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Title	Mobile Payments in Smart Tourism : Analyzing Influences, Constraints, and Behavioral Evolution
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Degree Grantor	北海道大学
Degree Name	博士(学術)
Dissertation Number	甲第16813号
Issue Date	2026-03-25
DOI	https://doi.org/10.14943/doctoral.k16813
Doc URL	https://hdl.handle.net/2115/99658
Type	doctoral thesis
File Information	YANG_Jie_summary.pdf, 全文の要約



Summary of Doctoral Dissertation

博士論文要約

Mobile Payments in Smart Tourism: Analyzing Influences, Constraints, and Behavioral Evolution (スマート・ツーリズムにおけるモバイル決済：影響要因、制約要因、行動変化に 関する分析)

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Introduction

As the top-ranked country in Asia-Pacific region in the 2024 Travel & Tourism Development Index (World Economic Forum, 2024), Japan is experiencing a rapid recovery in its tourism sector. According to the Japan Tourism Agency (JTA, 2024a), both inbound and domestic tourist expenditures have now surpassed pre-pandemic levels, underscoring the need for more efficient payment services. Despite numerous strategies implemented by the Japanese government and businesses to promote the development of cashless transactions, public acceptance remains below the desired level. As reported by Ministry of Economy, Trade and Industry (METI, 2025), the proportion of cashless payments stood at only 42.8% in 2024, significantly lagging behind countries such as South Korea (99.0%) and Australia (75.9%). The percentage of payments made through mobile phones and other electronic devices, excluding contact-based payment methods such as credit cards and debit cards, is even lower. However, the domestic market presents substantial potential for expansion (JTA, 2023). A survey conducted among 8,016 members of the leisure booking platform “Asoview!” reported that 87.5% of respondents had used cashless payments for travel or outings, while 90.4% expressed willingness to do so in the future (Hikosaka, 2023). These results highlighted latent opportunities for driving cashless payment adoption in Japan’s tourism market.

Mobile payments are defined as financial transactions conducted via smartphones or other mobile devices, including mobile wallets, QR (Quick response) code systems, electronic money, and carrier billing services. With the widespread use of smartphones and rapid rollout of 5G networks, they play a pivotal role in various travel scenarios, such as booking accommodations, purchasing tickets, and paying for transportation (Kim et al., 2010; Zhou, 2013). Whereas cashless payments encompass a broad and fragmented set of methods, mobile payments serve as a gateway to broader digital ecosystems (Hasebe, 2020). In addition to

facilitating transactions, they provide access to loyalty programs and financial tools, offering a more accurate reflection of evolving consumer payment behaviors (Miyai, 2020).

“Smart tourism” is generally defined as utilizing digital technologies (e.g., fifth generation mobile network (5G), Internet of Things, big data) to create and capture sustainable value for local entities by attracting more visitors, extending their stays, and boosting consumption. The concept derives from “smart city” initiatives (Gretzel, 2011) and has since evolved to encompass notions such as “smart tourism destinations (STDs)” (Buhalis & Amaranggana, 2013) and “smart tourism technologies (STTs)” (Neuhofer et al., 2015). Höjer and Wangel (2015) argued that smart tourism was not the unilateral application of technology but rather the integration of multiple technologies to create a more convenient environment. Japan’s service industry is globally recognized for its exceptional quality. As the nation advances its strategy of becoming a “tourism-oriented country”, delivering high-quality services in the travel sector has emerged as a national priority (Prime Minister’s Office of Japan, 2025). However, ongoing demographic challenges, particularly a declining birthrate and an aging population, have intensified labor shortage and reduced productivity in the service sector. In this context, the integration of digital technologies has become a critical strategy for ensuring the sustainable development of tourism (Arlt, 2006). According to the 2025 White Paper on Tourism, domestic travel expenditure by Japanese tourists reached a record 25.1 trillion yen in 2024, a 14.5% increase compared with 2019 (JTA, 2025). High-frequency transactions intensify users’ sensitivity to payment frictions, a point consistent with Transaction Cost Theory (Williamson, 1981). As the number of transactions grows, even small delays, errors, or procedural inconveniences become more noticeable and can accumulate into substantial friction costs. By contrast, convenient payment systems reduce the marginal transaction cost of each purchase and improve overall market efficiency. Thus, this remarkable growth highlights the significant role that payment methods play in stimulating tourism consumption (Susanto et al., 2022). As consumer behavior continues to shift toward cashless and seamless transactions, mobile payment adoption is expected to further enhance convenience and willingness to spend, especially in tourism-related services (Sun et al., 2022). Meanwhile, in 2020, METI launched the “Smart Resort” initiative, which closely aligns with the broader smart tourism concept. The initiative aimed to leverage digital technologies to create more efficient, convenient, and personalized travel experiences, ultimately improving the overall satisfaction of tourists. Among its core elements, the promotion of digital payments was emphasized as a means to streamline transactions, reduce reliance on cash, and facilitate smoother interactions for both domestic and international tourists.

Accordingly, this study concentrates on the use of mobile payment specifically in the context of travel, examining the factors that have led tourists who have already adopted this innovative

technology, and exploring what new insights these empirical findings may offer for further advancement of mobile payment in the future.

Research Aims and Significance

In the context of travel, which ideally prioritizes convenience and relaxation, the question arises: do mobile payments function as an enabling tool or as an additional burden? This dissertation seeks to determine whether smart tourism and mobile payments can reinforce each other, generating mutual benefits for the tourism ecosystem. If jointly promoted, these two elements may achieve dual outcomes: enhancing the efficiency of tourism services and accelerating the adoption of digital payments. Despite this potential, the development of mobile payments in Japan faces several obstacles, which merit deeper investigation. Hence, this dissertation investigates the development of mobile payments within the context of smart tourism from three perspectives. Study 1 aims to identify the intrinsic factors influencing mobile payment adoption behavior and explore whether usage impacts travel satisfaction. Study 2 focuses on measuring the external factors affecting the development of mobile payments. Study 3 evaluates the factors that influence changes in switching intention of mobile payment usage.

Currently, research on user adoption of mobile payments has predominantly been conducted in developing countries (e.g., Cheah et al., 2011, Al-Jabri & Sohail, 2012), where the relatively slow diffusion of the technology has encouraged researchers to investigate user behavior as a means of promoting wider adoption. In contrast, Japan presents a distinctive case as a developed economy where adoption has been comparatively slow, thereby providing a unique setting for this dissertation. This context offers an important opportunity to identify the underlying factors influencing this phenomenon. It underscores the importance of a comprehensive analysis to better understand the drivers and hinders of mobile payment acceptance in the country. Such an analysis not only contributes to the academic discourse but also offers actionable insights for fostering inclusive and sustainable growth within Japan's tourism sector.

Overview of the Dissertation

The dissertation is structured into six chapters.

Chapter 1 introduces the research background, aims, significance and overall structure of the dissertation. Chapter 2 reviews the relevant literature, focusing on prior studies and key

theoretical frameworks, including Innovation Diffusion Theory, Innovation Resistance Theory, Digital literacy, Satisfaction, E-SERVQUAL, and Push-Pull-Mooring framework. Chapters 3 to 5 present the design and implementation of the three empirical studies, outlining their aims, research questions, hypotheses, methodologies, data analyses, findings, and limitations. Chapter 6 synthesizes the findings from Chapters 3 to 5, identifying commonalities and differences, and offering a comprehensive discussion. The chapter concludes with key implications, acknowledges limitations, and proposes directions for future research.

Literature Review

Innovation Diffusion Theory (IDT)

Innovation Diffusion Theory (IDT), proposed by Rogers in 1962, has long served as a robust framework for studying innovation adoption (e.g., Agag & El-Masry, 2016; Agarwal & Prasad, 1997; Al-Jabri & Sohail, 2012). It posited that consumers did not adopt new technologies or products unconsciously; rather, adoption resulted from a deliberate decision-making process (Tornatzky & Klein, 1982). Combining IDT with the Technology Acceptance Model (TAM), which emphasized explaining and predicting context-specific adoption and usage behavior for information systems and new media technologies (Davis, 1989), provided a robust methodological approach. This integrated model's validity has been extensively tested across various innovation domains. The model highlighted that perceived usefulness and ease of use were critical predictors of consumer adoption and usage, thus shaping attitudes and intentions. Given that certain IDT attributes are less applicable to the context of mobile payments, this research selectively adopts two factors most relevant to mobile payment adoption. Relative advantage and observability are treated as positive determinants of mobile payment usage. A detailed discussion can be found in Chapter 3, which presents the findings of Study 1.

Innovation Resistance Theory (IRT)

Ram and Sheth (1989) proposed a theoretical model for innovation resistance theory (IRT), which identifies five key determinants of resistance to innovation, classified into functional and psychological barriers based on the characteristics outlined in IDT. A notable observation was that innovation adoption and resistance were not mutually exclusive but rather represented a balance of opposing forces. Despite IRT evolving from IDT, they differed fundamentally in nature and impacted consumer behavior in distinct ways (Claudy et al., 2015). Recent research

highlighted that focusing solely on factors leading to consumer adoption created a bias in favor of change, which may overlook the reasons for resistance (Talwar et al., 2020). Therefore, analyzing resistance factors often provided clearer insights into why certain technologies failed to gain traction. Among the five resistance factors proposed in IRT, this study selects usage barriers and risk barriers as the most relevant predictors for mobile payment adoption. Detailed findings are also presented in Chapter 3.

E-SERVQUAL

The traditional SERVQUAL model, developed by Parasuraman et al. (1985) and Parasuraman et al. (1988), evaluated service quality through five dimensions (tangibles, reliability, responsiveness, assurance, and empathy) and served as a reliable framework applicable across various service industries. With the rapid development of internet service and e-commerce, the concept of electronic service quality has been introduced as an extension of traditional SERVQUAL model, specifically designed to assess service delivery in online environments such as e-commerce platforms and websites. E-SERVQUAL can be understood as a digital adaptation of the SERVQUAL framework. Building on this, Parasuraman et al. (2005) developed two scales, namely E-S-QUAL and E-RecS-QUAL. This dissertation applies relevant dimensions from the two scales, as E-S-QUAL captures system performance during normal use while E-RecS-QUAL addresses recovery responses when problems occur. Integrating these complementary aspects with the specific characteristics of mobile payment services allows for a more systematic examination of external factors shaping their use during travel. These two scales serve as key components of the model for Study 2, as demonstrated in Chapter 4.

Push-Pull-Mooring (PPM) Framework

The Push-Pull-Mooring (PPM) framework, originally derived from migration studies (Lee, 1966), has since become an effective tool for studying consumer behavior switching across various fields (Bansal et al., 2005; Chen & Keng, 2019). The framework consisted of three parts. Push factors refer to internal influences that drive individuals to make behavioral changes, typically representing negative forces that motivate users to move away from existing solutions. Pull factors, on the other hand, are external influences that attract individuals to adopt new behaviors, which can be understood as positive forces encouraging users to choose new alternatives. Mooring factors are influences that either facilitate or hinder the transition

between push and pull factors, serving as mediators in the adoption process (Bansal et al., 2005). By understanding the interaction between these three forces, governments and businesses can better promote the adoption of mobile payments and enhance the overall travel experience for tourists. This framework provides an important foundation for the discussion in Study 3, detailed in Chapter 5.

Methodology and Findings

This dissertation empirically investigated the factors influencing mobile payment adoption by Japanese tourists through three quantitative studies conducted between November 2024 and September 2025. The data collection was carried out in collaboration with a Japanese research firm, Freeasy, targeting individuals who had used mobile payment during domestic travel within the past year. All constructs were measured using a five-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree). For the analysis, we employed both SPSS and SmartPLS 4. Mann-Whitney U tests in SPSS were used to compare the difference in usage frequency between travel and daily-life contexts. Partial Least Squares Structural Equation Modeling (PLS-SEM) was conducted using SmartPLS 4, selected for its high predictive power, robustness with smaller sample sizes, and flexibility in handling complex model structures.

Study 1 examined the influence of internal factors, such as digital literacy and actual usage behavior, on transaction satisfaction and travel satisfaction, utilizing the Innovation Diffusion Theory (IDT) and the Innovation Resistance Theory (IRT). Results showed that perceived relative advantage and observability had a significant positive effect on actual usage, while risk barrier demonstrated a significant negative effect; the usage barrier was not significant. Digital literacy positively affected both actual usage and transaction satisfaction. Furthermore, actual usage enhanced both transaction and travel satisfaction, with transaction satisfaction, in turn, positively influencing travel satisfaction.

Study 2 analyzed external factors, specifically the quality assessment of mobile payment as an electronic service and the effectiveness of service recovery mechanisms, based on the E-S-QUAL and E-RecS-QUAL frameworks. Findings revealed that efficiency and privacy components of E-S-QUAL positively influenced both transaction satisfaction and travel satisfaction. Responsiveness and contact components of E-RecS-QUAL showed a weak positive effect on transaction satisfaction but no significant effect on travel satisfaction. Transaction satisfaction was again confirmed to positively and significantly influence travel satisfaction. Moreover, traditional payment habits were found to negatively moderate the positive relationship between efficiency and transaction satisfaction.

Study 3 applied the Push-Pull-Mooring (PPM) framework to clarify the behavioral process by which travelers switch from conventional payment methods to mobile payment. The inefficiency of conventional payment methods (Push factor) was found to increase switching intention, whereas inertia (Mooring factor) weakened it. Switching cost (Mooring factor) had no significant effect on switching intention. Perceived herd behavior (Pull factor) and alternative attractiveness (Pull factor) positively influenced switching intention. Inertia also weakened the positive relationship between alternative attractiveness and switching intention. Switching intention positively affected actual switching behavior, which subsequently enhanced travel satisfaction.

Discussion and Implications

Across all studies, the mobile payment usage in the context of smart tourism was confirmed to be influenced by a complex interplay of facilitating, inhibiting, and switching factors. Crucially, all three studies empirically validated that the use of mobile payments during travel positively contributes to travel satisfaction, underscoring its importance for digitalizing tourism in Japan. Both positive and negative factors were found to be involved in adoption, and the moderating effects of traditional payment habits and inertia were also established. Furthermore, the SPSS analysis revealed a significant finding: even among travelers who already use mobile payments, the frequency of use in their daily lives is significantly higher than during travel. This suggests that delays in mobile payment support at destinations and the non-uniformity of the usage environment act as inhibitory factors. Therefore, promoting mobile payment adoption requires not only technological infrastructure improvement but also a deeper understanding of consumer psychology and coordinated efforts among multiple stakeholders. In conclusion, the promotion of mobile payment in Japan is not about forcing behavioral change on users, but constitutes a “mutually beneficial strategy” that simultaneously strengthens inbound tourism readiness and achieves the digital transformation of domestic tourism.

The academic significance of this study lies in filling a theoretical and empirical gap in mobile payment research within the tourism sector by integrating the understanding of tourism behavior and technology adoption. Prior research predominantly focused on daily consumption or finance, whereas this dissertation focused on the non-daily and varying-environment context of tourism. It provides a multi-faceted clarification of how users determine adoption through psychological resistance, behavioral inertia, and convenience evaluation. Theoretically, by integrating IDT, IRT, E-SERVQUAL, and the PPM model, the study proposes a novel analytical framework that comprehensively explains the three-layered structure of mobile

payment usage: facilitation, resistance, and switching. The originality is further enhanced by evaluating mobile payment as an electronic service and measuring user satisfaction from the perspective of service quality and recovery responsiveness.

Practically, this research offers guidance for tourism operators, financial institutions, and government agencies seeking to promote mobile payment adoption by providing insights into consumer psychology and behavioral change. Its social significance is highlighted by the clear identification of factors driving adoption intention, offering crucial direction for policymaking aimed at establishing a cashless ecosystem in tourist destinations.

Limitations and Future Direction

In summary, this dissertation has three main limitations that could be addressed in future research.

The first limitation concerns sample selection. Across three rounds of random sampling targeting different groups, it was observed that the number of tourists who used mobile payment during their trips was substantially lower than those who had not. This indicates that, as an emerging technology still in the growth phase, research should not only focus on understanding the motivations of adopters but also investigate the reasons behind non-adoption. Therefore, future studies should include non-users to gain a more comprehensive understanding of mobile payment adoption in tourism contexts. Moreover, the data were collected from domestic Japanese tourists, which may limit the generalizability of the findings to international tourists or different cultural contexts. Thus, future research could explore cross-cultural comparisons to better understand how cultural factors influence mobile payment adoption within the Japanese tourism sector.

Second, this study employed a broad conceptualization of travel satisfaction, aggregating all payment experiences during a trip. In reality, different usage contexts, such as transportation, dining, attraction tickets, and accommodation, may lead to varying transaction experiences. Furthermore, merchants that do not accept mobile payment differ in characteristics and service quality. Therefore, future research should differentiate between specific mobile payment usage scenarios during travel, allowing for a more precise identification of areas where mobile payment adoption is well-developed versus those that are lagging.

Lastly, while this study focused on mobile payment adoption, smart tourism encompasses a wider range of digital technologies such as AI-based travel assistants, IoT-enabled services,

and virtual experiences. For instance, for inbound tourists, AI travel assistants in Japan can provide real-time translation, personalized recommendations, and cultural explanations, helping to overcome language barriers and improve decision-making. IoT-enabled smart hotel services, such as mobile room keys, automated billing, and in-room service requests, offer increased convenience and efficiency for travelers. Additionally, VR-based cultural experiences allow tourists to explore historical sites and heritage virtually, potentially influencing their on-site behavior and engagement. Investigating these smart technologies could provide insights into creating a seamless, digitally enhanced tourism environment and inform strategies for promoting smart tourism in Japan and other contexts. Especially, the adoption rate of mobile payments in Japan remains relatively low, which may have influenced the findings. Future studies could examine technologies with higher penetration rates to test whether the proposed model holds in more mature innovation contexts, thereby enhancing the generalizability and persuasive power of the results.