pattern aligns with

uncertainty avoidance theory (Hofstede, 2001), where Japanese consumers prioritize predictability and reliability over functional optimization when forming satisfaction judgments.

However, the counterintuitive negative relationship between perceived usefulness and continued usage intention (H4) challenges conventional wisdom and requires deeper theoretical examination. This phenomenon can be explained through the expectation-disconfirmation paradigm in reverse: when perceived usefulness becomes highly salient, it may create elevated expectations for future performance that are difficult to maintain, leading to anticipatory disappointment and reduced continuance intention (Oliver, 1980).

The paradox of choice theory (Schwartz, 2004) provides additional insight: excessive emphasis on functional utility creates decision complexity and cognitive burden, particularly problematic in cultures that value simplicity and harmony. When QR code payment services are positioned primarily through their usefulness attributes, Japanese users may experience decision fatigue due to the need to continuously evaluate functional benefits against alternatives in Japan's saturated payment ecosystem.

More critically, the Japanese concept of "omotenashi" (hospitality) provides cultural context for understanding this paradox. In Japanese service philosophy, true quality service should be invisible and effortless, where functional benefits are seamlessly integrated without requiring conscious user evaluation (Takeda & Helms, 2006). When perceived usefulness becomes explicitly salient, it may paradoxically signal that the service has not yet achieved the ideal of transparent,

effortless functionality that Japanese consumers expect. Literature on consumer behavior supports this interpretation, showing that explicit emphasis on utilitarian benefits can be perceived as commercially driven, contradicting cultural values of subtlety and restraint (De Mooij, 2019).

Furthermore, cognitive dissonance theory (Festinger, 1957) explains how heightened usefulness perceptions can create psychological tension: if users have already committed to using QR code payments but then become highly conscious of utilitarian benefits, they may experience dissonance between their habitual usage patterns and rational utility calculations, leading to reduced continuance intention as a way to resolve this inconsistency. Therefore, the theoretical integration of these three relationships suggests that perceived usefulness operates differently in Japanese cultural contexts: while it can be cognitively recognized and appreciated (positive relationship with expectation confirmation), it does not translate into emotional satisfaction or behavioral continuance intention in the same manner as Western models predict. This pattern reflects the cultural prioritization of harmonious, expectation-consistent service relationships over utilitarian benefit maximization.

The role of satisfaction in the context of Japanese QR code payments demonstrates both expected and unexpected patterns that require cultural interpretation. While satisfaction maintained its significant positive influence on continued usage intention (H5) ($\beta = 0.357$ in the modified model), its impact was notably reduced compared to traditional expectation-confirmation models found in Western contexts. Research on mobile payment satisfaction has identified usage satisfaction

as a critical determinant of service adoption and continued use (Hariguna et al., 2023). However, Japanese findings reveal that satisfaction alone is insufficient to drive continued usage intentions, suggesting a more complex cultural mechanism. The strong direct relationship between expectations-confirmation and satisfaction (H2) (β = 0.849) and continuity intention (new path) (β = 0.446) indicates that satisfaction serves primarily as a mediating factor rather than a primary driver. This pattern aligns with relationship marketing theory in collectivist cultures, where satisfaction is viewed as a natural outcome of meeting expectations rather than an end goal in itself (Morgeson et al., 2011). In Japanese cultural context, satisfaction represents a baseline requirement—a necessary element but not sufficient condition for continued engagement. The direct path from expectation confirmation to continuance intention (β = 0.446) suggests that Japanese users evaluate service continuance based on trust and reliability signals that transcend momentary satisfaction levels.

This finding is consistent with long-term orientation theory (Hofstede, 2001), where Japanese consumers prioritize sustained, predictable relationships over short-term satisfaction maximization. Users continue using QR code payment services not because they are maximally satisfied at any given moment, but because the service consistently meets their expectations, creating a foundation of trust that supports long-term usage intentions. These findings answer the sub-question of understanding how perceived usefulness, confirmation of expectations, and satisfaction influence Japanese users' intention to continue QR code payment services in the post-government campaign context of Japan.

Based on these theoretical considerations, smartphone users are aware of the usefulness of QR payment. However, given that QR code payments represent merely one option among Japan's diverse payment ecosystem, it can be concluded that users adopt this technology primarily because it meets or exceeds their initial expectations, resulting in continued satisfaction and usage driven by the fulfillment of their anticipated benefits rather than explicit functional advantages. This suggests that successful QR code payment services in Japan should prioritize expectation management and consistent service delivery over aggressive promotion of utilitarian benefits.

7.2 Generalization of the Study Findings

The findings of this study contribute to a broader understanding of post-adoption behavior in digital payment systems, particularly within the unique context of government-promoted technology adoption in Japan. Our research represents a pioneering examination of continuity intention factors following large-scale governmental campaigns, offering insights that extend beyond the traditional technology acceptance models. The study's unique contribution lies in its exploration of how cultural and contextual factors shape user behavior in the post-campaign environment, where initial adoption incentives have been removed, and users must decide whether to continue using QR code payment services based on their actual experiences.

Generalization of the study findings is a critical aspect of this research, enabling the application of results to a broader population or context beyond the specific sample of Japanese QR payment users studied. While this study focused

on active Japanese users of QR code payment services following government promotional campaigns, caution must be exercised when generalizing these findings to users in other countries or cultural contexts. Variations in cultural values, payment preferences, government policies, digital infrastructure, and consumer behavior patterns may influence the factors affecting the continued use intention of QR code payment services differently across diverse settings. The unique Japanese cultural emphasis on expectation fulfillment, reliability, and service consistency may not directly translate to Western contexts, where functional utility and convenience typically drive technology adoption decisions.

However, the comprehensive data collection process, which captures responses from Japanese users across various demographics and usage patterns, provides valuable insights into the behavioral characteristics and decision-making processes of QR code payment users in the post-adoption context. This information serves as a valuable reference point for similar studies conducted in different regions or cultural contexts, facilitating cross-cultural and cross-national comparisons while contributing to a deeper understanding of the factors influencing the continued use intention of mobile payment technologies. The findings highlight the importance of the expectation confirmation theory in understanding post-adoption behavior, which may have broader applicability across different digital payment contexts, even if the specific factor relationships vary by cultural setting.

Furthermore, the statistical analysis employed in this study, utilizing Structural Equation Modeling with model refinement and hypothesis testing, enhances the reliability of the findings and strengthens their generalizability. Rigorous research

methodology and analytical procedures ensure that the conclusions reached are statistically sound and methodologically robust, providing a foundation for broader theoretical applications. The discovery of a direct relationship between expectation confirmation and continuity intention, bypassing traditional mediation through perceived usefulness, offers important theoretical insights that warrant validation across different cultural and technological contexts.

Researchers are encouraged to conduct similar investigations in other countries, cultural settings, or with different cashless payment technologies to validate and expand the applicability of these findings, thereby advancing collective knowledge on mobile payment continuance behavior and its cross-cultural implications for digital payment service providers globally.

CHAPTER 8 CONCLUSION

8.1 Summary

The present findings provide an answer to whether confirmation of expectations, perceived usefulness, and satisfaction factors affect users' continuity intention by measuring post-adoption behavioral patterns to improve the understanding of QR code payment service retention in the Japanese market. This study aimed to identify the key factors that influence the continued usage intention of QR code payment services among Japanese users and to investigate the impact of expectation confirmation on user satisfaction and continuity behavior following government promotional campaigns. Our findings confirm the importance of three key success factors: confirmation of expectations (meeting pre-formed user expectations), satisfaction (user contentment with service performance), and the direct relationship between expectation confirmation and continuity intention, while revealing the unexpected negative influence of perceived usefulness on continued usage behavior.

In Japan, the widespread adoption of QR code payments was significantly boosted by the 2019 consumption tax hike and subsequent promotional campaigns by the government and other entities. However, despite this initial push, a growing number of businesses are hesitant to accept QR code payments because of the loss of payment fee exemptions. This shift highlights a critical gap in our understanding; the specific mechanisms that drive consumers' continued use of QR code payments remain unclear. To address this issue, our study offers a novel approach by

investigating the sustained use of QR code payments through the lens of consumer satisfaction and perceived usefulness, utilizing an established model of information technology continuance as our analytical framework.

Although perceived usefulness has traditionally been considered a critical factor affecting continuity intention, our findings showed that it has no significant positive relationship with either satisfaction or continuity intention in the Japanese context. However, the relationship between perceived usefulness and post-adoption behavior requires further investigation in future research, particularly across different cultural contexts. It is essential to identify more diverse cultural and contextual factors that make mobile payment services more satisfying and encourage continued usage by both individual users and service providers. Moreover, by examining these success factors and their relationships with continuity intention, we aimed to provide insights into the factors that influence effective post-adoption behavior in QR code payment services. The current findings may have implications for the design and strategies of mobile payment services to promote user satisfaction and service continuity in the context of Japanese digital payment adoption.

Importantly, our analysis also showed that the confirmation of expectations directly moderates the relationship between satisfaction and continuity intention, bypassing traditional mediation through perceived usefulness. In particular, meeting users' pre-formed expectations about QR code payment services was found to have a positive effect on both satisfaction and continuity intention as well as on users' overall service evaluation. These findings suggest a significant direct

relationship between expectation confirmation, satisfaction, and continuity intention in the context of Japanese QR code payment adoption.

Overall, our study underscores the importance of incorporating expectation management and culturally appropriate service delivery strategies into the design of QR payment services to improve user satisfaction and continuity intention. By focusing on expectation confirmation rather than functional utility, service providers can enhance user retention, improve service satisfaction, and ultimately achieve more sustainable market penetration and better long-term business outcomes in the mobile payment sector in Japan.

8.2 Contribution

This study makes significant contributions in both academic and practical domains, enriching our understanding of the relationship between perceived usefulness, confirmation of expectations, satisfaction, and continued usage intention of QR code-based payment services in Japan.

8.2.1 Academic

In terms of academic contributions, this study advances the existing knowledge in several significant ways. First, it contributes to the literature by exploring the specific context of QR code payment continuance behavior among Japanese users following government promotional campaigns, filling the research gap identified in the post-adoption mobile payment literature. By focusing on this particular cultural and temporal context, this study provides a deeper understanding of how cultural values and expectation management influence continued usage intentions in mobile

payment services. The integration of expectation-confirmation theory with post-adoption behavior in the Japanese context expands the theoretical framework and adds to the existing body of knowledge on mobile payment continuance and cross-cultural technology acceptance patterns.

The empirical evidence represents another significant academic contribution to this study. Through quantitative analysis, specifically employing Structural Equation Modeling (SEM) with model refinement techniques, this study provides empirical support for the reconceptualized relationships between expectation confirmation, satisfaction, and continuity intention. The discovery of a direct relationship between expectation confirmation and continuity intention, along with the negative influence of perceived usefulness on continuance behavior, challenges conventional technology acceptance models and enhances the reliability of findings in cross-cultural mobile payment research. This contributes to the validity of post-adoption behavior theories and provides empirical evidence for cultural variations in technology acceptance patterns.

This study offers significant theoretical and methodological contributions to the field. Theoretically, it challenges the universal applicability of the traditional technology acceptance models by demonstrating that perceived usefulness may not serve as a primary driver of continued usage intention in collectivist cultures. The identification of expectation-confirmation as a direct predictor of continuity intention provides valuable insights for extending post-adoption theories in cross-cultural contexts. Methodologically, the research approach employed in this study, including the model refinement process and the exclusion of problematic observed

variables to improve model fit can serve as a valuable reference for future researchers interested in studying mobile payment continuance behavior across different cultural contexts.

This contribution enhances the methodological understanding of cross-cultural mobile payment research and provides guidance for conducting similar studies in diverse geographical and cultural settings, ultimately advancing collective knowledge on mobile payment adoption and post-adoption behavior globally.

8.2.2 Practical

The findings of this study have important implications for practitioners and policymakers in the context of QR payment service provision, digital payment adoption, and continuance in Japan. The practical contributions of this study are summarized as follows.

First, it provides valuable strategic insights for QR code payment service providers and digital wallet companies operating in Japan. By highlighting the significance of expectation confirmation over perceived usefulness in driving continuity intention, this study emphasizes the need for service providers to focus on expectation management and consistent service delivery rather than promoting functional advantages. This insight helps practitioners make informed decisions regarding marketing strategies, resource allocation, and service development priorities. Service providers should prioritize reliability, security, and meeting promised service levels to enhance user satisfaction and retention rather than investing heavily in promoting utility-based features that may not resonate with Japanese users' cultural preferences.

Second, the study offers policy recommendations for the Japanese government and regulatory bodies to enhance the sustainability of QR payment adoption initiatives. The findings suggest that government promotional campaigns should emphasize the reliability and trustworthiness of QR code payment systems rather than solely focusing on convenience and efficiency benefits. Policy measures could include establishing service quality standards, promoting transparent communication about service capabilities and supporting infrastructure development, which ensures consistent service delivery across different regions and merchant types. These recommendations aim to help sustain the momentum of digital payment adoption by aligning promotional strategies with user behavioral patterns and cultural preferences.

Moreover, this study provides guidance for merchants and retailers in Japan on how to leverage QR payment systems for long-term customer retention and satisfaction. By emphasizing the importance of setting appropriate expectations and delivering consistent service experiences, merchants are encouraged to focus on reliable payment processing, clear communication about payment procedures, and consistent service quality, rather than promoting complex features that may overwhelm users. The discovery that perceived usefulness negatively influences continuity intention challenges conventional wisdom, and suggests that service providers should adapt their strategies to local cultural preferences, prioritizing trust-building and expectation management over feature promotion to achieve sustainable user retention in the Japanese market.

One of the main contributions of this study is the application of expectations-confirmation theory to analyze post-adoption behavior in QR code payment services within the Japanese cultural context. Our research design and methodology allowed for the control of cultural and temporal parameters that were previously not adequately addressed in mobile payment continuance research, particularly the influence of government promotional campaigns on user expectations and subsequent behavior. The discovery that factors previously considered critical for technology adoption, such as perceived usefulness, were not found to have a significant positive relationship with continuity intention challenges conventional wisdom and provides new insights for service design and marketing strategies.

Finally, these findings have broader implications for international mobile payment providers seeking to expand to collectivist cultures, similar to those in Japan. To our knowledge, this study is among the first to analyze the direct effects of expectation confirmation on QR code payment continuity intention, while revealing the negative influence of perceived usefulness in the Japanese context. It is important to replicate this methodological approach and theoretical framework in studies examining mobile payment adoption in other Asian markets and collectivist cultures to validate the broader applicability of these cultural considerations in digital payment service design and marketing strategies.

8.3 Limitations and future directions

The present study found significant relationships between the confirmation of expectations, satisfaction, and continuity intention in QR code payment services

among Japanese users. However, our results do not fully clarify the underlying mechanisms behind why perceived usefulness showed the negative relationship between continuity intention in the Japanese context. While it is evident that expectation confirmation directly influences continuity intention and satisfaction, this study cannot completely explain the cultural and psychological factors that contribute to this unique pattern compared with Western technology adoption models. The cross-cultural validity of technology acceptance frameworks remains questionable, as Western-derived models may inadequately capture collectivist cultural values, social harmony considerations, and risk-averse behavioral patterns characteristic of Japanese consumers. Additionally, our study has built a hypothetical model by modifying frameworks proven in previous studies. However, we were unable to ensure optimal model fit, requiring model refinement during the analysis. This indicates, while the modified framework broadly captures relationships, certain aspects of the theoretical construct or their interconnections might not perfectly align with the specific dynamics of QR code payment adoption in Japan. Future investigations should prioritize thorough theoretical validation and perhaps explore alternative model specifications or latent constructs that better represent the observed relationships from the outset.

Furthermore, this study had several methodological limitations that should be considered when interpreting the findings. First, our sample consisted solely of active, continuous Japanese QR code payment users, aged 15 and over, spanning all regions and adoption timelines (before, during, and after government campaigns). While this offers a comprehensive view of sustained usage, it creates

a survivor bias by excluding non-users, infrequent users, those who discontinued the service, and other cashless payment users. Consequently, our findings reflect only the perspectives of individuals who have maintained their usage, limiting insights into adoption barriers, reasons for infrequent use, or factors leading to discontinuation. This means the study's generalizability is confined to the population of continuous users, rather than the broader Japanese public or those with varying usage patterns and to other cultural contexts, where different factors may influence continuity intention.

Second, the collected data may contained fraudulent responses and cannot be guaranteed that all fraudulent responses were eliminated despite the use of AI functionality and extra measures to eliminate unreliable data. This data quality issue is particularly problematic in online survey research and may have introduced systematic bias into the results. While this study adapted survey instrument from validated scales, may suffer from cultural adaptation issues in which certain constructs or items may not carry equivalent meaning across cultural contexts. The reliance on self-reported measures introduces common method bias, where relationships between constructs may be artificially inflated due to respondents' tendency to provide consistent answers across related questions.

At last, While our quantitative approach allowed for robust statistical analysis, it inherently limited our ability to capture the deep, nuanced cultural and psychological factors influencing post-adoption behavior. The reliance on closed-ended questions, by design, oversimplified complex motivations and subjective experiences, providing *what* is happening but less insight into the *why* within the

specific Japanese context (e.g., how Japanese service culture or the desire for a "cashless society" might shape perceived usefulness or drive continuity).

8.3.1 Future Directions

To address the theoretical limitations identified in this study, future research should prioritize developing culturally-adapted theoretical frameworks that better capture the unique dynamics of technology adoption in collectivist societies like Japan. Mixed-methods approaches combining quantitative analysis with qualitative investigations (in-depth interviews, focus groups) are essential to understand the cultural and psychological mechanisms underlying the unexpected negative relationship between perceived usefulness and continuity intention. Cross-cultural comparative studies examining the same theoretical relationships across different cultures would help validate or modify existing Western-derived technology acceptance frameworks. Additionally, future studies should explore alternative model specifications and latent constructs from the outset, incorporating culture-specific factors may better represent the observed relationships in Japanese contexts.

To overcome sampling limitations and biasness, future research should implement comprehensive sampling strategies that include diverse user segments: non-adopters, discontinued users, infrequent users, and users of alternative cashless payment methods. Longitudinal research designs tracking users from initial adoption through various stages of use would provide valuable insights into adoption barriers, discontinuation factors, and the dynamic nature of continuity intention while establishing causal relationships between constructs. Multi-stage

sampling approaches capturing users across different adoption timelines, demographic profiles, and geographic regions would enhance generalizability beyond continuous users to the broader population and enable replication studies across different cultural contexts.

To address methodological constraints, future studies should employ advanced data quality assurance techniques beyond AI-powered fraud detection, including attention checks, response time analysis, and multi-source validation methods. The development of culturally-adapted measurement instruments specifically validated for Japanese contexts would minimize cultural adaptation issues and improve construct validity. Most importantly, future research should adopt mixed-methods designs that combine quantitative surveys with qualitative approaches to capture the deep, nuanced cultural factors that quantitative methods cannot adequately explore.

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APPENDIX A – SCREENING SURVEY

QRコード決済の継続利用に関する意識調査

このアンケートは、日本国内においてスマートフォンを用いたQRコード決済を使用している方にお伺いします。QRコード決済アプリを使用したことがない方やQRコード決済アプリの使用を取りやめた方は回答しないでください。

☐ 上記内容に同意する　必須

引き続き、アンケートにご協力いただけますか。

はい
—————————

いいえ
—————————

1

あなたがQRコード決済を使い始めたのはいつ頃ですか？（ひとつだけ）*回答必須

○ 2018年以前
○ 2018年
○ 2019年
○ 2020年
○ 2021年
○ 2022年
○ 2023年
○ 2024年
○ 2025年

3

QRコード決済の使用頻度を教えてください。（ひとつだけ）*回答必須

○ ほぼ毎日
○ １週間に数回
○ 週に１回
○ 月に１回
○ 数か月に１回
○ ほとんど使用しない

2

Q1の時にQRコード決済を使用し始めた理由を教えてください。（いくつでも）*回答必須

☐ 政府や自治体のポイントキャンペーンが行われていたから
☐ キャッシュバックや割引などがあったから
☐ 新しい決済方法を試してみたかったから
☐ 友人や家族にすすめられたから
☐ 現金やクレジットカードなどと比べて便利だから
☐ その他

4

最も使用頻度の高いQRコード決済アプリを教えてください（日本国内での使用）。（ひとつだけ）*回答必須

○ PayPay
○ Rakuten Pay
○ Line Pay
○ d払い
○ au Pay
○ その他

5

次のどれに当てはまりますか？*回答必須

	1 :： 全くそう思わない	2 :：	3 :：	4 :： どちらでもない	5 :：	6 :：	7 :： 強くそう思う
1.QRコード決済システムの使用を継続するつもりである。 →	○	○	○	○	○	○	○
2.QRコード決済システムを現金やクレジットカード支払いよりも優先して使用したいと思う。 →	○	○	○	○	○	○	○
3.可能であれば、QRコード決済システムの使用をやめたい。 →	○	○	○	○	○	○	○
4.当設問の回答の際は、６を選択してください。 →	○	○	○	○	○	○	○
5.QRコード決済を使用することで、家計の管理がやりやすくなる。 →	○	○	○	○	○	○	○
6.QRコード決済を使用することで、支払作業の生産性が向上する。 →	○	○	○	○	○	○	○
7.QRコード決済を使用することで、家計管理を実施することの効果が向上する。 →	○	○	○	○	○	○	○
8.QRコード決済は支払管理に役立つ。 →	○	○	○	○	○	○	○

	1 .. 全くそう思わない	2 ..	3 ..	4 .. どちらでもない	5 ..	6 ..	7 .. 強くそう思う

9.QRコード決済を使ってみると、それ以前に思っていたものよりも良かった。 → ○ ○ ○ ○ ○ ○ ○

10.支払機能以外の機能も含めたQRコード決済システムのサービスは、思っていたものよりも良かった。 → ○ ○ ○ ○ ○ ○ ○

11.当設問の回答の際は、２を選択してください。 → ○ ○ ○ ○ ○ ○ ○

12.QRコード決済システムに対して期待していることのほとんどのことが実現されている。 → ○ ○ ○ ○ ○ ○ ○

13.QRコード決済システムを使用経験は、満足したものである。 → ○ ○ ○ ○ ○ ○ ○

15.QRコード決済システムを使用するときは、気分が良い。 → ○ ○ ○ ○ ○ ○ ○

17.QRコード決済システムを使用するときは、期待通りにスムーズに物事が進む。 → ○ ○ ○ ○ ○ ○ ○

19.QRコード決済システムを使用経験は、快適なものである。 → ○ ○ ○ ○ ○ ○ ○