



## Review article

## The role of open innovation, hotel service quality and marketing strategy in hotel business performance

Mohd Amy Azhar Mohd Harif<sup>a</sup>, Muhammad Nawaz<sup>b,\*</sup>, Waseem Ul Hameed<sup>c</sup><sup>a</sup> School of Economic, Finance and Banking, Universiti Utara Malaysia, Malaysia<sup>b</sup> School of Commerce and Accountancy, Minhaj University Lahore, Lahore, Pakistan<sup>c</sup> Centre of Excellence in Islamic Finance and Social Equity (CEIFSE), Department of Islamic and Conventional Banking (DICB), Institute of Business Management and Administrative Sciences (IBMAS), The Islamia University of Bahawalpur (IUB), Pakistan

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## ABSTRACT

These days, instead of developing and marketing new products in the market, organizations are shifting towards commercialization. Therefore, open innovation is of much importance in this era of industrialization. In this study, open innovation is used as a strategic tool to improve the service innovation and organizational performance of the Malaysian hospitality industry. Therefore, the objective of this research study is to examine the role of open innovation in business performance of Malaysian hospitality industry. A survey is conducted with the management of the organizations of the hospitality industry to collect data. Partial Least Square-Structural equation modeling (PLS-SEM) tool is used to test the hypothesis and get results. The findings of the study highlighted that open innovation is the main source of boosting organizational performance in the hospitality industry of Malaysia. The increase in open innovation practices among hotels can increase the business performance by increasing return on investment, return on assets, return on sales and return on equity. The term open innovation incorporates ICT, innovation in the organization, and internal and external knowledge management. Accumulation of these elements forms a mechanism that results in an increase in organizational performance by incorporating service innovation. Hence, this study is most suitable to develop strategies for service innovation using open innovation that improves organizational performance.

## 1. Introduction

Entering the 21st century has brought substantial transformation due to the rapid development of ICT (Information and Communication Technology). In developing economies, ICT playing a major role in the development and utilization of knowledge to increase the performance of the business (Roberts, 2000). In order to survive in fierce competition, individuals and organizations are required to be familiarized with the challenges related to the knowledge age (Yusuf, 2005). ICT accelerates the collection and transmission of the information to acquire external knowledge and generate the transmission procedure and internal innovation across the organization (Hueske et al., 2015).

Internal knowledge (IK) and external knowledge (EK) originates from the ICT, because of its two components information and communication technology. Information technology enables the organization to store and process the data cheaply and it is easy to access, whereas communication technology enables the employees to communicate easily and at

less cost using wired and wireless communication technologies (Bloom et al., 2014). The II and EK arise by the deployment of the communication technology and information technology are considered the substantial and non-substitutable intangible resources of the organization (Quintas, 2001), which are used for value addition. Though II and EK add value to the organizational processes, but they can only produce results when the organization engages knowledge management to combine and for effective deployment (Soo et al., 2002). In organizations, knowledge management is a systematic management of the vivid knowledge and its interrelated procedures that include (generation, organization, diffusion, and exploitation) in pursuit of organization objectives (Frost, 2014).

It is critical for the organization to determine which elements can improve the service quality or bring innovation to retain the customers. It is necessary for the organization to effectively adopt knowledge management that can meet the expectations of the customer (Bull, 2010) because it can align the organizational inimitable resources related to the knowledge with the requirements of the transforming market (Chen and

\* Corresponding author.

E-mail address: [nawaz120vbs@gmail.com](mailto:nawaz120vbs@gmail.com) (M. Nawaz).

Fong, 2015). It results in improved service quality that acts as the main foundation in dealing with the market competition and enhances the performance of the business.

There is massive research carried on establishing a link between ICE and the performance of the business, but there is very limited literature on determining the relationship of knowledge management with open innovation and organizational performance. The scarcity of the literature or resources on ICT, knowledge management, quality of the service, and organizational performance in the hospitality industry is the gap of this study. In this study, ICT, knowledge management, internal innovation, and external knowledge signifies open innovation that supports the service innovation, which eventually improves the organizational performance. Hence, the objective of this research work is to examine the role of open innovation in business performance of Malaysian hospitality industry.

**2. Theoretical outlook and hypothesis development**

This research work is based on the resource-based view (RBV). This managerial framework highlights that the success of any organization is based on the resources it has. The resources of the organization are classified as assets and capabilities, which can be tangible and intangible (Umrani, 2016). The managerial framework of this research is based on intangible resources. External knowledge and internal innovation largely depend on the capabilities and skills of the employees, who use the knowledge. Moreover, knowledge management is another resource of the companies in the hospitality industry that is used to extract quality knowledge effectively from internal and external knowledge. ICT is also a major resource of the organization, which has a central importance in the above-mentioned process. All these resources enable the organization to develop service innovation that leads to higher organizational performance as shown in Figure 1 below:

Henry (2006) has defined open innovation as the purposive usage of in and outflow of knowledge to stimulate internal innovation and market expansion to use the innovation externally (Henry William Chesbrough, 2012). Moreover, the reinforcement of open innovation depends on two substantial resources i.e inflow and outflow of knowledge, which enables the organization to bring innovative ideas (Bogers et al., 2018). Open innovation is a two-way process, where knowledge enters the organization and comes out in the shape of a new and innovative idea.

**2.1. Information and communication technology (ICT) and external knowledge acquisition**

Generally, as the name signifies, ICT is a combination of two components that includes information and communication technology. The

study invokes the difference in the meaning of information technology (IT) and communication technology (CT). Both components of ICT relate to technology, the information component relates to technical knowledge (Bunge, 1985), whereas the second component relates to wired and wireless communication (Bloom et al., 2014). Information and communication technology plays a critical role in the knowledge-based developing economies in which organizations create and exploit the knowledge to improve organizational performance (Hassan, 2003). ICT also endorses the collection and distribution of knowledge like the instant collection of knowledge, its storage, and dissemination).

II and EK are the resultant factors that originated from the usage of ICT. The EK is collected or created from the organizations or individuals who use ICT to share the knowledge explicitly (Bughin et al., 2012). Knowledge is the most substantial resource for the organization to gain a competitive advantage, whose importance is recognized strategically (Bharati et al., 2015). According to Alavi and Leidner (2001), in organizations, ICT is not only related to the technical changes, but it also enhances the organizational capability to gather knowledge or external information. Di Minin et al. (2016) signifies that the ICT also increases the mobility of the external knowledge by enabling customer and supplier integration.

Bhatt and Grover (2005) highlight that organizations in pursuit of achieving the organizational objectives strive for the maximum external knowledge. Along with this, it is also highlighted that implementation of diverse strategies particularly ICT can help in obtaining different knowledge (Freeze and Kulkarni, 2007). According to Hwang and Lee (2010), knowledge enhances the ability of the organization to absorb external knowledge using ICT, which highlights the dedication of the organization in developing knowledge assets. The researchers agree that ICTs acts as a tool in obtaining knowledge for innovation in the organization (Scuotto et al., 2017). Scuotto, Ferraris, and Bresciani (2016) comment that organizations in order to obtain external knowledge use the science (ICTs) and market-based partners (Customers, Suppliers, and Rivals).

Similarly, Dahlander and Gann (2010) explain that in order to acquire external knowledge, the organization chose between monetary and non-monetary ICT practices. It is argued that ICTs ecosystems are essential for the acquisition and management of the knowledge that exploits external knowledge flows (Soto-Acosta and Cegarra-Navarro, 2016). The research highlighted that numerous organization has developed the ICT based social media monitoring (SMM) for the collection of external knowledge to improve the organizational performance (Kasper and Kett, 2011; Zhang and Vos, 2014). Therefore, it is clear that organizations use the ICTs' digital ecosystems to collect external knowledge to efficiently competing with the competitors. Based on this fact, this research also examines the impact of ICTs on the acquisition of external knowledge.

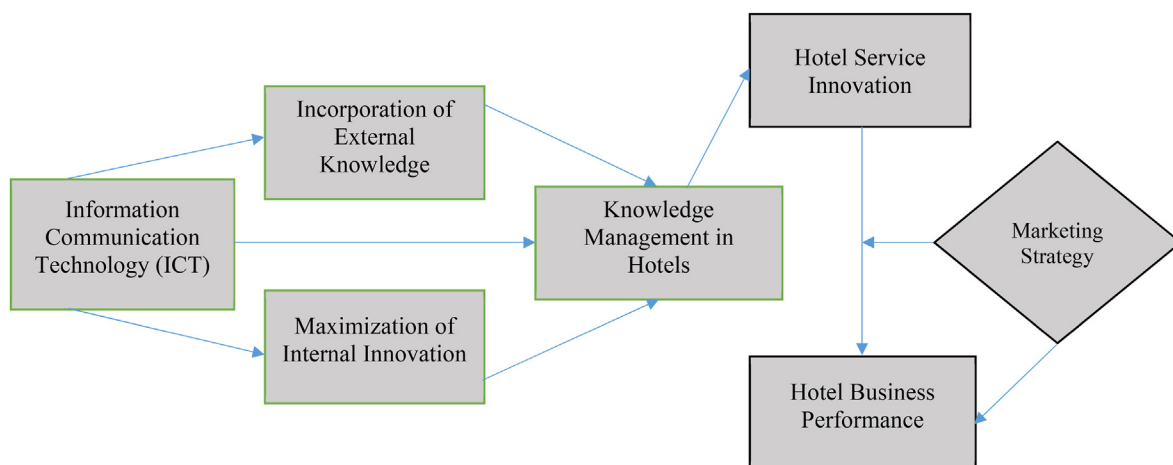


Figure 1. The theoretical framework of the current study showing that how open innovation expedite service innovation and business performance.

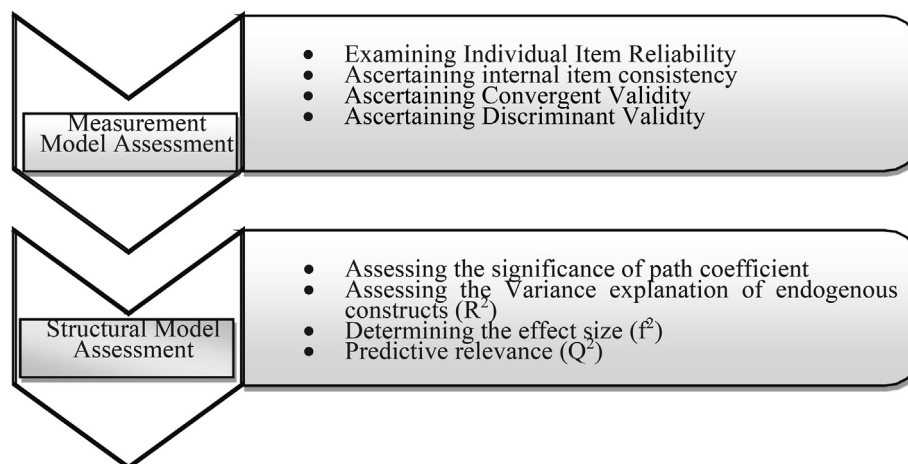


Figure 2. PLS-SEM steps. Source: Henseler et al. (2009).

**H1.** The ICTs have a positive influence on incorporation of external knowledge.

## 2.2. Information and communication technology (ICT) and internal innovation

The term innovation implies to change something existing or create something new. Moreover, internal innovation in the organization refers to the modification of the existing things or creating something new by the employees (Baregheh et al., 2009). To create new things or modify the existing initiate the struggles of the organizational members irrespective of the origin. In the age of globalization, internal innovation plays a significant role in attaining sustainable competitive advantage (Hueske et al., 2015). In organizations, internal innovation take place when it uses the ICTs (social media and internet) to acquire or search for external knowledge (Henry W Chesbrough, 2011).

In organizations, internal innovation results from the capacity, organizational efficiency, and time spent on the research and development within it (Argyres and Silverman, 2004). According to research, ICT is considered an effective tool in boosting the internal innovation capacity of the organization (Brynjolfsson and Saunders, 2009). Furthermore, another research highlights that ICT contributes directly or indirectly to boosting the internal innovation of the organization (Brynjolfsson and Hitt, 2000). Tsuji et al. (2018) also explain that the information and communication technology mechanisms in the organization promote internal innovation. Information and communication technology also enhances the ability of the organization to discover new ways to innovate from the organization along with its contribution to external knowledge (Zahra and Hayton, 2008).

Tsai and Wang (2008) added that organizations that use ICTs in their R&D department enhance internal innovation. Furthermore, technology is considered an important source of internal innovation in the organization (Parida et al., 2012). Chiaroni, Chiesa, and Frattini (2010) highlight that the organizations that properly manage technology-based inter-organizational networks stimulate internal innovation. Therefore, it can be said that ICT plays a significant role in improving internal innovation in order to achieve the organizational objective and compete with the fierce competition in the market. Based on this, the research proposes the following hypothesis:

**H2.** The ICTs have a positive influence on maximization of internal innovation.

## 2.3. External knowledge acquisition and knowledge management

Knowledge is the accretion of expert insights, contextual information, values, and experience that collectively provides the platform for the

organization to develop new and innovative ideas (Davenport and Cronin, 2000). In organizations, knowledge instigates and utilized in the knowers' mind and it is embedded in the values, norms, and practices of the organization along with the documents (Gupta et al., 2000). However, knowledge management refers to the formation, management, organization, and dissemination of the knowledge to improve the competencies to achieve the organizational set objectives (Alavi and Leidner, 2001). According to Davenport and Cronin (2000), organizations know what knowledge they need to acquire, whereas knowledge management is required to manage the external knowledge and internal innovation to improve organizational performance. Laursen and Salter (2006) also emphasized that the effective and proper management of external knowledge is critical for the organization. On the other hand, Liao and Marsillac (2015) explain that in order to gain a competitive advantage, organizations are required to link external knowledge with the existing knowledge and processes. In addition, another research highlighted that the organization acquires external knowledge and manages (integrates with the existing knowledge and processes) it to take benefit (Birkinshaw et al., 2002). Cohen and Levinthal (1990) argued that only those organizations, that have the capability to integrate the external knowledge with the existing processes can best utilize it to gain competitive advantage. Furthermore, research has documented that the ability of the organization to enhance its capability, improve resources, and effective management of the external knowledge largely depends on the internal efforts of the organization (Cassiman and Veugelers, 2006; Grimpe and Kaiser, 2010).

In organizations, technical initiatives integration with the existing processes provide the infrastructure for the effective management of external knowledge in order to obtain maximum benefit (Zack, 1999). Moreover, the research highlighted that the organizations use effective knowledge management of the external knowledge to stimulate innovation in the organizational processes (Earl and Timperley, 2015). Coombs and Hull (1997) explain that it is not enough for the organization to acquire external knowledge, they are required to improve their capability to produce innovative ideas by using knowledge management. Therefore, it can be said that the effective use of acquired external knowledge and knowledge management improves the quality of the services. Based on this, the research proposes the following hypothesis:

**H3.** The incorporation of external knowledge has a positive influence on knowledge management in hotels.

## 2.4. Internal innovation and knowledge management

Innovation helps the organization to add value, gaining a competitive advantage, and improving problem-solving skills that result in an increase in organizational performance (Gloet and Terziovski, 2004). The

Table 1. Data statistics.

	No.	Missing	Mean	Median	Min	Max	Standard Deviation	Excess Kurtosis	Skewness
ICT1	1	0	3.926	4	1	5	0.99	0.58	-0.912
ICT2	2	0	3.641	4	1	5	1.115	-0.312	-0.598
ICT3	3	0	3.539	4	1	5	1.183	-0.638	-0.506
ICT4	4	0	3.991	4	1	5	1.056	0.479	-1.022
ICT5	5	0	4.134	4	1	5	0.888	1.573	-1.141
ICT6	6	0	3.816	4	1	5	1.113	-0.313	-0.742
EKI1	7	0	3.733	4	1	5	1.219	-0.542	-0.69
EKI2	8	0	3.613	4	1	5	1.175	-0.537	-0.566
EKI3	9	0	3.654	4	1	5	1.193	-0.579	-0.567
EKI4	10	0	3.71	4	1	5	1.137	-0.437	-0.584
EKI5	11	0	3.677	4	1	5	1.131	-0.087	-0.688
MII1	12	0	3.908	4	1	5	0.941	1.066	-0.984
MII2	13	0	3.945	4	1	5	1.037	-0.209	-0.738
MII3	14	0	4.115	4	1	5	0.989	0.752	-1.069
MII4	15	0	3.931	4	1	5	0.984	0.181	-0.797
MII5	16	0	3.912	4	1	5	1.046	0.297	-0.895
KM1	17	0	3.558	4	1	5	1.106	-0.326	-0.538
KM2	18	0	3.71	4	1	5	1.092	-0.118	-0.686
KM3	19	0	3.724	4	1	5	1.127	-0.496	-0.607
KM4	20	0	3.641	4	1	5	1.164	-0.499	-0.591
KM5	21	0	3.843	4	1	5	1.04	0.643	-0.944
HSI1	22	0	3.825	4	1	5	0.996	0.155	-0.768
HSI2	23	0	3.825	4	1	5	0.973	0.038	-0.67
HSI3	24	0	3.829	4	1	5	0.902	0.393	-0.603
HSI4	25	0	3.521	4	1	5	1.267	-0.853	-0.41
HSI5	26	0	3.507	3	1	5	1.26	-1.022	-0.287
MS1	27	0	3.696	4	1	5	1.172	-0.476	-0.6
MS2	28	0	3.719	4	1	5	1.176	-0.776	-0.518
MS3	29	0	3.728	4	1	5	1.227	-0.787	-0.552
MS4	30	0	3.263	3	1	5	1.229	-0.908	-0.228
HBP1	31	0	4.226	4	1	5	0.931	3.344	-1.674
HBP2	32	0	4.134	4	1	5	1.014	1.686	-1.34
HBP3	33	0	4.166	4	1	5	0.965	3.015	-1.609
HBP4	34	0	4.29	5	1	5	0.923	1.906	-1.425
HBP5	35	0	4.161	4	1	5	0.958	3.22	-1.657

innovation in the organization largely depends on the learning processes and internal and external knowledge (Cardinal, 2001). Knowledge management stimulates the internal innovation of the organization in three ways. Firstly, Knowledge management enables the organization to gain and sustain the competitive advantage in the industry by capitalizing on the integrated processes (Tamer Cavusgil, Calantone and Zhao, 2003). Furthermore, it reduces the innovation complexity within the organization, as the innovation largely depends on knowledge readiness. Pyka (2002) also explained that the organization can also stimulate internal innovation by using the existing knowledge. Thirdly, it improves the service quality by integrating existing internal and new external knowledge (Chen et al. 2004).

Lichtenthaler and Lichtenthaler (2009) explained that the capability of the organization to manage external knowledge helps explaining the diversity of knowledge and alliancing strategies of the organization both internally and externally. Moreover, Menon and Pfeffer (2003) also highlighted the importance of the knowledge management capacity that helps the organization to incorporate or utilize the internal innovation and integrated external knowledge. Furthermore, the organization can manifest internal innovation by utilizing effective knowledge management practices in the organization (Brunswick and Vanhaverbeke, 2015). Fosfuri and Tribó (2008) asserted that the absorptive capacity of the organization is a substantial source of competitive advantage that originates from effective knowledge management. According to the

research, the major part of the innovation in the organization comes from its internal departments that need a central network, that is used to coordinate with other departments and reflects the necessity of knowledge management (Tsai and Wang, 2008). Therefore, it can be said that internal innovation is the most valuable intangible resource of the organization, whose effective management enables the organization to gain competitive advantage among the competitors. Based on this, the research proposes the following hypothesis:

**H4.** Maximization of internal innovation have a positive influence on the knowledge management in hotels.

#### 2.5. Knowledge management and service innovation

In an organization, the term innovation refers to the development of new ideas by the employees who engage with others and the term service is a perspective that creates value (Edvardsson, 2005; Van de Ven et al., 1998). Therefore, this new and fresh solution has numerous aspects, which include a new value system, the new concept of product/service, a new delivery system, technological improvement, and a new revenue model (Den Hertog, Van der Aa and De Jong, 2010). In the last decade, there is a drastic shift in how the organization looks at the innovation concept. It is not limited to the inside of the organization, rather the utilization of the different actors allows suppliers, partners, and customers to evolve (H. Chesbrough, 2003).

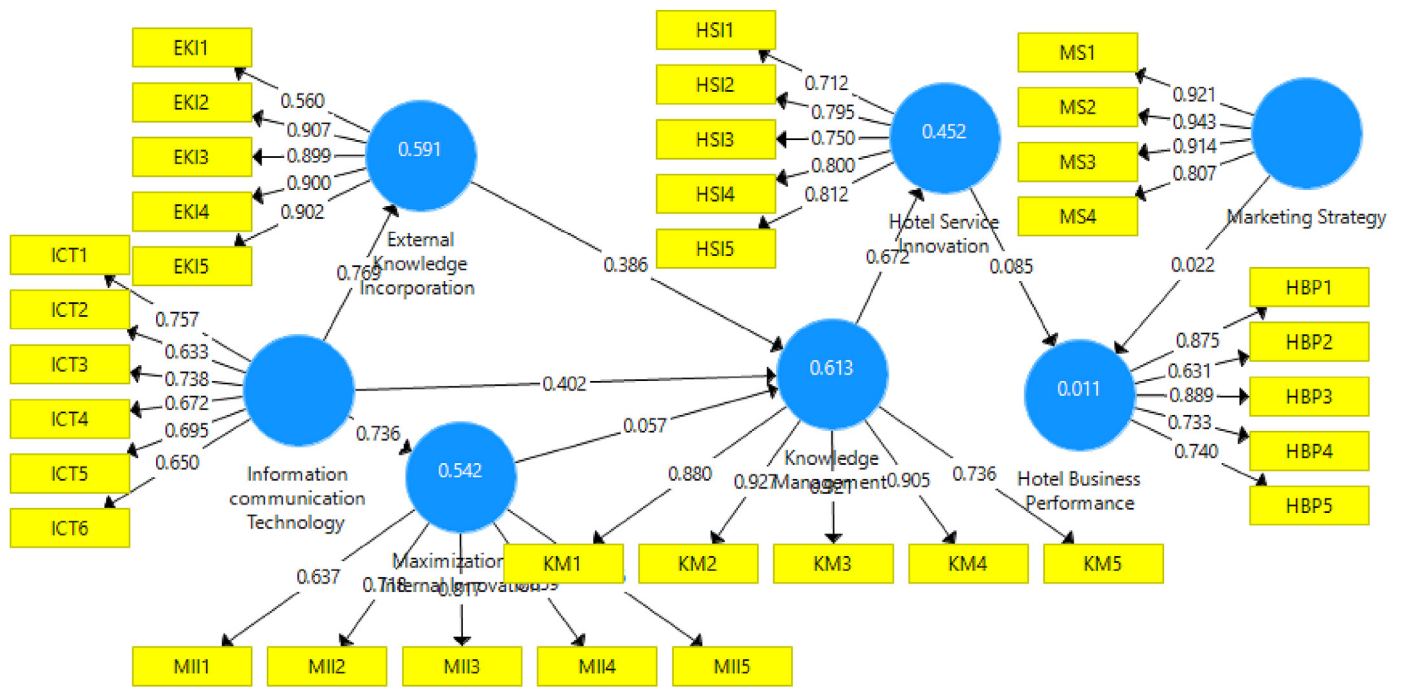


Figure 3. Measurement model.

In this information age, the term service innovation refers to the progress of wider conceptualization, new ideas, and framework (Lusch and Nambisan, 2015). In research, Alkalha et al. (2012) highlighted that the sharing of experience and consultation from the experts helps the organization to bring service innovation. A researcher Castells (1996) emphasized that the organizational learning capability and its knowledge are the substantial sources of innovation. In organizations, knowledge management also includes the coordination systems and organization having effective knowledge management bring more innovation than organization lacking knowledge management (Darroch, 2005). Another researcher conducted by Swan et al. (1999) emphasized active networking within the organization originated from the knowledge management initiatives from the base of the innovation.

Likewise, the research highlighted that the knowledge management mechanism of the organization is critical in boosting internal innovation (López-Nicolás and Meroño-Cerdán, 2011), and an increase in the knowledge management practices reduces the innovation complexities (Du Plessis, 2007). Some other researches emphasized that irrespective of the nature of the industry, effective recognition and management of knowledge ensures the achievement of innovation (Adams and Lamont, 2003; Darroch and McNaughton, 2002). The research also highlighted the purpose of knowledge management that is to utilize integrative practices to bring innovation which is an essence in meeting the competition in the market (Tamer Tamer Cavusgil et al., 2003). Along with this, collaboration plays a significant role in the acquisition and management of knowledge, which is the essence of successful innovation (Obeidat and Abdallah, 2014; Pyka, 2002).

Similarly, Rodan (2002) explained that knowledge management elevates the frequency of new arrangements (elements of tacit and explicit knowledge) in the organization that develops new ideas and leads to innovation. Based on this, it can be said that knowledge management plays a distinctive role in bringing innovation that leads to a competitive advantage. Based on this, the following hypothesis is proposed:

**H5.** Knowledge management in hotels has a positive influence on hotel service innovation.

## 2.6. Service innovation and business performance

Due to the increase in globalization, the significance of service innovation cannot be overlooked (Johannessen and Olsen, 2010). It is highlighted that the product innovations in manufacturing concerns and service innovation have a similar impact on the performance of the organization (Aas and Pedersen, 2010), another research described that the service innovation and product innovation has an indistinguishable effect on business performance (Agarwal and Selen, 2011). Storey and Kahn (2010) suggested that service innovation gives strategic advantages to the organization that improves the overall value of the organization. Similarly, many other pieces of research highlighted that service innovation improves the performance of the organization (Crook et al., 2011; Liao and Rice, 2010).

Ponsignon et al. (2011) explained that innovation in service and incorporation of new service channels attract new customers that improve the overall performance of the organization. Another research conducted by Cheng and Huizingh (2014) argued that eco product, service, and organizational innovation are positively related to organizational performance. Lee and Chang (2008), innovation activities in the restaurants based on the self-efficacy of entrepreneurs have a positive impact on the performance of the restaurant in Australia. Similarly, Prajogo, Oke, and Olhager (2016) exhibited that the fit between organizational competitiveness and service innovation improves the performance of the organization significantly. Research conducted in the Spain hospitality industry explains that back-office innovation and service innovation creates synergies that improves the performance of the hotels in the hospitality industry (Mattsson and Orfila-Sintes, 2014). Furthermore, another research shows that innovation activities in the organization have a positive impact on organizational performance (Ramadani et al., 2017).

These days, managers and researchers are dealing with issues of developing new services. Kitsios and Kamariotou (2016) found that organizations that produce the new service based on innovation improves organizational performance. Similarly, Eggert et al. (2011) highlighted that collaboration of innovation in business model and the product has a

**Table 2.** Construct reliability and convergent validity.

Construct	Indicators	Loadings	Composite Reliability	AVE
Information communication Technology (ICT) ( $\alpha$ , 0.952)	ICT1	.757	.886	.507
	ICT2	.633		
	ICT3	.738		
	ICT4	.672		
	ICT5	.695		
	ICT6	.650		
External Knowledge Incorporation (EKI) ( $\alpha$ , 0.891)	EKI1	.560	.924	.714
	EKI2	.907		
	EKI3	.899		
	EKI4	.900		
	EKI5	.902		
Maximization of Internal Innovation (MII) ( $\alpha$ , 0.813)	MII1	.903	.871	.577
	MII2	.845		
	MII3	.896		
	MII4	.908		
	MII5	.862		
Knowledge Management (KM) ( $\alpha$ , 0.922)	KM1	.880	.943	.768
	KM2	.927		
	KM3	.921		
	KM4	.905		
	KM5	.736		
Hotel Service Innovation (HIS) (SI) ( $\alpha$ , 0.837)	HSI1	.712	.882	.600
	HSI2	.795		
	HSI4	.750		
	HSI5	.800		
	HSI5	.812		
Hotel Business Performance (HBP) ( $\alpha$ , 0.869)	HBP1	.875	.884	.608
	HBP2	.631		
	HBP3	.889		
	HBP4	.733		
	HBP5	.740		
Marketing Strategy (MS) ( $\alpha$ , 0.919)	MS1	.921	.943	.806
	MS2	.943		
	MS3	.914		
	MS4	.807		

long-term impact on the organizational performance. Research conducted in the Dutch manufacturing industry posits that collaboration among employees stimulates service innovation, which has a positive

**Table 3.** Discriminant validity.

	External Knowledge Incorporation	Hotel Business Performance	Hotel Service Innovation	Information communication Technology	Knowledge Management	Marketing Strategy	Maximization of Internal Innovation
External Knowledge Incorporation							
Hotel Business Performance	0.082						
Hotel Service Innovation	0.761	0.101					
Information communication Technology	0.802	0.118	0.803				
Knowledge Management	0.805	0.103	0.745	0.843			
Marketing Strategy	0.744	0.075	0.753	0.765	0.718		
Maximization of Internal Innovation	0.716	0.099	0.819	0.608	0.667	0.622	

impact on the overall organizational performance (Mennens et al., 2018). Another research showed that service innovation enables the organization to sustain a competitive advantage that in turn improves the performance (Gan et al., 2018). Therefore, it can be said that bringing innovation in the service enables the organizations to improve their organizational performance. Based on this, the following hypothesis is proposed:

**H6.** The hotel service innovation has a positive influence on hotel business performance.

Furthermore, it can also be concluded that:

**H7.** The ICT has a positive influence on hotels business performance.

*2.7. Moderating role of hotel marketing strategy*

Previous sections show that; innovation in hotel industry can lead to the business performance. Especially, innovation in services has the potential to enhance business performance (Kitsios and Kamariotou, 2016; Mennens et al., 2018). These sections highlighted that the positive effect of service innovation on business performance in hotel industry can be further promoted through marketing. The marketing strategies among the hotels can enhance the effect of service innovation on business performance. Therefore, marketing strategies has moderating role between service innovation and business performance. A marketing strategy denotes to a business's complete game plan for reaching potential consumers as well as turning them into customers of their products along with the services. A marketing strategy comprises the business's value proposition, important brand messaging, data on target customer demographics, as well as other high-level elements.

**H8.** Hotel marketing strategy has a positive influence on hotel business performance.

**H9.** Hotel marketing strategy moderates the relationship between hotel service innovation and hotel business performance.

**3. Methodology**

*3.1. Sample and data collection*

The study used the quantitative method to conduct research in the Malaysian hospitality industry. The population in this study comprises hospitality firms. The selection of the Malaysian hospitality industry has numerous reasons which include that Malaysia is a tourist company where thousands of tourists come each year. Second is the fondness of the firms of using information and communication technology to improve

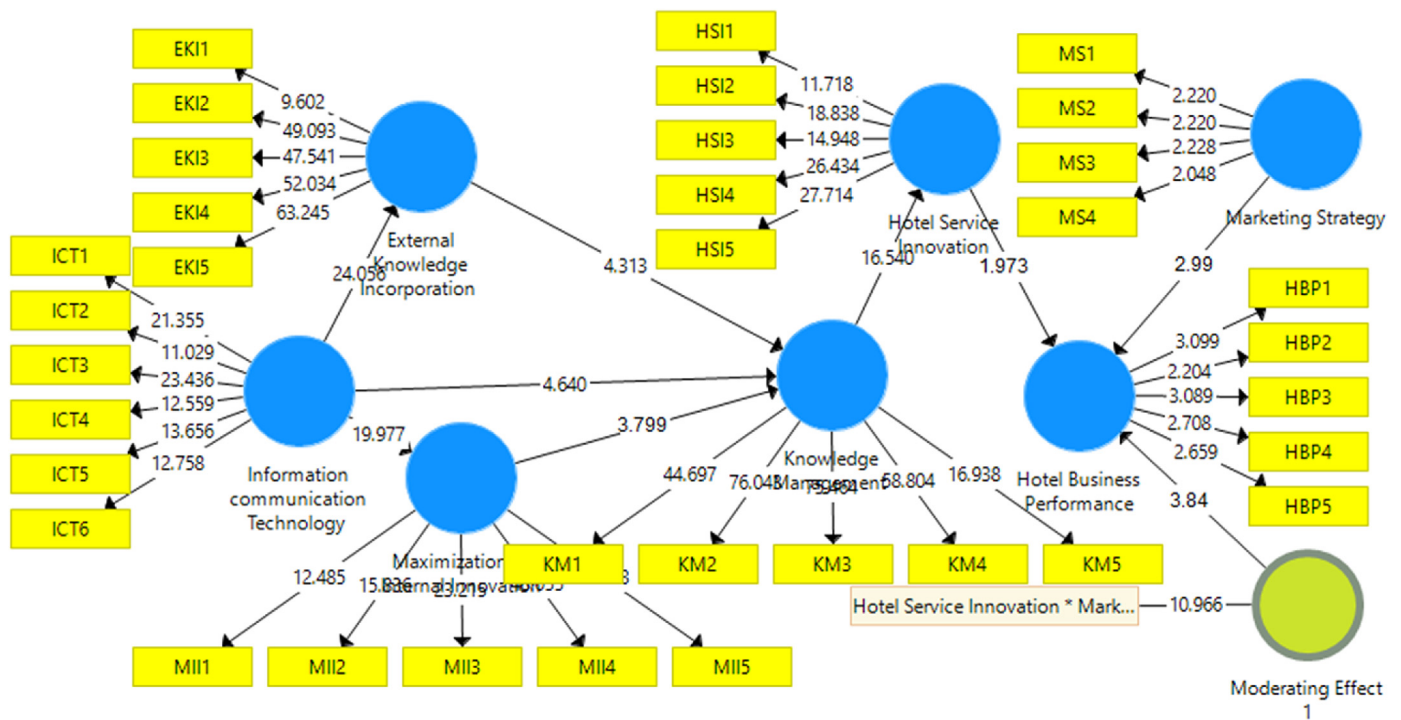


Figure 4. Structural model assessment.

the quality of the service in order to effectively cope up with the fierce competition. The third is the need of the organization to innovate to attract new customers because of the intense competition in the industry. Therefore, the above three reasons are doomed for this study. In this study, few scales are modified with required modifications, whereas all these are initiated on five-point Likert-type scales. Moreover, new scales were modified before the data collection process, after the thorough discussion with the practitioners in the workshop. A pilot study was conducted to test the scales and few scales were remodified. Furthermore, questionnaires were used for data collection, and at the later stage, 400 questionnaires were randomly distributed among the managerial staff of Malaysian hospitality firms. Before data collection, a consent was obtained from the respondents to participate in the survey. In simple random sampling, each member of the subset has an equal probability of being chosen. A simple random sample is meant to be an unbiased representation of a group. However, 212 questionnaires were received and eleven of them are excluded from the research because they were missing a considerable portion of the questionnaire. Therefore, 201 responses were used in this research.

### 3.2. Measures

This research found hints from previous studies of its operationalization. Hence, a scale of items was developed with the help of previous studies and discussion in the workshop participating experts. After systematically testing the scale items in a pilot study, these times were again assessed employing exploratory factor analysis to make sure the content validity. Evolving the notion of ICT, the scale is drawn from Nadeem et al. (2018). Moreover, knowledge management was conceptualized based on the existing studies K. C. Lee, Lee, and Kang (2005). The major elements of open innovation, namely; external knowledge and internal innovation are measured by following Hameed et al. (2018). Service innovation and business performance is measured by adapting the measures from Hu et al. (2009) and Samiee and Roth (1992), respectively. The scale items for marketing strategy are adapted from Knight (2000). Furthermore, prior to validation of the questionnaire, face validity and content validity

are examined. In this way, various experts in the current field are invited to examine the study questionnaire. The recommendations of the experts were used to improve the questionnaire before pilot study. The final questionnaire is attached in appendix.

### 3.3. Statistical tool

This research study tested its hypotheses by using Partial Least Square-Structural Equation Modeling (PLS-SEM). This research utilized software package Partial Least Square (PLS) version 3. It is recommended to analyze primary data (Ringle et al., 2015). PLS-SEM consist of two major steps, 1) measurement model assessment and, 2) structural model assessment which is shown in Figure 2. Additionally, this study used Common Method Bias (CMB) with the help of full collinearity test. CMB is identified with the help of variance inflation factor (VIF) which should be less than 3.3. In the current study, the VIF values are less than 3.3. Therefore, there is no contamination of CMB in this study. Finally, data statistics are reported in Table 1.

### 4. Data analysis and findings

First, by examining the PLS-SEM measurement model, this study examined factor loadings to confirm the internal item consistency. PLS-SEM measurement model is given in Figure 3 and results are given in Table 2. The current study considered 0.5 a minimum threshold level to retain the scale items (Hair et al., 2014; Hulland, 1999). It is evident from the results that all the items having factor loadings above 0.5 as recommended by Hair et al. (2010). Furthermore, to examine the reliability, this study used Cronbach alpha and composite reliability (CR) (Bacon et al., 1995; Peterson and Kim, 2013). Cronbach alpha and CR value must be above 0.7 which is recommended in literature. Table 2 shows that all the values are above threshold level. Additionally, Fornell and Larcker (1981) explained that convergent validity should be achieved by using average variance extracted (AVE) which should be above 0.5. It is given in Table 2, all the values for AVE are above 0.5. Finally,

**Table 4.** Structural model assessment results.

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics ( O/STDEV )	P Values
External Knowledge Incorporation-> Knowledge Management	0.386	0.387	0.089	4.313	0
Hotel Service Innovation-> Hotel Business Performance	0.083	0.043	0.042	1.973	0.048
Information communication Technology-> External Knowledge Incorporation	0.769	0.768	0.032	24.056	0
Information communication Technology-> Knowledge Management	0.402	0.403	0.087	4.64	0
Information communication Technology-> Maximization of Internal Innovation	0.736	0.736	0.037	19.977	0
Knowledge Management-> Hotel Service Innovation	0.672	0.671	0.041	16.54	0
Marketing Strategy-> Hotel Business Performance	0.003	0.033	0.001	2.99	0.004
Maximization of Internal Innovation-> Knowledge Management	0.057	0.055	0.015	3.799	0
Moderating Effect 1-> Hotel Business Performance	0.077	0.049	0.02	3.84	0

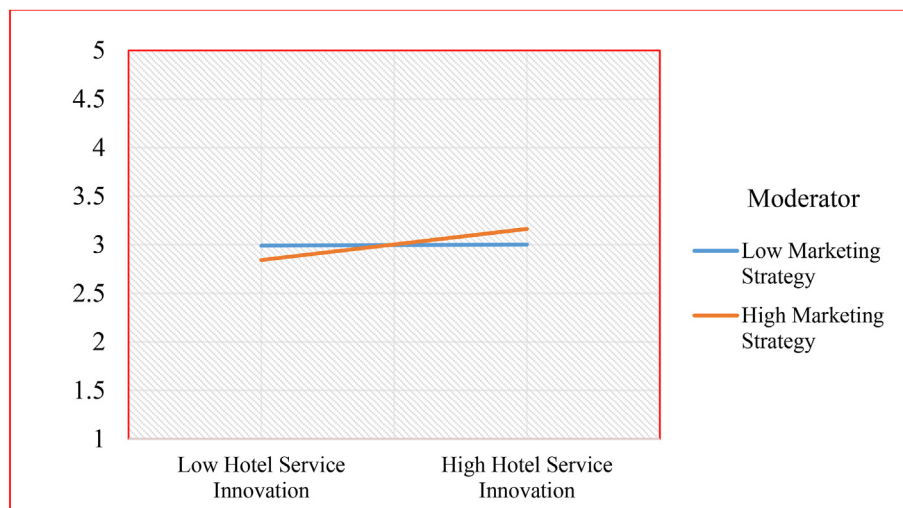
heterotrait-monotrait ratio (HTMT) is the most important method to confirm discriminant validity. According to HTMT<sub>0.85</sub>, none of the value is above 0.85 as shown in Table 3.

**Table 5.** Predictive relevance (Q<sup>2</sup>).

	SSO	SSE	Q <sup>2</sup> (=1 - SSE/SSO)
External Knowledge Incorporation	1,085.00	660.104	0.392
Hotel Business Performance	1,085.00	551.00	0.507
Hotel Service Innovation	1,085.00	813.818	0.25
Knowledge Management	1,085.00	606.98	0.441
Maximization of Internal Innovation	1,085.00	772.336	0.288

PLS bootstrapping is another important step of PLS-SEM which examined the relationship between variables (F. Hair Jr et al., 2014; Hair et al., 2012; Henseler et al., 2009) and it is shown in Figure 4 and results are given in Table 4. PLS bootstrapping was performed and 201 cases are examined to address the relationship between variables. Results of the study are based on the t-value and beta value. The minimum level of t-value 1.96 is considered to accept the hypotheses. It is found that all the variables have t-value above 1.96 which supported all the hypotheses. It indicates that; ICT has positive effect to enhance knowledge from external sources and innovation inside the boundaries of the company. Both the knowledge from external sources and internal innovation also has positive role to promote knowledge management. Finally, knowledge management promotes the hotel service innovation which lead to the hotel business performance. In addition to this, moderating effect of marketing strategy is examined between hotel service quality and hotel business performance which is significant. Figure 5 indicates that marketing strategy as moderating variable strengthen the relationship between hotel service quality and hotel business performance.

Finally, the current study also examines effect size (f<sup>2</sup>). Literature shows that; 0.02 value of effect size considered as weak effect, 0.15 considered as moderate effect size and 0.35 considered as strong effect size. According to the results of the current study, the effect size is small and moderate for all the relations, however, ICT has strong effect size for external knowledge. Predictive relevance (Q<sup>2</sup>) clarifies the quality of the overall model which is given in Table 5. Henseler et al. (2009) demonstrates that predictive relevance (Q<sup>2</sup>) should be above zero to attain the reasonable level of model quality. The predictive relevance (Q<sup>2</sup>) for hotel business performance is 0.507. Finally, this study calculated fit indexes and found that; chi-square is 193.24 and df is 117 which is appropriate. Finally, Figure 5 shows that; moderating role of marketing strategy



**Figure 5.** Moderating role of marketing strategy strengthen the relationship between hotel service innovation and hotel business performance.



strengthen the relationship between hotel service innovation and hotel business performance.

## 5. Discussion and conclusion

This research work is an attempt to offer a new model integrating open innovation as a supporter of performance in the hospitality industry. The surveys were conducted to collect the data from the managerial staff and analyzed by using the PLS-SEM to obtain the results.

The findings of the study highlighted that open innovation is substantial to improve the organizational performance in the hospitality industry of Malaysia. The current research postulates that open innovation incorporates ICT, knowledge management, internal innovation, and external knowledge. All these components of open innovation enhance the service innovation that improves organizational performance. Henry William Chesbrough (2006) posits that external knowledge and internal innovation are the key components that contribute to the success of open innovation, which later evidenced by Hameed et al. (2018), entails effective knowledge management. Effective ICT ecosystems are required to collect internal and external knowledge. Along with the model of open innovation, it is found that ICT has a positive direct relationship with external knowledge and internal innovation. Brynjolfsson and Saunders (2009) explained that ICT is witnessed as an essential element to boost the capacity of organizational internal innovation. Gago and Rubalcaba (2007) also found comparable results. The literature of current research work also discovered that there is a positive significant relationship between external knowledge and ICTs. As numerous scholars concur that ICT is a key tool for the acquisition of external and internal knowledge to boost organizational innovation capacity (Scuotto et al., 2017).

From the above results, It is established that ICT has a significant relationship with the external knowledge and internal innovation that exhibits the direct positive relationship of knowledge management with ICT. Omona, Weide, and Lubega (2010) and this research also exhibit the positive relationship between knowledge management and ICT. Furthermore, it is also established from the above results that external knowledge and internal innovation have a substantial relationship with the knowledge management practices of the organization. Therefore, it can be said that the accumulation of open innovation components (ICT, knowledge management, and internal innovation) forms the mechanism that stimulates service innovation through the incorporation of new and innovative ideas in service delivery. It can also be proved from the above results that knowledge management has a positive impact on service innovation in the hospitality industry as identified by the previous research (Islam et al., 2015; Shang et al., 2009; Storey and Kahn, 2010). Lastly, it is also established from the above results that service innovation improves the organizational performance of the hospitality industry of Malaysia. Moreover, different research studies have also established that service innovation has a significant positive relationship with organizational performance (Crook et al., 2011; T.-S. Liao and Rice, 2010).

Different research has examined the organizational performance in the hospitality industry but ignored the open innovation. Consequently, to fill the gap, a model is developed in this study incorporating open innovation which can stimulate the service innovation that eventually increases the overall organizational performance in the hospitality industry of Malaysia. Thus, it can be concluded that this study is among the pioneer research work in this phenomenon of open innovation.

## 6. Managerial implications

The result of the study presents useful discernments for the hospitality industry. The model developed in this research based on open innovation is of much importance for the organizations in the hospitality industry. This recommended framework has the ability to facilitate the hospitality industry managers to comprehend new and innovative ideas that can help to improve service quality and customer satisfaction.

In the previous studies, the scholar majorly focused on innovation and overlooked the concept of open innovation, especially in the hospitality industry. Therefore, the proposed framework of this study will help hospitality firms to improve service quality by incorporating open innovation. Similarly, it also exhibits the importance of open innovation in improving service quality incorporating its components to determine the quality-of-service delivery in the hospitality industry.

The hotels working in Malaysia should adopted various open innovation strategies. The management should introduce the concept of external knowledge to facilitate internal innovation in services to create attraction among customers. To promote external knowledge, the coordination with suppliers, partners and other stakeholders must be promoted by the practitioners. Additionally, to promote external knowledge, it is important to introduce ICT. The latest technology for communication is needed among the hotels to enhance collaboration between hotel management and stakeholders.

## Declarations

### Author contribution statement

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Data included in article/supp. material/referenced in article.

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The authors declare no conflict of interest.

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