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It's about time: Revisiting UTAUT2 to examine consumers' intentions to use NFC mobile payments in hotels☆

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ABSTRACT

October 2015 marks the deadline for merchants in the U.S. to accept Europay Mastercard and Visa (EMV) payments, or else be liable for fraud. Within this new context, and corroborated with the rapid development in mobile payment technology, a new form of payment is increasingly gaining ground: near field communication (NFC) mobile payments (NFC-MP). NFC-MP, relatively new to the U.S., are completed using mobile devices equipped with proximity technology such as NFC (e.g., Apple iPhone6) and are substantially different than traditional web-based mobile payments. Based on data from a sample of 794 hotel consumers selected from the United States general population, this study revisited the Unified Theory of Acceptance and Use of Technology (UTAUT2) to build a comprehensive model that explains intentions to use NFC-MP in hotels. It was found that performance expectancy was the highest predictor of intentions, while hedonic motivations, habit, and social influences have relatively lower effects. Several important implications for academics and industry decision-makers are formulated.

1. Introduction

With credit card fraud being rampant (Kassner, 2014), the major credit card companies insisted that U.S. merchants phase out their current magnetic-stripe-based point of sale (POS) payment systems and deploy more secure payment systems (e.g., Europay, Mastercard, and Visa (EMV) cards) (Kossman, 2015). However, the slow deployment in the U.S. of EMV cards caused confusion among merchants regarding the pace of the change, and propelled into the public attention the rival methods of payment. The most significant rival technology is the near field communication (NFC) mobile payment (NFC-MP) method (also known as proximity payment), which, as the relatively newer protocol, seems to be gaining ground among U.S. merchants faster than anticipated (Day, 2014). Specifically, industry experts estimate five-year compound growth rates of over 172% representing an estimated volume of over $800 billion by 2019 (Heggestuen, 2015).

Ahead of a mass deployment of NFC-MP technology in U.S. hotels, the hotel industry began to show an ardent interest in NFC-MP (Gartner Inc., 2014). Such interest in NFC-MP was stimulated by decision makers' recognition of the hotel NFC-MP task–technology environment as unique and radically different from any other commercial, service or retail environment. Its uniqueness is attributable to several defining characteristics. First, unlike any other service settings, a typical hotel stay experience reflects a number of discrete transactions. While such transactions may occur on the hotel property, they may involve third party service providers (e.g., parking, gift shop, entertainment), which require separate payments. Accordingly, the payment of the core service, which is typically set up prior to consumption but completed at the end of the service experience, is intertwined with the payment of the multiple ancillary services that enhance the overall experience.

Second, the legacy service orientation in hotels, including business traveler-oriented properties, places an emphasis on "hospitality", which encompasses convenience, easy access, friendly service, and encourages guests to consume casually (Kirillova et al., 2014). Yet, contrary to such service orientations, it remains necessary in most hotels to carry physical forms of payment to enter discrete transactions. To align with the core service orientation, most of today's hotel service models are moving toward using the ubiquitous smartphone – which consumers increasingly carry with them in leisure settings (Morosan and DeFranco, 2015) – as the primary tool in facilitating consumer behavior oriented toward the hotel: information search, pre arrival check in, guestroom access, or responding to push notifications While web based

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payments could be conducted before the deployment of NFC MP, the business models accommodating web based payment from smartphones were inefficient in hotels. Thus, the novel smartphone NFC MP orientation allows consumers to complete all phases of consumption exclusively based on the smartphone, and eliminate the need to carry an actual wallet (Apple, 2015). In turn, NFC MP allow consumers to go through the entire sequence of purchasing/consumption using a single device, opening up new opportunities for hotels to design service models based on personalization, which allow consumers to interact with the hotels and appropriate a higher value (Morosan, 2015).

Third, and most importantly, NFC-MP are poised to become the optimal solution to the challenge of securing the payment protocols that are notoriously vulnerable in hotels (Kassner, 2014). Such vulnerability is associated with the high fragmentation of property ownership and the uneven distribution of the resources dedicated to security, high fragmentation of transactions, and the relatively relaxed attitudes of guests toward their hotel consumption habits (Nyheim and Connolly, 2012). In sum, NFC-MP have great potential for both hotels (e.g., increased sales, novel ancillary services, reduced fraud) and consumers (e.g., convenience, ability to manage payment methods, response to mobile marketing) (Kent, 2013). However, despite their potential, little is known about consumers' adoption of NFC-MP in hospitality, especially in hotels.

While the literature explaining adoption of various hospitality systems is increasing in size and scope (Law et al., 2012), to date, it does not provide any insight into consumers' adoption of NFC-MP or any mobile payment in hotels. Moreover, while the general information systems (IS) literature documents research examining mobile payments (e.g., Au and Kauffman, 2008; Shin, 2010a; Yang, 2012), the systems examined in those studies are mostly web-based payment systems that are dissimilar to NFC-MP (e.g., Kim et al., 2010a,b; Schierz et al., 2010) or the research was conducted in contexts outside of the U.S. (e.g., De Meijer and Bye, 2011; Wei et al., 2009). This acute lack of research on the adoption of NFC-MP marks a critical research lacuna. Moreover, reviewing the vast IS adoption literature body uncovered three additional research lacunae.First, while the predominant IS artifacts predicting adoption remain the system performance perceptions, the conceptualization of such perceptions does not account for the multiple facets of system performance, thus treating such important predictors of intentions vaguely (Benbasat and Barki, 2007). Second, while adoption was conceptualized mainly using system-perceptions, little is known about the influence on adoption of broader societal, hedonic, or personal factors (e.g., automatic behaviors/habits) (Lankton et al., 2010). Third, while newer studies seem to incorporate increasingly contextual factors in empirical research (Shin, 2010b), the role of the critical inhibitors of adoption such as privacy and security is not well understood (Ha and Stoel, 2009). This is especially important as security and privacy are increasingly fluid notions in today's business environment, which is characterized by frequent data breaches, fraud, and surveillance (Lanier and Saini, 2008).

Addressing the above mentioned research lacunae, this study develops and validates empirically a model that explicates hotel consumers' intentions to use NFC-MP in hotels. Specifically, revisiting a popular contemporary adoption theory—Unified Theory of Adoption and Use of Technology (UTAUT2) (Venkatesh et al., 2012) by augmenting it to better capture the specific consumer task–technology environment dynamics in hotels (Kim et al., 2008b; Li et al., 2011), this study pursued two specific objectives: (1) understand the role of the task environment as outlined by more comprehensive system performance perceptions and (2) clarify the roles of privacy and security perceptions in shaping intentions to use NFC-MP.

2. Review of literature

2.1. Functionality of NFC-MP

Due to their use of NFC technology to establish communication between hardware located in the proximity of each other, NFC-MP are radically different from all the other methods of payment that can be completed using a mobile device, which are mainly web-based. NFC-MP are founded on a secure information exchange protocol between a mobile device (i.e., smartphone) and a point of sale (POS) system, which is designed to communicate with the device using NFC (Day, 2014). While in other world regions NFC-MP have become well established among consumers and merchants, in the U.S. their deployment has been slow (Arthur, 2014). At the time of this writing not all popular smartphones currently in use in the U.S. are equipped with NFC, although the newer ones (e.g., Apple iPhone6, Samsung Galaxy S6) are (Apple, 2015). Also, while not all merchants have deployed NFC-based POS terminals that allow for NFC-MP, many popular merchants (e.g., McDonald's, Starbucks) have already deployed such systems and enjoy a relatively high popularity (Day, 2014). However, given the major stakeholders' orientation to move forward from today's magnetic strip payment methods, and the natural tendency of users to upgrade their mobile devices to NFC-capable ones, NFC-MP seem to be positioned to grow substantially in the hotel industry.

To use NFC-MP, first, a consumer must set up a mobile pay app on his/her device, by storing various payment methods (e.g., credit cards). However, credit card numbers are not stored on the device per se, but rather as Device Account Numbers (DAN) (Kassner, 2014). The NFC-MP protocol is initiated at the point of sale, when the consumer opens the payment app and connects to the POS terminal using NFC. To ensure security, the DAN is combined with a unique transaction code to form unique transaction information, which is authorized by the consumer. The consumer's device validates the data/transaction, transmits it to the merchant's POS system, which then routes it through its back-end protocols until the consumer's bank matches the transaction information (DAN + transaction information), processes the payment, and transmits a verification (Day, 2014). From a transaction security viewpoint – the main reason for the evolution of payment methods – NFC-MP are believed to be more secure than the rival methods as no credit card information is exchanged, each purchase is allocated a new transaction number, and there is no card swiping, eliminating skimming and malware-based fraud (Kassner, 2014).

2.2. Theoretical foundations

The IS adoption literature is dominated by several popular theories (e.g., Technology Acceptance Model (TAM) Davis, 1989, Innovation Diffusion Theory (IDT), Moore and Benbasat, 1991), which have been instrumental in explaining adoption of a variety of IS in their corresponding task environments. Such theories have been able to explain adoption based on system perceptions—attitudinal/behavioral links (Venkatesh et al., 2012). Despite the popularity, such models have been under constant criticism, mainly due to their inability to comprehensively explain the specifics of task–technology environments (Benbasat and Barki, 2007). Such criticism provided opportunities for the re-conceptualization of theories based on the following grounds: (1) system perceptions still accurately reflect users' understanding of operating a IS to complete a task, with functionality and effort perceptions remaining critical (Venkatesh et al., 2012); (2) there is a need to incorporate innate consumer characteristics (Aluri and Palkurthi, 2011); and (3) contextual aspects reflective of consumers' use of IS outside of the studied task environment, but which can impact adoption within the task environment (e.g., habit,