Factors affecting hotels’ adoption of mobile reservation systems: A technology-organization-environment framework

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ABSTRACT

This study explores why hotels adopt mobile reservation systems; based on a technology-organization-environment (TOE) framework, nine factors are hypothesized to explain hotels’ adoption of mobile hotel reservation systems (MHRS). Logistic regression is employed to analyze data gathered from 140 hotels in Taiwan. The results indicate that compatibility, firm size, technology competence, and critical mass are significantly positively related to MHRS adoption, while complexity is significantly negatively related to MHRS adoption. By indentifying the predictors of hotels’ adoption of MHRS through the TOE framework, this study provides several theoretical and practical implications related to mobile service adoption.

1. Introduction

Mobile commerce has emerged as a vital tool for many firms as smart phones continue to evolve and gain in popularity. It offers customers accessibility, enabling them to purchase products or services at anytime, from anywhere. The emergence of mobile commerce has attracted the attention of researchers interested in gaining a better understanding of the basis for its adoption. Previous research has investigated mobile commerce adoption pertaining to specific technologies or industries, such as the insurance industry (Lee, Cheng, & Cheng, 2007), banking (Zhou, Lu, & Wang, 2010), payment services (Yang, Lu, Gupta, Cao, & Zhang, 2012), healthcare (Wu, Li, & Fu, 2011), multimedia messaging services (Chang & Pan, 2011), shopping for fashion products (Ko, Kim, & Lee, 2009), broadband wireless access technology-based games (Ha, Yoon, & Choi, 2007), public transportation ticketing services (Mallat, Rossi, Tuunainen, & Öörni, 2008), and the usage of electronic procurement systems (Gebauer & Shaw, 2004).

As suggested in previous studies (e.g., Ho, 2012; Khalifa, Cheng, & Shen, 2012; Slade, Williams, & Dwivedi, 2014; Zhou & Lu, 2011), theoretical perspectives underpinning mobile commerce adoption research include motivational theories (see Ryan & Deci, 2000), the technology acceptance model (Davis, 1989), the theory of planned behavior (Ajzen, 1991), the task-technology fit (Goodhue & Thompson, 1995), the innovation diffusion theory (Rogers, 2003), the unified theory of acceptance and use of technology (i.e., UTAUT; see Venkatesh, Morris, Davis, & Davis, 2003), UTAUT2 (Venkatesh, Thong, & Xu, 2012), the information systems success model (DeLone & McLean, 2003), the valence framework (see Peter & Tarpey, 1975), and the flow experience (Csikszentmihalyi, 1975).
One important mobile application associated with the hotel industry is mobile hotel reservation systems (MHRS). Wang and Wang (2010) define MHRS as location-based online distribution information systems that enable customers to reserve hotel rooms at anytime, from anywhere, through the use of portable devices. However, their study focuses on the adoption of MHRS from a customer standpoint. While a considerable body of research has investigated customers’ or individuals’ adoption of mobile commerce (e.g., Chang & Pan, 2011; Ha et al., 2007; Ko et al., 2009; Lee & Mills, 2010; Mallat et al., 2008; Yang et al., 2012; Zhou et al., 2010), relatively little research has examined mobile commerce adoption from an organizational standpoint (e.g., Liang, Huang, Yeh, & Lin, 2007; Mallat & Tuunanen, 2008; Pagani, 2006; Stoica, Miller, & Stotlar, 2005; Wang & Cheung, 2004). Prior researchers have called for additional studies that investigate organizational mobile commerce adoption (e.g., Slade, Williams, & Dwivedi, 2013). However, investigating MHRS adoption from the standpoint of hotels has not been addressed as of yet, representing a knowledge gap.

The purpose of this study is to investigate factors affecting hotel adoption of MHRS, and thereby contribute to the organizational mobile commerce adoption literature. In this study, MHRS refer to hotel booking mobile apps. These apps tend to fall into one of two categories: the first is apps offered by a hotel for its customers to check hotel locations, room rates, promotions, or membership information (e.g., membership points); the second is apps offered by a third-party organization that provides information on different hotels for the convenience of travelers. The factors that drive a hotel’s adoption of these two types of mobile apps may differ; as such, this study focuses on hotel development and implementation of hotel booking mobile apps to ensure a better understanding of this category. Further, the current study utilizes a technology-organization-environment (TOE) framework (see Tornatzky & Fleischer, 1990) to integrate various perspectives into this investigation.

The remainder of this article sequentially discusses the theoretical foundation underpinning the study, the research model, the quantitative research method utilized to test this model, results of hypothesis-testing, and contributions, implications, and limitations associated with this study.

2. Theoretical background and research model

2.1. Organizational technology adoption

Organizational mobile commerce adoption is closely related to organizational technology adoption. An influential framework that has been utilized by organizational technology adoption studies is the technology-organization-environment (TOE) framework (see Tornatzky & Fleischer, 1990). Previous studies utilize perspectives relevant to the TOE framework to investigate the adoption of various technologies.

For instance, Hung, Hung, Tsai, and Jiang (2010) use the organizational and information system perspectives to investigate critical factors that influence hospital adoption of customer relationship management systems (cf. Racherla & Hu, 2008 for a proposed TOE framework for hospitality organizations’ adoption of electronic customer relationship management systems). In Hung et al.’s (2010) study, characteristics of organization include size of organization, IS capabilities of staff, innovation of senior executives, and knowledge management capabilities. Characteristics of customer relationship management systems include relative advantage and complexity. They find that size of organization, IS capabilities of staff, innovation of senior executives, knowledge management capabilities, and relative advantage have a significant influence on hospital adoption of customer relationship management systems, while complexity does not.

Pan and Jang (2008) also employ a TOE framework to investigate firms’ adoption of enterprise resource planning systems in the communications industry. The technological factors include IT infrastructure and technology readiness; the organizational factors include organization size and perceived barriers; and the environmental factors include production and operations improvement, enhancement of products and services, competitive pressure, and regulatory policy. They found that technology readiness, organization size, perceived barriers, and production and operations improvement are important determinants of adoption, while the remaining factors are not.

Teo, Lin, and Lai (2009) take a TOE framework to investigate companies’ adoption of e-procurement systems. The technological factors include perceived direct benefits, perceived indirect benefits, and perceived costs; the organizational factors include firm size, top management support, and information sharing culture; and the environmental factor is business partner influence. They found that perceived indirect benefits, firm size, top management support, and business partner influence are positively associated with adoption, while the others are not.

Lin (2014) takes a TOE framework to investigate firms’ adoption of electronic supply chain management systems. The technological factors include perceived benefits and perceived costs; the organizational factors include firm size, top management support, and absorptive capacity; and the environmental factors include trading partner influence and competitive pressure. Lin (2014) found that perceived benefits, perceived costs, top management support, absorptive capacity, and competitive pressure are significant adoption discriminators, while the remaining two factors are not.

2.2. Organizational mobile commerce adoption

Some studies investigate organizational mobile commerce adoption without specifying technologies and industries. For instance, Stoica et al. (2005) formulate a mobile commerce adoption model consisting of firm external factors (new technological change and government involvement) and firm internal factors (organizational culture, management structure, and business strategy).

Other studies investigate organizational mobile commerce adoption in a specific industry. For instance, Wang and Cheung (2004) investigate travel agencies’ adoption of mobile e-business. They found that major obstacles to mobile e-business adoption include the lack of competitive pressure and misfit between current mobile solutions, characteristics of travel products, and patterns of customer behavior.

Additional studies investigate organizational mobile commerce adoption for a specific technology. For instance, Mallat and Tuunanen (2008) explore merchant adoption of mobile payment systems: they investigate various types of merchants, such as grocery stores, restaurants, and content providers. They found that drivers of merchant adoption include increased impulse purchases, enhanced customer service, increased product/service availability, new service offerings, gaining new customers, enhanced company image, and reductions in fees or payment processing costs. Barriers to merchant adoption include incompatibility (with existing business, as well as lack of standardization of mobile payments and suitable charging models), current solution complexity, lack of critical mass, high commissions and implementation costs, and lack of perceived security and trust in mobile payment service providers. A few years earlier, Pagani (2006) investigates factors influencing business adoption of wireless high speed data services. The companies investigated include banks and insurance
companies, among others. Pagani (2006) found that, for all segments, data speed and technology suitability are important determinants. However, data connectivity is particularly important for research companies and the banking segment; customer satisfaction is paramount for service providers and pharmaceutical firms; and workforce productivity is particularly important for insurance companies.

2.3. A TOE framework for hotels’ adoption of MHRS

Based on the above literature, it can be observed that the selection of factors influencing organizational technology/mobile commerce adoption varies across different industries and technologies. In addition, inconsistent findings for a given factor (e.g., complexity or firm size) are common. Existing organizational mobile commerce/technology adoption models are too fragmented to serve as a solid foundation for investigations on hotels’ adoption of MHRS. Prior research has also suggested that there is a need to develop an adoption model for each specific technology/industry (e.g., Oliveira & Martins, 2010). Following this line of thought, the current study intends to construct an adoption model that pertains to the specific context associated with the hotel industry and MHRS, and thereby offer industry-specific and technology-specific insights.

The applicability of the TOE framework to hotels’ adoption of MHRS has not been addressed by previous studies. This study seeks to build upon the TOE framework to analyze factors affecting hotels’ adoption of MHRS, in turn widening its application. However, the TOE framework is a higher-level conceptual framework, rather than a context-specific framework. Consequently, as suggested by Wang, Wang, and Yang (2010), it will not specify factors that influence a specific kind of organizations’ adoption of a particular technological innovation. Therefore, with respect to the specific context of MHRS, this article also draws on relevant studies to identify predictors that can be utilized within the TOE framework. In this study’s research model, relative advantage, complexity, and compatibility are identified as technological factors; top management support, firm size, and technological competence constitute organizational factors; and competitive pressure, critical mass, and information intensity represent environmental factors. Each of these predictors is discussed below.

2.4. Technological context

The three technological factors are based on the innovation diffusion theory (Rogers, 2003). Relative advantage is defined as “the degree to which an innovation is perceived as better than the idea it supersedes” (Rogers, 2003, p. 229). In an organization, the perception of benefits associated with an innovation offers economic and political legitimacy to its adoption (Premkumar, Ramamurthy, & Crum, 1997). Relative advantage includes tangible and intangible benefits such as profitability (e.g., an increase in sales or operational cost reduction) and response time improvement (Premkumar, Ramamurthy, & Nilakanta, 1994; Ramamurthy & Premkumar, 1995). Mallat and Tuunainen (2008) found that benefits constitute drivers for merchant adoption of mobile payment systems, while Hung et al. (2010) noted that relative advantage has a significant influence on hospital adoption of customer relationship management systems.

In the light of these suggestions, it is anticipated that MHRS can provide hotels with benefits such as profitability and response time improvement. Compared with alternatives such as hotel reservations by phone or made online, the benefits of MHRS may include an increase in customer room reservations due to the location-based services and convenient service accessibility; operational cost reductions due to reduced paperwork; and response time improvements due to the improved speed of the room reservation process. Hotels are more likely to adopt MHRS when they perceive the relative advantages associated with them. Accordingly, the following hypothesis is proposed:

Hypothesis 1. Relative advantage has a positive effect on hotels’ adoption of MHRS.

Rogers (2003, p. 257) further defines complexity as “the degree to which an innovation is perceived as relatively difficult to understand and use”. Premkumar et al. (1994) suggest that the complexity of an innovation is usually negatively related to its adoption. Grover (1993) found that when customer-based inter-organizational systems are perceived as complex to adopt and/or use, they are less likely to be adopted. Mallat and Tuunainen (2008) suggest that perceived complexity inhibits merchant adoption of mobile payment systems.

In the light of these suggestions, it is expected that hotels are less likely to adopt MHRS when their adoption or use is perceived as being complicated or complex. Accordingly, the following hypothesis is proposed:

Hypothesis 2. Complexity has a negative effect on hotels’ adoption of MHRS.

Rogers (2003, p. 240) defines compatibility as “the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters”. Tornatzky and Klein (1982) suggest that compatibility consists of normative compatibility (values or norms) and operational compatibility (existing practices). As an alternative, Premkumar et al. (1994) treat compatibility with the existing hardware/software as technical compatibility and view compatibility with the existing work procedures and value systems as organizational compatibility. Grover (1993) found that when customer-based inter-organizational systems are perceived as being compatible with organizational values, experience with similar systems, and technological infrastructure, they are more likely to be adopted. Wang et al. (2010) found that compatibility has a positive effect on the adoption of Radio Frequency Identification (RFID). Moreover, Mallat and Tuunainen (2008) note that perceived incompatibility of a new payment method with existing business inhibits merchant adoption of mobile payment systems.

This study posits that hotels are more likely to adopt MHRS when they perceive that MHRS are compatible with their existing values, information infrastructure, and management practice, and that the scope of change brought about by the adoption of MHRS is lessened. On this basis, the following hypothesis is proposed:

Hypothesis 3. Compatibility has a positive effect on hotels’ adoption of MHRS.

2.5. Organizational context

Based on the functional perspective of top managers (e.g., Premkumar & Roberts, 1999), the capability perspective of an organization (see Damanpour, 1992; Zhu, Kraemer, & Xu, 2003), and the technological resource perspective of an organization (see Zhu, Dong, Xu, & Kraemer, 2006), top management support, firm size, and technological competence are identified as important organizational factors. Premkumar and Roberts (1999) suggest that top management represents potential decision-makers in an organization. They can create a positive environment to facilitate adoption of new technologies by creating an appealing vision of how the adoption will benefit the firm, securing sufficient resources, and overcoming any member resistance to the change. Soliman and Janz (2004) found that top management support significantly
affects the adoption of Internet-based inter-organizational information systems, while Lin (2014) noted that top management support is positively related to the likelihood of firms’ adoption of electronic supply chain management systems. Teo et al. (2009) also found that top management support is positively associated with companies’ adoption of e-procurement systems.

This study contends that hotels are more likely to eventually implement MHRS when top managers are willing to create an appealing vision associated with MHRS adoption, shoulder the risks involved in the adoption process, and organize the required resources (e.g., financial resources) to support the adoption. Accordingly, the following hypothesis is proposed:

**Hypothesis 4.** Top management support has a positive effect on hotels’ adoption of MHRS.

Large organizations often have increased capabilities (e.g., financial slack) that can facilitate the adoption of innovations (Damanpour, 1992). Zhu et al. (2003) suggest that larger firms often possess additional slack resources, are more capable of bearing the investment risk, and are more likely to achieve economies of scale for their investment; in turn, these larger firms are more likely to implement e-businesses. Pan and Jang (2008) also found that organization size is a positive determinant of firms’ adoption of enterprise resource planning systems in the communications industry. Further, Teo et al. (2009) found that firm size is positively associated with companies’ adoption of e-procurement systems.

MHRS are more likely to be adopted by larger hotels since they are likely to have greater financial resources to support the adoption and afford the risk of financial loss. Therefore, the following hypothesis is proposed:

**Hypothesis 5.** Firm size has a positive effect on hotels’ adoption of MHRS.

As indicated by Zhu et al. (2006), technology competence represents an organization’s internal technological resources. They conceptualize technology competence as consisting of IT infrastructure and Internet skills. In their study of technological innovation, Kuan and Chau (2001) treat perceived organizational technological resources as a critical factor for small firms’ adoption of electronic data interchange. They found that adopter firms perceive higher levels of technological competence than non-adopter firms do. Zhu et al. (2003) also found that firms with higher levels of technological competence are more likely to adopt electronic business.

It is expected that hotels are more likely to adopt MHRS when they have technology resources that can lay the foundation for MHRS operation. Thus, the following hypothesis is proposed:

**Hypothesis 6.** Technological competence has a positive effect on hotels’ adoption of MHRS.

2.6. Environmental context

Inspired by the perspective of competitive bandwagon pressures (see Abrahamson & Rosenkopf, 1993), the innovation diffusion theory (Rogers, 2003), and the perspective of information-processing needs (see Thong, 1999), competitive pressure, critical mass, and information intensity are identified as potential environmental factors. Abrahamson and Rosenkopf (1993) suggest that, from the perspective of competitive bandwagon pressures, an organization adopts an innovation in order to avoid the risk of competitive disadvantage. It seeks to avoid the scenario that, being a non-adopter, its performance falls below the average performance of organizations if the innovation succeeds. Based on this perspective, Wang and Cheung (2004) propose that competitive pressure is positively related to travel agencies’ adoption of e-business. Oliveira and Martins (2010) found that competitive pressure is a positive predictor of e-business adoption for both the telecommunications industry and the tourism industry, while Zhu et al. (2003) found that firms facing higher levels of competitive pressure are more likely to adopt electronic business. In addition, Lin (2014) found that competitive pressure is positively related to the likelihood of firms’ adoption of electronic supply chain management systems.

In the light of these suggestions, this study hypothesizes that hotels are more likely to adopt MHRS when they believe that non-adopter will lead to competitive disadvantage (e.g., losing potential customers). On this basis, the following hypothesis is proposed:

**Hypothesis 7.** Competitive pressure has a positive effect on hotels’ adoption of MHRS.

In Rogers’ (2003) view, at the system level, critical mass in the diffusion of innovation refers to a tipping point after which innovation adoption by individual members of a system becomes self-sustaining. At the individual level, a threshold point is reached if an individual has the perception that some minimum number of other individuals has adopted an innovation (see also Markus, 1994). Rogers suggests that critical mass is relevant to network externalities, which suggest that the value of a product/service increases with the number of users. The rate of adoption speeds up when many members of a system perceive that everybody is using an innovation.

Van Slyke, Ilie, Lou, and Stafford (2007) found that perceptions of the critical mass of instant messaging positively influence behavioral intentions to use that innovation. Barnes and Bohringer (2011) noted that habit in micro-blogging usage is driven by perceived critical mass. Mallat and Tuunainen (2008) suggest that perceived lack of critical mass/customer adoption of mobile payments inhibits merchant adoption of mobile payment systems. Based on these findings, it can be inferred that hotels are more likely to adopt MHRS when they perceive that most customers use MHRS via smart phones. Therefore, the following hypothesis is proposed:

**Hypothesis 8.** Critical mass has a positive effect on hotels’ adoption of MHRS.

Porter and Millar (1985) propose that IT can play a strategic role in an industry characterized by high product information intensity. Thong (1999, p.196) defines information intensity as “the degree to which information is present in the product or service of a business”. Due to information-processing needs, information-intensive businesses are more likely to adopt innovative information systems.

As mentioned earlier, MHRS are location-based mobile information systems (Wang & Wang, 2010). Location-based services provide users with the capacity of real-time positioning and connect them to information they are interested in, such as routing, weather, and traffic conditions (Sadoun & Al-Bayari, 2007). As for information requirements of hotel customers for location-based services, which act as a virtual hotel concierge, Murphy and Schegg (2006) found that restaurants, local activities, and transportation options constitute the most requested information. In a relatively highly information-intensive hospitality industry, MHRS can be used to help hotels process real-time information requirements raised by customers. Thus, this study suggests that hotels are more likely to adopt MHRS when they perceive their products/services to be information-intensive. In turn, the following hypothesis is proposed:

**Hypothesis 9.** Information intensity has a positive effect on hotels’ adoption of MHRS.
3. Method

3.1. Sample

In order to empirically test the research model, the survey strategy and the self-administered questionnaire technique (Saunders, Lewis, & Thornhill, 2007) were utilized. A random sample of 500 hotels was selected from a list provided by the Taiwan Tourism Bureau. Questionnaires were sent to the 178 hotels that agreed to participate in this study, and 140 useful responses were received, of which 48 (34.3%) had already adopted MHRS. Table 1 displays the participant profiles.

3.2. Measures

The questionnaire included three parts, including basic hotel information (e.g., hotel type), and responses to the measurement items associated with the dependent and independent variables. Adoption of MHRS was treated as a dichotomous dependent variable: a yes/no response was utilized to measure whether a hotel was an adopter or a non-adopter (0: non-adopter; 1: adopter).

All measures for the independent variables were developed from existing instruments, and are reproduced in the Appendix. The measures for the complexity, compatibility, and relative advantage were adapted from Grover (1993) and Ramamurthy, Premkumar, and Crum (1999). The measures for firm size and information intensity were developed from Grover (1993). The items for top management support were adapted from Soliman and Janz (2004). The measures for technological competence and competitive pressure were adapted from Iacovou, Benbasat, and Dexter (1995) and Lin (2006). The items for critical mass were modified from Hsu and Lu (2004). A 7-point Likert scale ranging from "strongly disagree" to "strongly agree" was utilized for all measurement items.

4. Results

4.1. Reliability and validity

Cronbach’s alpha was utilized to assess the reliability of the measures for the independent variables. All alpha coefficients for the constructs exceeded the recommended threshold value of .7 (Hair, Black, Babin, & Anderson, 2010). A principal component analysis with orthogonal factor rotation was utilized to assess the validity of the construct measures. All of the factor loadings were greater than .5 (Hair et al., 2010), and no cross-loadings were found. Table 2 shows the alpha coefficients and factor analysis results, indicating adequate reliability and validity of the measures.

4.2. Testing the research model

Logistic regression is useful when the purpose of a study is to model predictors of a binary (two-group) dependent variable (Hair et al., 2010). This statistical technique has been adopted by previous organizational technology/e-business adoption studies, such as those focusing on firms’ adoption of e-business (e.g., Oliveira & Martins, 2010), enterprise resource planning systems (e.g., Pan & Jang, 2008), electronic supply chain management systems (Lin, 2014), and e-procurement systems (Teo et al., 2009).

The dependent variable in this study was binary (i.e., adopter and non-adopter). Logistic regression was utilized to test the research model. All independent variables were simultaneously entered. Table 3 indicates that no correlations between independent variables exceeded .9 (Hair et al., 2010). Table 4 shows that no condition index exceeded 30. Thus, multicollinearity issues were determined to not have affected the results.

As for the goodness-of-fit of the research model, Hair et al. (2010) suggest that the lower the –2 log likelihood (–2LL) value, the better the goodness-of-fit of the research model; further, the higher the value of the Cox and Snell $R^2$ / Nagelkerke $R^2$, the greater the model fit. As indicated in Table 5, the values of the Cox and Snell

Table 2

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<td>4.33</td>
<td>.76</td>
<td>.83</td>
<td></td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>HI1</td>
<td>4.68</td>
<td>.76</td>
<td>.83</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>HI2</td>
<td>4.68</td>
<td>.81</td>
<td>.85</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>HI3</td>
<td>4.64</td>
<td>.77</td>
<td>.84</td>
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</table>

Notes. RA = relative advantage; CB = compatibility; CX = complexity; FS = firm size; TC = technology competence; TS = top management support; CM = critical mass; CP = competitive pressure; II = information intensity.

Factor loadings with absolute values lower than .5 are omitted.
Thus, hypotheses 1, 4, 7, and 9 are not significantly related to hotels' MHRS adoption, while complexity is significantly negatively related to hotels' MHRS adoption. Thus, information intensity did not exhibit a significant relationship with hotels' MHRS adoption. In summary, judging by the aforementioned findings, the research model correctly predicted 89.1% of the non-adopters and 62.5% of the adopters. An alternative explanation is offered by Oliveira, Thomas, and Espadanal (2014), who found that relative advantage positively influences the manufacturing sector's adoption of cloud computing, but this is not the case for the service sector, suggesting that the influences of relative advantage may vary across industries. Hotels could be viewed as belonging to the service sector, and this insignificant result is similar to their finding.

Organizational factors affecting hotels' adoption of MHRS are also investigated. As expected, firm size constitutes a facilitator, as does technology competence (see also Kuan & Chau, 2001; cf. Wang et al., 2010). These two findings are similar to those obtained in the electronic business adoption study of Zhu et al. (2003). The finding that firm size constitutes a facilitator is similar to that in both Pan and Jang (2008) study of firms' adoption of enterprise resource planning systems in the communications industry, and Teo et al.'s (2009) study of companies' adoption of e-procurement systems. However, this finding differs from that obtained by Lin (2014), who noted that firm size is not positively related to the likelihood of firms' adoption of electronic supply chain management systems. Surprisingly, top management support does not exhibit a significant relationship with hotels' MHRS adoption. Thus, hypotheses 1, 4, 7, and 9 are not supported.

### Table 5

#### Goodness-of-fit of the research model.

<table>
<thead>
<tr>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>−2LLnull model</td>
</tr>
<tr>
<td>−2LLresearch model</td>
</tr>
<tr>
<td>Change in −2LL</td>
</tr>
<tr>
<td>Cox and Snell R²</td>
</tr>
<tr>
<td>Nagelkerke R²</td>
</tr>
</tbody>
</table>

Note. ***p < .001.

### Table 6

#### Classification table.

<table>
<thead>
<tr>
<th>Actual</th>
<th>Predicted</th>
<th>% Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-adopters</td>
<td>Adopters</td>
<td></td>
</tr>
<tr>
<td>82</td>
<td>10</td>
<td>89.1%</td>
</tr>
<tr>
<td>Adopters</td>
<td>18</td>
<td>62.5%</td>
</tr>
<tr>
<td>Overall</td>
<td></td>
<td>80.0%</td>
</tr>
</tbody>
</table>

### Table 7

#### Logistic coefficients.

<table>
<thead>
<tr>
<th>Predictor</th>
<th>B Coefficient</th>
<th>Wald statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relative advantage</td>
<td>−.12</td>
<td>.11</td>
</tr>
<tr>
<td>Compatibility</td>
<td>1.25**</td>
<td>10.38</td>
</tr>
<tr>
<td>Complexity</td>
<td>−1.48**</td>
<td>8.25</td>
</tr>
<tr>
<td>Firm size</td>
<td>1.73***</td>
<td>15.30</td>
</tr>
<tr>
<td>Technology competence</td>
<td>1.30***</td>
<td>10.96</td>
</tr>
<tr>
<td>Top management support</td>
<td>−.09</td>
<td>.06</td>
</tr>
<tr>
<td>Critical mass</td>
<td>1.63***</td>
<td>12.18</td>
</tr>
<tr>
<td>Competitive pressure</td>
<td>.01</td>
<td>.00</td>
</tr>
<tr>
<td>Information intensity</td>
<td>.11</td>
<td>.10</td>
</tr>
</tbody>
</table>

Note. *p < .05; **p < .01; ***p < .001.

### 5. Discussion

This study explores the factors affecting hotels' adoption of MHRS through the theoretical lens of the TOE framework (Tornatzky & Fleischer, 1990), and investigates technological factors that influence hotels' adoption of MHRS. As expected, compatibility constitutes a facilitator (see also Grover, 1993; Wang et al., 2010; cf. Premkumar et al., 1997), while complexity is an inhibitor (see also Grover, 1993). These two findings are similar to those obtained by Mallat and Tuunainen (2008) in their study of merchant adoption of mobile payment systems. The finding that complexity is an inhibitor differs from Hung et al.'s (2010) study of hospital adoption of customer relationship management systems, which found that complexity does not have a significant influence on adoption. Surprisingly, relative advantage does not constitute a facilitator (see also Grover, 1993; Joo & Kim, 2004; Wang et al., 2010). This finding differs from those obtained in both Mallat and Tuunainen (2008) and Hung et al. (2010). The reason for this insignificant result is that the average perceived relative advantage levels are almost the same between MHRS adopters and non-adopters (adopters: 4.60; non-adopters: 4.59). Thus, they are indistinguishable with respect to the factor of relative advantage. An alternative explanation is offered by Oliveira, Thomas, and Espadanal (2014), who found that relative advantage positively influences the manufacturing sector's adoption of cloud computing, but this is not the case for the service sector, suggesting that the influences of relative advantage may vary across industries. Hotels could be viewed as belonging to the service sector, and this insignificant result is similar to their finding.

R² and Nagelkerke R² are .31 and .44, respectively. The −2LL value for the research model is 127.16. The −2LL value for the null model is 180.03. The chi-square test of the difference of −2LL values (null model versus research model) is significant (p < .001), suggesting that the model fit is significantly improved from the null model. In addition, the research model correctly predicted 89.1% of the non-adopters and 62.5% of the adopters, with the overall predictive accuracy of 80% (Table 6), which is better than the 50% predicted by random guessing. In summary, judging by the aforementioned model fit indices, the research model exhibited an acceptable fit with the data.
significant positive effect on hotels’ adoption of MHRS (see also Wang et al., 2010; cf. Soliman & Janz, 2004). This insignificant result is similar to one obtained by Seyed, Awais, Shamail, and Abbas (2004), who found that management support is not significantly positively associated with the electronic commerce adoption of small and medium enterprises. However, this result differs from that obtained by Lin (2014) study of firms’ adoption of electronic supply chain management systems, and Teo et al.’s (2009) study of companies’ adoption of e-procurement systems. The reason for this insignificant result is that the average perceived levels of top management support between MHRS adopters and non-adopters differed only slightly (adopters: 4.74; non-adopters: 4.73). Thus, they are indistinguishable in terms of the factor of top management support.

Finally, environmental factors influencing hotels’ adoption of MHRS are investigated. Critical mass is found to be a facilitator (see also Barnes & Börhringer, 2011; Van Slyke et al., 2007; cf. To, Liao, Chiang, Shih, & Chang, 2008), which reflects the finding obtained in Mallat and Tuunainen (2008) study of merchant adoption of mobile payment systems. However, information intensity does not exhibit a positive effect; this is similar to the result found in Thong’s (1999) study of information systems adoption (see also Grover, 1993; Teo, 1997; Weng, 1997). The reason for this insignificant result is that the average perceived levels of information intensity are similar between MHRS adopters and non-adopters (adopters: 4.76; non-adopters: 4.62), making them indistinguishable with respect to the factor of information intensity. Competitive pressure also does not exhibit a positive effect on hotels’ adoption of MHRS. This insignificant result differs from those obtained in Wang and Cheung (2004) study of travel agencies’ adoption of e-business, Oliveira and Martins’ (2010) study concerning e-business adoption in the tourism industry, Zhu et al.’s (2003) study of electronic business adoption, and Lin’s (2014) study of firms’ adoption of electronic supply chain management systems. The explanation for this finding is somewhat similar to those listed above: the average perceived levels of competitive pressure are almost the same between MHRS adopters and non-adopters (adopters: 4.47; non-adopters: 4.48), making them indistinguishable with respect to the factor of competitive pressure. However, Thong (1999) suggests that while information intensity and competition do not have a significant direct effect on the likelihood of information systems adoption, they may indirectly influence information systems adoption through the characteristics of information systems (e.g., compatibility).

6. Theoretical implications

The contributions of this study to organizational mobile commerce adoption research are threefold: a new context, a new model, and new findings. It contributes to the tourism management literature by identifying some of the factors that affect hotels’ MHRS adoption.

As for a new context, extant research on organizational mobile commerce/technology adoption has paid insufficient attention to hotels’ adoption of MHRS. In order to bridge this knowledge gap, this study specifically investigates organizational mobile commerce/technology adoption in that specific context, offering industry- and technology-specific insights.

With regard to a new model, this study builds upon the TOE framework (Tornatzky & Fleischer, 1990) to integrate various perspectives into a proposed adoption model. With respect to this model, based on the innovation diffusion theory (Rogers, 2003), this study begins by proposing that relative advantage, complexity, and compatibility serve as technological characteristics that may influence hotels’ adoption of MHRS. Then, building upon the functional perspective of top managers (e.g., Premkumar & Roberts, 1999), the capability perspective of an organization (see Damanpour, 1992; Zhu et al., 2003), and the technology resource perspective of an organization (see Zhu et al., 2006), this study proposes that top management support, firm size, and technology competence comprise the organizational aspects that may influence hotels’ adoption of MHRS. Finally, inspired by the perspective of competitive bandwagon pressures (see Abrahamson & Rosenkopf, 1993), the innovation diffusion theory (Rogers, 2003), and the perspective of information-processing needs (see Thong, 1999), this study proposes that competitive pressure, critical mass, and information intensity serve as the environmental features that may influence hotels’ adoption of MHRS. This type of TOE model that integrates various perspectives is new in terms of the integration of the combinations of these theoretically grounded variables.

Lastly, regarding new findings, this study compares its findings with the findings of previous organizational mobile commerce/technology adoption literature, including how the findings of this study are different from those of previous researchers as well as how the insignificant results are dissimilarly interpreted by this study and previous research. The different findings and the dissimilar interpretations of the insignificant results denote the newness of this study. In terms of the applicability of extant theoretical perspectives, this study found that relative advantage, top management support, competitive pressure, and information intensity, which have been emphasized in previous research on organizational adoption of technology/information systems/e-business/mobile commerce (e.g., Hung et al., 2010; Lin, 2014; Oliveira & Martins, 2010; Teo et al., 2009; Zhu et al., 2003), do not play a significant role in the context of the hotel industry’s adoption of MHRS, suggesting that the theoretical perspectives underpinning these four factors do not have adequate predictive power in this industrial and technological context.

Furthermore, the findings of this study provide direction for future research on MHRS adoption. First, researchers should attempt to uncover additional potential factors that may influence hotels’ adoption of MHRS. The findings in this study show that relative advantage, top management support, competitive pressure, and information intensity did not constitute significant predictors of MHRS adoption. The research model predicts 89.1% of the variance of non-adopters and 62.5% of the adopters, which suggests that other independent variables might exist. For instance, Zhu et al. (2006) found that security concerns (e.g., information and transaction security) negatively influenced e-business usage.

Second, researchers can focus on the conceptualization of the independent variables. For instance, the findings show that compatibility is positively related to hotels’ adoption of MHRS. Purnakumar et al. (1994) found that the greater the technical compatibility of electronic data interchange systems, the better the adaptation (i.e., initial use of the innovation). However, this is not the case for organizational compatibility. Thus, future research should consider organizational and technical compatibility as separate predictors and explore whether there is any difference in terms of their impact on hotels’ adoption of MHRS.

Finally, researchers can revisit the conceptualization of the dependent variable. The findings show that compatibility, complexity, firm size, technology competence, and critical mass constitute significant predictors of MHRS adoption. Damanpour (1992) suggests that the stages of innovation adoption in organizations include the initiation stage and the implementation stage. In his meta-analytic review, organizational size was found to be more strongly related to the implementation of innovations than to the initiation of innovations. Likewise, future research can consider adoption as consisting of multiple stages, and explore whether
compatibility, complexity, firm size, technology competence, and critical mass significantly influence these different stages with respect to hotels’ adoption of MHRS.

7. Practical implications

The findings of this study provide important practical implications for MHRS developers and suppliers. Firstly, both compatibility and complexity in the technological context have a significant effect on hotels’ adoption of MHRS. In order to facilitate organizational adoption, MHRS developers may need to ensure that adoption is a relatively simple process, and that systems are compatible with hotels’ existing information infrastructure.

Secondly, both firm size and technological competence in the organizational context have a significant positive effect on the adoption of MHRS. Larger hotels are likely to have additional financial and technical resources to support this adoption. MHRS suppliers may consider larger hotels as primary potential customers, and focus promotion of these systems to them.

Lastly, critical mass in the environmental context was found to be positively related to hotels’ adoption of MHRS. In their study of groupware acceptance, Lou, Luo, and Strong (2000) suggest that, in order to achieve a critical mass of users, the choice of appropriate individuals to participate in the initial introduction is crucial. As a first step to increase the perception of critical mass, Lou et al.’s (2000) suggestion may be utilized to enhance the strategy of selecting larger hotels as the main target market: these larger hotels are likely to accommodate high numbers of hotel guests, which should help to achieve a critical mass of hotel guests who use MHRS.

8. Limitations

When interpreting the findings of this study, there are some potential limitations that must be taken into consideration. The first pertains to the measurement scales utilized. For example, relative advantage was measured using a 7-point Likert scale; Premkumar et al. (1994) suggest that each of the benefits can be weighted by its importance rating to provide a weighted measure. In their view, this type of scale is more accurate. Future studies can seek to utilize a weighted measure and explore how it affects the obtained results.

The second limitation refers to the statistical techniques employed. Moch and Morse (1977) investigate organizational adoption of innovations and take interaction effects into consideration. The logistic regression technique (Hair et al., 2010) was herein utilized to analyze the relationships between hotels’ adoption of MHRS and their predictors. It did not analyze the relationships between the predictors. Future researchers can elaborate on the findings of this study by investigating these relationships.

The third limitation centers on the data. In addition to quantitative data, Brown and Russell (2007) also collected qualitative data in order to assess factors that influence the adoption of RFID. Since the data in this study are quantitative, future studies should collect participants’ opinions about the factors that influence their adoption of MHRS, which will provide more qualitative explanations.

Lastly, there is a limitation pertaining to generalizability. Zhu et al. (2003) make a cross-country assessment of the facilitators and inhibitors of electronic business (EB) adoption, and differentiate between high EB-intensity and low EB-intensity countries. The participants in this study are hotels in Taiwan. As such, the findings may not be applicable to more heterogeneous contexts. Future research can examine the predictive power in different national contexts, and elaborate on the findings obtained in this study by making cross-country or cross-cultural comparisons.

9. Conclusions

This study contributes to the organizational mobile commerce adoption literature by investigating factors affecting hotels’ adoption of MHRS. The results indicate that significant predictors of hotels’ adoption of MHRS include: compatibility and complexity in the technological context, firm size and technological competence in the organizational context, and critical mass in the environmental context. However, relative advantage in the technological context, top management support in the organizational context, and competitive pressure and information intensity in the environmental context do not constitute significant predictors.

This contribution can be further advanced by considering the theoretical and methodological implications of these results. At the theoretical level, future studies can seek to investigate other potential factors influencing hotels’ adoption of MHRS (e.g., security concerns), conceptualize independent variables in alternative manners (e.g., treating organizational and technical compatibility as separate predictors), and conceptualize adoption as consisting of different stages, so as to treat each stage as a dependent variable. At the methodological level, future research can seek to adopt alternative measurement scales (e.g., a weighted measure for relative advantage), utilize other statistical techniques to analyze the relationships between predictors, offer qualitative explanations for MHRS adoption choices based on participant opinions, and examine the generalizability of this study’s findings by making cross-country comparisons.

In addition to the theoretical and methodological implications, this study also provides several important practical implications for MHRS development and promotion. It would be beneficial for MHRS developers to make the adoption of MHRS a technically simple process, and to make systems easily compatible with hotels’ existing information infrastructure. It would also be beneficial for MHRS suppliers to select larger hotels as their main target market, and to promote the systems to this group.

Appendix

Relative advantage

RA1: We expect a mobile hotel reservation system (MHRS) to help increase market share.
RA2: We expect an MHRS to help speed up the booking process.
RA3: We expect an MHRS to help lower costs.

Complexity

CX1: We believe that an MHRS is complex to implement.
CX2: We believe that developing an MHRS is a complex process.
CX3: Integrating an MHRS into our work practice is very difficult.

Compatibility

CB1: The changes introduced by an MHRS are consistent with my hotel’s existing beliefs/values.
CB2: An MHRS is compatible with my hotel’s existing information infrastructure.
CB3: The changes introduced by an MHRS are consistent with my hotel’s existing practice.

Top Management support

TS1: My top management is likely to invest funds in an MHRS.
TS2: My top management is willing to take the risks involved in
the adoption of an MHRS.

**Firm size**

FS1: The capital of my hotel is high compared to the hotel industry in general.

FS2: The revenue of my hotel is high compared to the hotel industry in general.

FS3: The number of employees at my hotel is high compared to the hotel industry in general.

**Technology competence**

TC1: The information technology infrastructure of my hotel is able to support MHRS-related applications.

TC2: My hotel is dedicated to ensuring that employees are familiar with MHRS-related technology.

TC3: The employees of my hotel contain a high level of MHRS-related knowledge.

**Competitive pressure**

CP1: My hotel experienced competitive pressure to introduce an MHRS.

CP2: My hotel would have experienced a competitive disadvantage if an MHRS had not been adopted.

CP3: We believe that we will lose customers to our competitors if we do not adopt an MHRS.

CP4: We feel that it is a strategic necessity to introduce an MHRS in order to compete in the existing marketplace.

**Critical mass**

CM1: Most customers in the hotel industry use smart phones.

CM2: Most customers in the hotel industry download MHRS-related applications via smart phones.

CM3: Most customers in the hotel industry use MHRS via smart phones.

**Information intensity**

II1: Customers generally require a lot of information before purchasing products/services in the hotel industry.

II2: Products/services in the hotel industry are complex and hard to understand.

II3: The booking process in the hotel industry is generally a complex process.

**References**


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