



Innovation capability: The impact of e-CRM and COVID-19 risk perception

Nguyen Thi Khanh Chi

Foreign Trade University, 91 Chua Lang, Hanoi, Viet Nam

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ABSTRACT

The e-CRM application has currently offered benefits for companies in different business sectors, especially in hospitality industry. The objective of this paper is to investigate the impact of e-CRM components (i.e. technology-based CRM, knowledge management and customer orientation) on firms' innovation capabilities. Data was collected through a structured questionnaire survey conducted in Vietnam. The dataset consists of 213 valid responses by managers. Correlation analysis and structural equation modeling (SEM) were employed to examine the causal relationships among technology-based CRM, knowledge management, customer orientation, long-term relationships and innovation capability. The results show that knowledge management, customer orientation and technology-based CRM have positively influence on long-term relationships and innovation capability. Covid-19 risk perception has the role in enhancing the link between long-term relationships and innovation capability. From these findings, this study provides an improved understanding of how knowledge management, customer orientation and technology affect on innovating activities. This study also provides several implications for practice.

1. Introduction

The global economy has recently been driven by information technology (IT) development. However, it has also been negatively influenced by the COVID-19 pandemic [1,2]. These issues force firms in different industries to innovate their business operations [3] because innovation capabilities promote higher firm profits (Tidd et al., 1997). Particularly, businesses in the hotel sector require technology to overcome the current challenges. Consequently, this study contributes to the digital service in the hospitality industry by examining innovation capability under the impact of electronic customer relationship management (e-CRM) and COVID-19 risk perception.

Innovation capability has become a new field of interest for many scholars [4]. As effective innovation enables firms to meet the demands of a highly unpredictable competitive market, their innovation capabilities are the most crucial factor for competitive advantage [5]. Regrettably, despite these important advances, research on innovation capability under the impact of technology and pandemics in the service sector is scant, especially in the hotel sector. For example, Tang et al. [6] only refer to service innovation in the hotel industry in the context of social capital and knowledge sharing, while Pascual-Fernandez et al. [7] address marketing innovation in the hotel industry.

One potential antecedent that has, thus far, been neglected in technological innovation is risk perception. Since the COVID-19 pandemic is

an uncontrollable factor for firms, it has led to increased pressure on business operations. Consequently, firms (especially service firms) need to manage this risk to innovate their business activities. Several studies concern the impact of COVID-19 risk perception on the behavioural intention towards tourism [8], environmental awareness [9], and knowledge management (KM) during COVID-19 [10]. However, research on the impact of COVID-19 risk perception on firms' innovation capability remains scant.

Although e-CRM has been well evidenced in the literature [11,12], research that examines the effects of technology-based CRM (CRM (IT)), customer orientation, and managing customer knowledge technology on innovation capability is unclear. Recently, firms have implemented e-CRM efforts, having realised the critical role of e-CRM in their business operations [13], based on technology and KM. e-CRM focuses on relationship marketing with the goal of improving long-term relationships [14]. Firms' adoption of e-CRM helps innovate their products, services, and marketing activities, which constitutes their innovation capability [15]. Consequently, understanding how e-CRM can affect innovation capability is necessary for firms in an uncertain business environment.

Several recent studies have examined the impact of technology, customer orientation, and KM on firm performance in the e-CRM framework [15,16]. For example, Nguyen et al. [16] proposed a new framework to investigate the impact of critical factors (organisation, technology, customer orientation, CRM strategy, and KM) on e-CRM

E-mail address: chintk@ftu.edu.vn.

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success. Meanwhile, Migdadi [15] examined the impact of KM on firm performance, measured by marketing innovation, process innovation, and service innovation. The existing research on e-CRM is mostly conceptual, and includes empirical studies confirming the impact of technology and KM on CRM innovation [17]. Reflecting on prior studies related to CRM, this study proposes that CRM (IT), customer orientation, and KM may be linked to innovation capability.

Nevertheless, the empirical evidence on the interrelationship between e-CRM, long-term relationship with customers, and firms' innovation capability, in conjunction with COVID-19 risk perception, has enjoyed little attention. To bridge this gap, this study develops a new, integrated framework that examines these interrelationships. The relationships are tested empirically, using data collected from Vietnamese hotel managers. These service firms were chosen because, in a developing country such as Vietnam, emerging hotels generally follow high standards based on international best practices.

This study contributes both theoretically and practically. First, it is among the first studies to shed light on how e-CRM implementation leads to innovation capability. The study highlights the impact of KM, CRM (IT), and customer orientation on innovation capability. It shows how, and to what extent perception of the COVID-19 risk regulates the causal relationship between long-term relationships and innovation capability. Second, it offers meaningful practical implications. Given the impact of the COVID-19 pandemic on the global economy, managers need to respond to this impact by innovating their business operations.

2. Literature review and hypothesis development

2.1. Innovation capability

According to the Oslo Manual (2005), innovation is the adoption of new business processes, marketing methods, improved service quality, or external relations. Innovation capability can be developed by new operational practices to obtain a novel technology (Wong et al., 2011), because it is a source of firm performance [18]. Innovation capability is an important source for firms in the hospitality industry for modernisation and competitiveness. According to Migdadi [15]; innovation capability has five components: product innovation (product physical change), service innovation (the effectiveness of service processes), process, marketing, and administrative innovation. Innovation capability has become a means for firms to increase their competitive advantage, respond to customer satisfaction, and increase revenue [19]. In this vein, innovation capability addresses changes in service innovation (customer service, after-sales service, and delivery service) and in marketing and process innovation (quick response to customers, partners, and stakeholders). From this perspective, this study considers service firms' innovation capability as their ability to implement new business processes, improved service quality, and marketing methods.

2.2. e-CRM

In their study, Frow and Payne [20]; p.11) found that 'CRM is a cross-functional strategic approach concerned with creating improved shareholder value through the development of customer relationship'. However, with the development of information technology, CRM has currently developed into e-CRM [21]. Melović et al. [22] defined e-CRM as a strategy for firms to provide good quality, achieve long-term relationships, and increase business profit. Drawing on these prior studies, e-CRM, in this study, is viewed as a technology strategy to maintain customer relationships and achieve business success.

Several studies have considered e-CRM from various perspectives, including as a tool for creating long-term relationships via IT [23], and as a strategy based on technology for innovation capability [24,25]. According to Pushkala et al. [26]; a successful e-CRM needs to integrate information technology, information resources (customer database and good interaction with customers), as well as knowledge management.

Thus, based on these studies, CRM (IT), customer orientation, and KM are three key components of e-CRM adoption.

CRM (IT) is viewed as the factor relating to the soft and hard aspects of CRM implemented [27]. Therefore, technological systems are suggested as a key component in e-CRM solution deployment [28]. Chen and Ching [29] suggested that one of the key components of e-CRM implementation was IT. Other studies [27,30] have also confirmed the role of technology in implementing e-CRM. Thus, CRM (IT) refers to a system that includes software and hardware in adopting e-CRM.

Customer orientation is considered as an employee disposition or tendency to meet customer needs in an on-the-job context [31]. Customer orientation, critical for business success in the service industry [32], has two components: the need and the enjoyment. The need component demonstrates employees' belief in their ability to meet customer demand, while the enjoyment component describes employees' enjoyable interactions with customers [33]. Based on these aspects, customer orientation is defined as a set of behaviours that prioritises customer interests and provides high customer value.

KM refers to the sum of actual and potential resources embedded within, available through and derived from the network of relationships possessed by a social unit [34]. Wong and Wong [35] viewed KM capability from a balanced socio-technical perspective, by focusing on technology, structure, and culture. Moreover, KM is a combination of IT and knowledge related to business ownership and exchange between IT executives and functional managers [36]. Many studies have demonstrated the effect of KM on IT adoption, generally, and on CRM specifically. Armstrong and Sambamurthy [37] suggested that IT and business knowledge led to effective technology application. In detail, Mata et al. [38] identified KM as a critical predictor in successfully adopting IT systems for obtaining strategic benefits. Consequently, based on the literature, KM, in this study, is seen as managing knowledge resources to facilitate access and reuse of knowledge in using advanced IT.

2.3. Hypothesis development

2.3.1. E-CRM and innovation capability

KM is considered one of the critical processes in determining a firm's ability to learn and innovate (Salmodor & Bueno, 2007). Therefore, the most important purpose of KM is to improve innovativeness and responsiveness, which includes marketing innovation, process innovation, and service innovation [39]. Some studies have found KM to be knowledge sharing [40] and knowledge creation [41], with a positive influence on marketing innovation [15]; Xu et al., 2021). Firms can utilise KM to facilitate marketing innovation because tacit knowledge can be transferred to the innovative marketing process [42]. Dabić et al. [43] emphasise the importance of the intellectual agility of staff in SMEs, which is a key determinant in successfully innovating a business. Managing the application of knowledge can expand employees' creativity and generate creative ideas, which, in turn, lead to innovative marketing and services [44]. Dost et al. [45] found that knowledge from internal sources facilitated the generation of process innovation, while Xu et al.'s (2021) recent findings suggest the importance of KM in innovating new products. In this vein, with effective KM, firms can improve service development, create innovative marketing strategies, and innovate their business processes. Therefore, the following hypothesis is proposed:

H1a. KM positively impacts innovation capability

Regarding a firm's orientation towards its customers, the evidence on the impact of customer orientation and innovation capability in the hotel sector is not clear-cut. Tajeddini [46] found no significant relationship between customer orientation and process innovation in 156 hotels in Germany and France. In contrast, Tajeddini and Trueman [47] observed that employees focused on innovation after attending to customers in terms of their wants and needs in the retail industry in Switzerland. Similarly, Domi et al. [48] found that an enhanced

experience was key in attracting tourists and promoting tourism SME innovation in Albania. Some studies examine the relationship between customer-centricity and firm performance in manufacturing firms [49, 50]. Fewer studies investigate the link between customer orientation and innovation capability in general service sectors [15,48]. The relationship between customer orientation and innovation capability in the hotel sector has remained relatively unexplored, yet the available evidence points to a positive link between them. In this study, it is argued that customer orientation will positively affect the innovation capability of hotel providers. Hence, the following hypothesis is proposed:

H2a. Customer orientation positively impacts innovation capability

Thanks to the adoption of new technology, firms can achieve the benefits of e-CRM implementation [51]. They can share information throughout their organisations, which, in turn, enhances firm innovation [52]. Furthermore, empirical research has suggested the positive influence of CRM (IT) on marketing innovation. For example, Groznic et al. (2008) first showed that CRM (IT) improved firm's efficiency, productivity, and customer services. In this vein, CRM (IT) has a significantly positive impact on marketing innovation [53]. Nazari-Shirkouhi et al. [54] demonstrated that technology was an effective tool in improving firms' competitive advantage because it enabled firms to create quick responses to customer requests for marketing innovation. An IT platform improves firms' service quality by enabling them to respond to buyers faster, at a lower cost [55]. Recently, Chege and Wang [56] addressed the influence of technology on SME innovation in Kenya, while Lew et al. [57] suggested a relationship between technology and innovation in the payment process in the hospitality industry. Therefore, Dabić et al. [58] suggest a roadmap for firms that focuses on technology in their business innovation. Drawing on the above findings, this study suggests a positive relationship between CRM (IT) and innovation capability in the service sector. Thus, the following hypothesis is proposed:

H3a. CRM (IT) positively impacts innovation capability

2.3.2. The mediating role of long-term relationships

Long-term relationships refer to a long-lasting desire to uphold a valued relationship [59]; p. 316), and to a firm's commitment to its partners [60]. Although the benefits of long-term relationships are undeniable, not all companies can endure their relationships with their partners [61]. As e-CRM is concerned with the relationships between organisations and both potential and current customers [62]; p. 445), overcoming such inherent challenges to build long-term relationships requires firms that adopt e-CRM to focus on value creation for their partners.

Wang et al. (2018) demonstrated that KM improved firms' innovation performance. Moreover, Lin and Su [63] first noted the important role of KM in supporting firms to improve long-term relationships with their customers and enhance customer satisfaction, which all led to firm innovation. Furthermore, previous studies have found an association between e-CRM adoption, firms' channels, firms' partners, and their innovation. For example, Sen and Sinha [64] first suggested that failure in implementing e-CRM could be prevented when e-CRM components were linked with firms' channels, employees, and partners. Long-term relationships, which are the results of CRM adoption, have positively impacted innovation in organisations [15]. This is consistent with Ode and Ayavoo's [65] findings that KM improves customer relationships and firm performance in their process innovation. In this respect, this study also suggests that the positive relationship between KM and innovation capability is translated through long-term relationships with customers. Thus, the following hypothesis is proposed:

H1b. Long-term relationships positively mediate the relationship between KM and innovation capability

Firms that have a customer orientation strategy not only increase

their job performance, but also exhibit long-term relationships with customers [66]. Customer orientation is an essential force for building customer loyalty [67] because businesses that are oriented towards their customers acquire deep knowledge about their partners, both individually and in groups [68]. Consequently, firms that seek to enhance their relationships with customers should consider customer orientation as a key strategic option [69] since it directly affects firm performance [16]. A long-term relationship with customers retains them, thus facilitating an understanding of their needs and demands, which consequently promotes marketing innovation [70]. Firms not only implement innovative strategies, but also adopt various changes to their organisational factors, infrastructure, and technology to create new firm innovation, such as in marketing and processes (Maheshwari et al., 2006). In this respect, the current study proposes a positive relationship between customer orientation and firms' innovation capability, which is translated through a commitment to long-term relationships. Therefore, the following hypothesis is proposed:

H2b. Long-term relationships positively mediate the relationship between customer orientation and innovation capability

According to Melović et al. [22]; e-CRM develops firms' relationships with their customers, which consequently requires firms to innovate their business strategies and technical platforms. Several studies have suggested a mediating role for long-term relationships between CRM and firms' innovation in various sectors. For example, Muro et al. Muro et al. (2013) showed that adopting CRM in the banking industry strengthened the loyalty relationship with customers and banking service innovation (Muro et al., 2013). Iriquat and Abu Daquar (2017) found an impact of e-CRM on firms' long-term relationships and their employees' behaviour in the service sector in Palestine. Aldaihani et al. [71] recently revealed the role of customer empowerment in the relationship between CRM and customer intention. Based on this finding, they suggested that service firms should innovate technology in their business process. Drawing on prior research, this study proposes that e-CRM implementation has some links with firms' innovation capability, through building strong long-term relationships with customers.

By identifying customers' needs and demands, e-CRM can reinforce and upgrade service quality. For example, with the support of CRM (IT), firms can obtain customers' information and segment the market. Frow and Payne [20] suggested that using the validated tool in CRM assessment would help companies identify how they need to change if they are to achieve more sophisticated relationships with their customers. Many firms that adopt e-CRM without awareness of customers' data and sufficient technology do not innovate [72]. In this vein, long-term relationships are enhanced when firms utilise IT from channel touchpoints as well as their innovations. Therefore, the following hypothesis is posited:

H3b. Long-term relationships positively mediate the relationship between CRM (IT) and innovation capability

2.3.3. The moderating role of COVID-19 risk perception

Risk perception is seen as value judgments that relate to uncertain situations that arise from a particular risk (Bauer, 1960). Many studies have investigated the concept of perceived risk (Dillard et al., 2012). Risk perception includes two dimensions (Brug et al., 2004): cognitive and affective. The cognitive dimension focuses on individuals' perceived susceptibility to risk and its severity, while the affective dimension focuses on individuals' anxiety about their exposure to risk (Sjöberg, 1998). Risks can be divided into different types, including financial, social, time, and psychological risks (Lai-Ming Tam, 2012). A firm's risk perception is considered to be its assessment of the risk inherent in a situation [73]. Under the COVID-19 pandemic, hotels will perceive the uncertainty and unpredictability of this situation as it pertains to their business operations.

Regarding innovation capability, Pascual-Fernández et al. [7] show

the impact of the COVID-19 pandemic on sustainable competitive advantage. Therefore, firms' perceptions about COVID-19 require them to innovate their businesses. As the severity of the COVID-19 pandemic has significantly impacted the tourism and hospitality industry, the disease has drawn widespread attention [8]. Rosenstock (1974) considered perceived risk as a critical component in predicting customer behaviour and firm performance. It may be concluded that hotel managers' COVID-19 risk perception is likely to enhance the association between long-term relationships and innovation capability.

H4. COVID-19 risk perception positively strengthens the relationship between long-term relationships and innovation capability.

3. Research method

3.1. Measurement

The current study employed a structural equation model (SEM) to test the proposed hypotheses. A five-point Likert scale was used to assess the degree of KM, customer orientation, CRM (IT), risk perception, long-term relationships, and innovation capability. KM comprises four items adapted from Sin et al. [74] and Mahawah et al. [75]. The CRM (IT) scales, with four items, were developed based on Nguyen et al. [16] and Sin et al. [74]. Long-term relationship comprises four items, as adapted from Werner et al. (2005) and Nguyen et al. [16]. Innovation capability, with four items, was validated by reference to Hammer (2004) and Migdadi [15]; while customer orientation, with four items, was adapted from Nguyen et al. [16]. COVID-19 risk perception was measured using five items, following Zhao et al. [73].

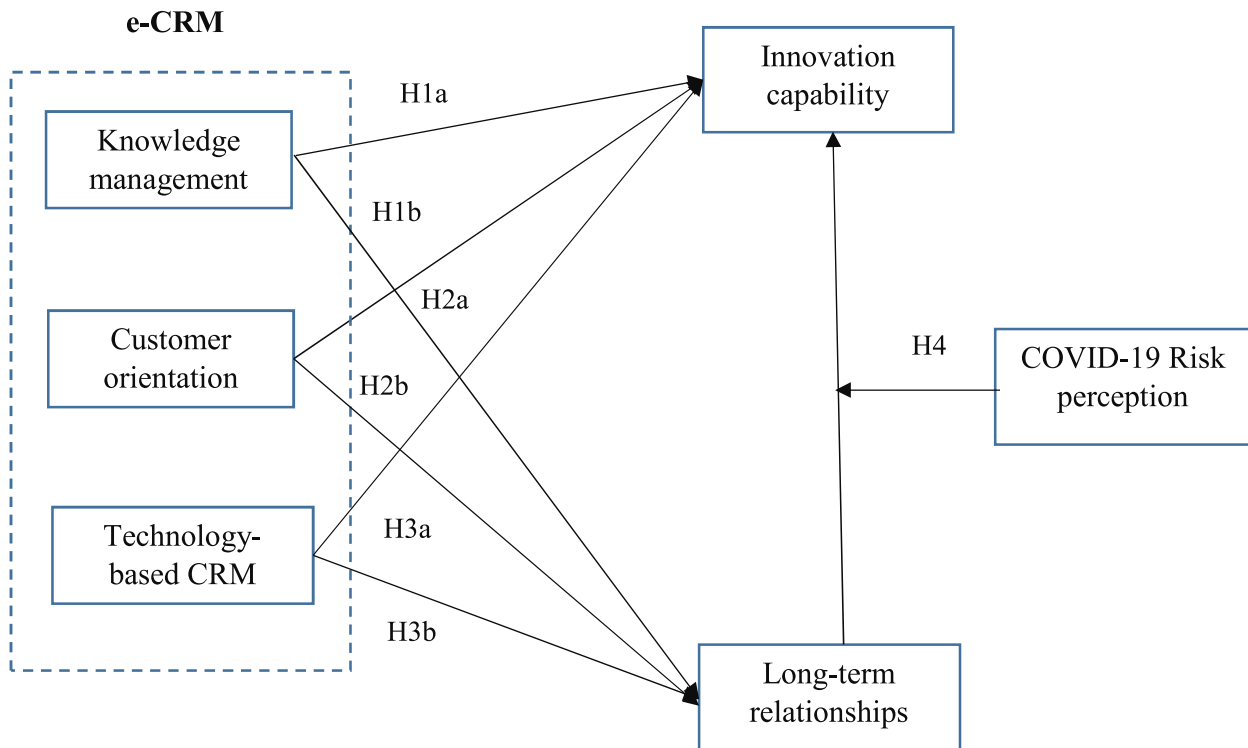
3.2. Population and sample

The data for this study were collected from hotel managers in Hanoi, Danang, and Ho Chi Minh City, where there is a high concentration of hotels. The questionnaire was translated from English into Vietnamese, and then back into English, by two bilingual experts, to guarantee

translation quality (Brislin, 1970). Some 100 hotels were randomly chosen, using the proportionate stratified random sampling (SRS) method, from 357 hotels that had all implemented CRM and e-CRM. SRS produces the least bias of restricted sampling designs, and is more efficient than the simple random sampling design; additionally, SRS provides better representation of each important segment of the population, and generates more valuable and differentiated information (Sekaran & Bougie, 2009). The sample was drawn from the firms (population) that had implemented e-CRM, followed by a random selection of subjects from each stratum.

Initially, each hotel's general manager was personally contacted and provided with an information sheet about the study, which explained the need and significance of the research. Since the hotel managers had agreed to participate, they each provided a list of the heads of each department for data collection purposes. The questionnaires were distributed to approximately 400 hotel managers, for each one of which four managers were approached. Five assistants were recruited to launch the questionnaires. The trained assistants visited each hotel to explain the significance of the study and the survey procedures to the participants. The managers knew that the collected data would be kept confidential, and would be processed in aggregate form. The completed questionnaires were returned directly to the researcher by post or in person. On receipt of the completed questionnaires, those that had incomplete or disengaged responses were discarded, while only complete questionnaires were used for data analysis. Having collected the data, the completed questionnaires were inputted, cleansed, and assessed, to ensure good quality. Proper ethical procedure was followed: all the participants' answers were kept confidential, while complete anonymity was ensured.

The large-scale survey was launched from 22 September to December 16, 2020. The valid responses totalled 213, or a response rate of 53.3%. Regarding the respondents' information, the survey was completed exclusively by first-line managers (84.5%), middle managers (13.2%), and top managers (4.3%). Specifically, regarding participants' positions in the banking and hospitality sectors, the highest frequency of exposure was observed in the customer relations department (49.4%),



followed by the technology department (37%).

3.3. Data analysis

To test the proposed model, a three-stage approach was employed. First, confirmatory factor analysis (CFA), recommended by Hair et al. (2010), was used to validate the measurement scale. Second, SEM, following Anderson and Gerbing (1988), was used to assess the relationship between e-CRM and innovation capability, using the AMOS 21.0 software. The model fit indices, including χ^2/df , goodness of fit index (GFI), TLI, normed fit index (NFI), comparative fit index (CFI), and root mean square error of approximation (RMSEA), were examined, with the following criteria: 1 to 5 for χ^2/df , above 0.90 for GFI, TLI, and CFI (Kline, 2005), and below 0.08 for RMSEA (Bollen, 1989). Third, ‘Process’ macro in SPSS 21.0 was employed for analysing the moderating impact of COVID-19 risk perception.

4. Research findings

4.1. Measurement model test - validity and reliability

The correlations between the items in the total and exploratory factor analysis were analysed to evaluate the scales. To check the validity of the structures, CFA was conducted to evaluate the scale. The analysis results revealed that the model achieved an acceptable overall fit to the actual data (Chi-square/df = 2.638; GFI = 0.902; CFI = 0.932; TLI = 0.920; RMSEA = 0.055). The load factor for each item in the structure (>0.5) showed that the components in the first-order structure had achieved convergence values. Cronbach’s Alpha and the coefficient of synthesis (>0.7), as well as the mean-variance (>0.3) indicated that the model was sufficiently reliable (Table 1).

As shown in Tables 2 and 3, the factor analysis results satisfied the criteria for construct validity, including both convergent validity (eigenvalues greater than 1, item loading greater than 0.5) and discriminant validity (cross-loading of items less than 0.5). The factor loadings of items in each construct were higher than 0.5, which indicated that the first-order constructs reached convergent validity. Convergent validity and discriminant validity were therefore demonstrated.

4.2. Hypothesis testing

Table 4 shows the hypothesis testing results using SEM on the whole sample. Clearly, from Table 5, our baseline model has a good fit (Chi-square/df = 1.669; CFI = 0.952; GFI = 0.902; TLI = 0.945; IFI = 0.952; RMSEA = 0.044), while the proposed relationships are all statistically significant and positive.

The results in Table 4 show that KM has the highest impact on innovation capability, of the three factors (technology and customer orientation, 0.425; CRM (IT), 0.129). It may thus be inferred that managing knowledge is important for managers in the hospitality industry, to innovate their business process, service, and marketing. Further, CRM (IT) is found to have a stronger effect on long-term relationships with customers (0.324) than KM and customer orientation.

To assess the total impact of all the factors in the model on e-CRM implementation, the direct, indirect, and total effect analyses were examined. The results (Table 5) report the direct and indirect effects of all the variables on innovation capability. KM, customer orientation, and CRM (IT) have not only a significant direct effect on innovation capability, but also an indirect impact on firm innovation, through long-term relationships. The total effect of KM on innovation is the strongest (0.436), followed by CRM (IT) (0.147), while the total impact of customer orientation is the lowest (0.120). Thus, H1a, H1b, H2a, H2b, H3a, and H3b are supported.

To examine the moderating effect of COVID-19 risk perception, the ‘Process’ macro in SPSS 21.0 was employed. The results show that COVID-19 risk perception enhances the relationship between long-term

Table 1
Measurement-scale items for variables.

| Item code | Item description | Source |
|---------------------------------|---|---|
| Knowledge management-KM | | |
| KM1 | We provide channels that enable continuous two-way communication with key customers | Sin et al. [74]; Mahawrah et al. [75] |
| KM2 | We have established processes to gather customer knowledge | |
| KM3 | We can make quick decisions with the knowledge of our customers | |
| KM4 | We can provide real customer information that allows for quick and accurate interaction with them | |
| Technology-IT | | |
| IT1 | We have a dedicated engineering team to provide technical support for using e-CRM technology in building customer relationships | Sin et al. [74]; Nguyen et al. [16] |
| IT2 | We have the right hardware to serve our customers | |
| IT3 | We have the right software to serve our customers | |
| IT4 | Our information systems are integrated in different functional areas | |
| Customer orientation | | |
| COR1 | My business objectives are focused on meeting customer demand | Nguyen et al. [16] |
| COR2 | My business strategies are established to increase customer value | |
| COR3 | I frequently measures customer satisfaction | |
| COR4 | I focus great attention on after-sales service | |
| COR5 | I closely control and assesses the level of commitment in serving customers’ needs | |
| COVID-19 risk perception | | |
| RIS1 | I am worried about COVID-19 occurring in my business | Zhao et al. [73] |
| RIS2 | There is a high likelihood of acquiring COVID-19 compared to other diseases | |
| RIS3 | The founder stands to lose dearly financially | |
| RIS4 | There is considerable uncertainty when predicting how well the business will do | |
| RIS5 | The probability of failure is high | |
| Long-term relationships | | |
| RE1 | Our relationship with customers will be beneficial | Werner et al. (2005) and Nguyen et al. [16] |
| RE2 | Maintaining long-term customer relationships is important to us | |
| RE3 | We focus on long-term goals in our customer relationships | |
| RE4 | We care about the long-term success of our customer relationships | |
| Innovation capability | | |
| INC1 | My business needs to have marketing innovation | Hammer (2004), Migdadi [15] |
| INC2 | My business needs to have process innovation | |
| INC3 | My business needs to have service with superior quality | |
| INC4 | My business needs to have administrative innovation | |
| INC5 | My business needs to have new combinations of marketing, services, and information | |

relationships and innovation capability. Therefore, H4 is supported.

Table 6 shows that COVID-19 risk perception plays a moderating role to enhance the relationship between long-term relationships and innovation capability. It can thus be concluded that firms’ COVID-19 pandemic perception is important for establishing long-term relationships with their customers to innovate their business operations.

Table 2
Reliability and convergent validity.

| Construct | Factor Loading | Standard Error | Standardised Factor Loading | t-value | Cronbach's Alpha | CR | AVE |
|------------------------------|----------------|----------------|-----------------------------|-----------|------------------|------|------|
| Knowledge management (KM) | | | | | .891 | .799 | .593 |
| KM1 | 1.000 | | | | | | |
| KM2 | 1.035 | 0.088 | | 11.739*** | | | |
| KM3 | 0.977 | 0.09 | | 10.910*** | | | |
| KM4 | 0.917 | 0.088 | | 10.420*** | | | |
| Technology-based CRM (IT) | | | | | .856 | .799 | .735 |
| IT1 | 1.000 | | 0.846 | | | | |
| IT2 | 1.006 | 0.06 | 0.892 | 16.899*** | | | |
| IT3 | 0.834 | 0.056 | 0.828 | 14.937*** | | | |
| IT4 | 1.035 | 0.065 | 0.862 | 15.964*** | | | |
| Long-term relationships (RE) | | | | | .820 | .799 | .526 |
| RE1 | 1.000 | | 0.679 | | | | |
| RE2 | 1.035 | 0.122 | 0.746 | 8.482*** | | | |
| RE3 | 1.009 | 0.113 | 0.681 | 8.891*** | | | |
| RE4 | 1.06 | 0.121 | 0.79 | 8.786*** | | | |
| Customer orientation | | | | | .811 | .833 | .506 |
| COR1 | 1.000 | | 0.707 | | | | |
| COR2 | 0.815 | 0.091 | 0.670 | 8.926*** | | | |
| COR3 | 0.830 | 0.102 | 0.606 | 8.112*** | | | |
| COR4 | 1.264 | 0.115 | 0.886 | 10.96*** | | | |
| COR5 | 0.820 | 0.101 | 0.892 | 8.110*** | | | |
| COVID-19 risk perception | | | | | .805 | .830 | .579 |
| RIS1 | 1.000 | | 0.741 | | | | |
| RIS2 | 0.942 | 0.097 | 0.719 | 9.679*** | | | |
| RIS3 | 0.923 | 0.095 | 0.726 | 9.757*** | | | |
| RIS4 | 0.972 | 0.099 | 0.732 | 9.837*** | | | |
| RIS5 | 0.843 | 0.099 | 0.634 | 8.554*** | | | |
| Innovation capability | | | | | .897 | .832 | .550 |
| INC1 | 1.000 | | 0.675 | | | | |
| INC2 | 0.876 | 0.093 | 0.721 | 9.412*** | | | |
| INC3 | 0.999 | 0.101 | 0.767 | 9.928*** | | | |
| INC4 | 1.035 | 0.104 | 0.771 | 9.968*** | | | |
| INC5 | 1.067 | 0.107 | 0.769 | 9.948*** | | | |

Table 3
Discriminant validity.

| Constructs | Technology factors | Knowledge management | Customer orientation | Long-term relationship | Risk perception | Innovation capability |
|------------------------|--------------------|----------------------|----------------------|------------------------|-----------------|-----------------------|
| Technology factors | 0.857 | | | | | |
| Knowledge management | 0.642 | 0.770 | | | | |
| Customer orientation | 0.704 | 0.643 | 0.711 | | | |
| Long-term relationship | 0.698 | 0.484 | 0.692 | 0.725 | | |
| Risk perception | 0.704 | 0.593 | 0.709 | 0.655 | 0.761 | |
| Innovation capability | 0.703 | 0.614 | 0.706 | 0.685 | 0.711 | 0.741 |

Table 4
The result of SEM analysis.

| Hypothesis | Path | Path Coefficient | P |
|--|-------|------------------|---|
| Knowledge management → Innovation capability | 0.425 | *** | |
| Customer orientation → Innovation capability | 0.114 | 0.04 | |
| Technology-based CRM → Innovation capability | 0.129 | 0.03 | |
| Knowledge management → Long-term relationship | 0.154 | 0.02 | |
| Customer orientation → Long-term relationship | 0.246 | ** | |
| Technology-based CRM → Long-term relationship | 0.324 | *** | |
| Long-term relationship → Innovation capability | 0.508 | *** | |

Note: *** <0.001, ** <0.01 Chi-square/df = 3.253; CFI = 0.912; TLI = 0.930; GFI = 0.912; RMSEA = 0.052.

5. Discussion

First, this study found a positive impact of KM on long-term relationships. This finding is consistent with Migdadi's [15] and Xu et al.'s

Table 5
Direct, indirect, and total effect coefficients.

| Path | Direct effect | Indirect effect | Total effect |
|--|---------------|-----------------|--------------|
| Knowledge management → Innovation capability | 0.425 | 0.011 | 0.436 |
| Customer orientation → Innovation capability | 0.114 | 0.006 | 0.120 |
| Technology-based CRM → Innovation capability | 0.129 | 0.018 | 0.147 |
| Knowledge management → Long-term relationship | 0.154 | 0.000 | 0.154 |
| Customer orientation → Long-term relationship | 0.246 | 0.000 | 0.246 |
| Technology-based CRM → Long-term relationship | 0.324 | 0.000 | 0.324 |
| Long-term relationship → Innovation capability | 0.508 | 0.000 | 0.408 |

(2021) research, which suggested the KM path in building better customer relationships. KM has become an important component for CRM success [43]. Managing knowledge has a direct effect on e-CRM in various business sectors [75]. However, findings by Garrido-Moreno and

Table 6
The results of the moderating effect of social networks.

| Path | β | t | p | LLCI | ULCI | Moderation |
|--------------------------------|---------|-------|-------|-------|-------|------------|
| H5: RIK x RE \rightarrow INC | 0.151 | 0.853 | 0.036 | 0.093 | 0.210 | Yes |

Note: β = standardised regression weight, t = t value, LLCI = Lower limit of confidence interval, ULCI = Upper limit of confidence interval, and RIK x RE = interaction between risk perception and long-term relationship.

Padilla-Meléndez' [76] suggested that KM only had an indirect effect on CRM success, through enhancing customer relationships. Particularly, the research findings address the important role of KM in marketing innovation. This result is consistent with Huang and Li [77]; who suggested that managing knowledge would facilitate firms' innovation since it transformed tacit knowledge into innovative marketing activities and services. Herman et al. [40] also confirmed that KM strengthened the impact of knowledge-oriented leadership on innovation capability. Therefore, it can be concluded that the significantly positive effect of KM on long-term relationships and innovation capability has an important implication for companies in achieving their business goals.

Second, the research revealed a positive impact of CRM (IT) on long-term relationships and innovation capability. Based on these results, the current study differs slightly from previous research. For example, Chege and Wang [56] showed that the technological factor had the most impact on e-CRM implementation. Nguyen et al. [16] also confirmed the high impact of technology on airline performance, while Dabić et al. [58] suggest the important role of technology in firm innovation. However, the study's finding is similar to those of Nazari-Shirkouhi et al.'s [54] and Liu and Huang's [55]; who believed that CRM (IT) improved firms' service quality by enabling them to respond to buyers faster, at a lower cost. For example, through CRM (IT), firms obtain precise customer information and then meet customer demands and offer better services. Therefore, CRM (IT) has a significantly positive impact on marketing innovation [53]. Consequently, it is suggested that CRM (IT) is an important tool for companies to build long-term relationships with customers and create innovative service and marketing activities.

Third, the study found a positive impact of customer orientation on long-term relationships and innovation capability. This finding is consistent with Babakus et al.'s [66] and Sa et al.'s [50] results. These authors showed that firms with customer concentricity had good relationships with customers in the long-term and raised their performance. The current study also showed a positive impact of long-term relationships on marketing innovation, which was consistent with several studies [48]. The authors suggested that a long-term relationship with customers increased customer retention, thus facilitating an understanding of customers' needs and demands, which consequently promoted marketing innovation.

Finally, the moderating role of risk perception in terms of the COVID-19 pandemic has also been shown to be an important factor in enhancing innovation capability. This finding is similar to Pascual-Fernández et al.'s [7]. Firms need to factor the COVID-19 pandemic into their process, marketing, and service innovation.

6. Theoretical and managerial implications

This study's findings can be employed to draw various insights for the information management literature as well as for practitioners. There are four main theoretical contributions. First, this is one of the few empirical studies that examine the association of e-CRM, COVID-19 risk perception, and long-term relationships with innovation capability in the service sector, especially in the hospitality industry. Innovation under the COVID-19 pandemic is a topical issue in marketing research, especially in developed countries [78,79]; however, it seems to have attracted less interest in developing nations. Second, this study finds a significantly positive impact of KM on firm innovation, both directly and

indirectly. The new insight lies in understanding the important role of facilitating and using knowledge in adopting advanced IT, which should be employed throughout an organisation to create firm value. Third, CRM (IT) is found to be the second most important factor in firm innovation capability. This finding sheds light for hotel providers in developing countries on the urgent need to exploit technology in their business process. By understanding their firms' technological capabilities and the influence of technology on innovation, decision-makers in corporate and government agencies can make better strategic decisions that enhance the innovation capability needed to address the technological and convergent industrial changes under the COVID-19 pandemic. Fourth, the study provides clear support for marketing strategy that incorporates a customer orientation focus. This is key to attracting and retaining customers, and ultimately enhancing firm business performance. In other words, these findings provide an enhanced understanding of how KM, customer orientation, CRM (IT), and long-term relationships influence innovation capability. The study can be used to plan key components of e-CRM application, and highlights the implementation issues and processes that need the most attention in the hospitality industry. Therefore, it offers a new perspective: the adoption of e-CRM helps companies gain an edge in their business innovation.

Several implications can be derived from this study. First, by raising the importance of KM on firm innovation, the study warns managers to encourage their employees to share their knowledge about ideas for R&D or new products/services; managers should support employees to improve their knowledge about technological change through training courses. In the context of the COVID-19 pandemic, firms can consider establishing or buying online courses to train their staff. To optimise technology and resources, knowledge-sharing strategies should be developed for all firm operators in their decision-making process. Second, service firms, especially hotel providers, must focus not only on providing high value for customers by prioritising their preferences, but also on considering them primarily as personal partners, because customer information is an important source of customised services and process development. Therefore, it is necessary for managers to design customer-oriented programmes that are more comprehensive in their innovation. Moreover, social networks may be an effective channel through which service firms can communicate new offers and provide unique experiences to their customers. Third, firms must focus on the intensive use of information and communication technology, which enables them to target different consumer segments. Furthermore, to implement e-CRM, service firms should carefully consider two options: (1) they may develop their own e-CRM system, or (2) they may purchase a full e-CRM package from a third party (e.g. Microsoft Dynamics, Oracle Sales Cloud, Nimble, Zoho, Insightly, etc.). Finally, under the impact of the COVID-19 pandemic, it is suggested that government policy should support firms in the hospitality industry by reducing tax.

7. Limitation and future research

This study has some limitations. First, this study did not compare the efficacies of two different measures, the service and process items, in the marketing innovation construct. Therefore, this is a possible improvement in future research. Second, the study does not discuss the interrelationships among other factors that influence firms' innovation capabilities. Consequently, future studies should fill this gap. Third, the demographic characteristics were not explored; different sectors may perceive innovation differently. Thus, the effect of different services should be investigated in future studies. Additionally, the scale of the innovation capability construct is a limitation, as this research used a structured questionnaire. Future research might consider open-ended questions, reconsider the Likert-scale rating, and employ both quantitative and qualitative methods. Finally, this study was conducted in Vietnam, and not in different countries. Future research could address this limitation.

8. Author declaration

I wish to draw the attention to the Editor to the following facts that there is no conflict of interest exists. I also confirm that I have given due consideration to the protection of intellectual property associated with this work and that there are no impediments to publication, including the timing of publication, with respect to intellectual property. In so doing I confirm that we have followed the regulations of our institutions concerning intellectual property.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.techsoc.2021.101725>.

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