

# Factors Influencing Open Innovation Adoption in the Ghanaian Hospitality Industry : The Role of ICT Infrastructure

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## ABSTRACT

This research work adds to extant writings on open innovation by evaluating the factors that impact open innovation adoption in the hospitality industry in Ghana. The research investigates withal the moderating function of ICT infrastructure in the correlation among human skills, managerial style and competition and open innovation. Data collected from 530 managers and owners in the Ghanaian hospital industry, in a cross-sectional observation employed on a five-point Likert scale survey, is analyzed and employed in the validation of the study's empiric and theoretic contributions. We employed SmartPLS software 3.2.8 to investigate primary data and the outcome indicates that the six determining factors significantly impact on open innovation adoption in the hospitality business. There are, particularly, positive and significant correlations between competition, human skills, management style, IT infrastructure and open innovation adoption. Nonetheless, both cultural and cost factors have negative, yet statistically significant impact on open innovation adoption. In Ghana's hospitality SMEs, the ICT infrastructure has proven to moderate a positive correlation betwixt open innovation adoption and competition. Similarly, ICT infrastructure moderates the correlation betwixt managerial style and open innovation adoption. Moreover, ICT infrastructure moderates a positive correlation between human skills and open innovation adoption in the Ghanaian hospitality SMEs.

**Keywords :** Competition, Cost, Cultural factors, Human skills, Managerial style, ICT infrastructure, Open innovation.

## I. INTRODUCTION

Specific emphasis in the literature on entrepreneurship has centered on rapid firm growth, which has cumulated into firms' innovation. Innovation has been crucial to the sustainability of businesses in a highly competitive hospitality market (Hall & Williams, 2019). Innovation sets the basis for competition and influences the financial and non-financial status of companies doing business in the hospitality industry in the current competitive

market setting (Chou, Horng, Liu, Huang, & Zhang, 2020). Innovation is described as the entire activity set that leads to the initiation of new things which strengthen the competitive edge of a firm (Van der Meer, 2007). Open innovation also refers to a model under presumption that companies can and must employ both internal and external concepts as well as external and internal market paths while the companies seek to improve their technology (Henry Chesbrough, 2003).

According to Olk and West (2020) open innovation as a series of techniques which profit from innovations and a cognitive framework to develop, analyze, and study those practices. The word open innovation is a relatively new idea widely known as utilizing purposive information inflow and outflow for the promotion of internal creativity as well as the development of opportunities for applying innovation externally (Bogers, Chesbrough, & Strand, 2019). This theory suggests that companies should and can appropriate external innovations and internal developments along with internal and external business routes when they try to develop their technologies (Henry Chesbrough, 2017). Over the past two decades, open innovation has managed to generate massive interest in both academia and practices. The stance of open innovation, which typically preaches that businesses need to innovate to be competitive or even flourish, and research may direct corporate innovation management. Since knowledge is a crucial tool, open innovation must be incorporated into a general business approach, which recognizes the significant use of external innovation, knowledge explicitly, and technological advances to generate value (OECD, 2008 ). In the last two decades, open innovation has created a significant degree of awareness among scholars and professionals, with little proof of open innovation being taken up by hospitality SMEs (Storey, Keasey, Watson, & Wynarczyk, 2016).

Given the growing awareness, the core determinants of open innovation in the hospitality industry remain poorly illustrated (Bogers et al., 2019; Divisekera & Nguyen, 2018; Marasco, De Martino, Magnotti, & Morvillo, 2018; Mawson & Brown, 2017; Naqshbandi, Tabche, & Choudhary, 2019; Olk & West, 2020). Further, due to increasing research on open innovation, academics have been criticizing the lack of focus extended to elements that affect the application of open innovation within the hospitality industry (Biemans & Griffin, 2018). In contrast to new product innovation, service innovations are

highly fragmented, and the factors which make up for the acceptance of open innovations in hospitality SMEs are not widely discussed (Biemans & Griffin, 2018).

This study seeks to address the void in the literature by presenting empirical analysis into the factors driving the application of open innovation in the tourism and hospitality business in the context of Ghana, sub-Saharan African context. This study adds to extant literature on management via the exploration of an untapped yet theoretically viable scope in which factors that impact the implementation of open innovations within the hospitality sector are empirically analyzed. In management science, the limited awareness of open innovation practices by hospitality SMEs is especially significant. As part of contribution to the open innovation literature, this study addresses the limited research on the moderating role of ICT infrastructure in the development and maintenance of the open innovation in the hospitality industry in Ghana for the deployment of more dynamic open innovation strategies.

Theoretical Background and Hypotheses development

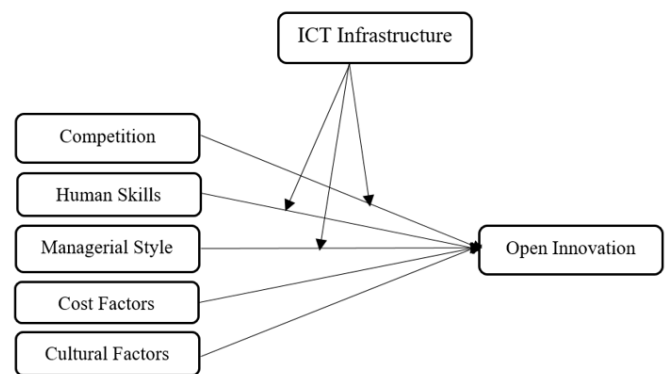


Figure 1. Hypothesized Model

Relationship between Cost Factors and open innovation

Cost factors in this study refer to the resources at the disposal of SMEs. Previous studies have reported that one central issue fronting SMEs in their quest to

innovate is the lack of resources (Abor & Quartey, 2010; OECD, 2017). The cost of doing business is increasing day-in-day out with number of taxes, becoming quite uncomfortable for most SMEs (World Bank, 2018). There is some evidence to suggest that SMEs operating in the hospitality sector are not competitive due to lack of coordination, high costs of doing business, relatively high transaction costs, low capacities, and difficult access to finance, and a high-risk perception for investing in the sector (World Bank, 2018).

Researchers are, however, conscious of the implication of getting sufficient resources and its effect on firms' innovation strategies and policies. A number of researchers have reported that firms can meaningfully succeed depending on their innovative efforts and the quality of its capital stock (Abor & Quartey, 2010; Santarelli & Sterlacchini, 1990). Kerr and Newell (2003) point out that technology adoption significantly hangs on the level of expected capital improvements and the willingness of the organization to attract technology investment funds. However, capital should provide the required potential for adoption of technology in the business, capital costs being a key issue which thwarts the capacity of the business to make decisions about investment in technology (Kerr & Newell, 2003).

*H1: Cost factors have significant inverse effect on adoption of open innovation in the hospitality SMEs in Ghana*

### **The potential moderating effect of ICT infrastructure and open innovation adoption**

ICTs thus Information and Communication Technologies comprises compilation, storing, processing, transmitting, and presenting of information (voice, data, text, images) in hardware, software, networks, and media as well as corresponding services (OECD, 2015). According to Gerguri and Ramadani (2010), the concept of

creativity is the development of fresh ideas and emerging technologies into innovative products and services. Joseph Schumpeter describes creativity as a mechanism that leads to the invention of products and services, as well as the new production function.

Innovation is a mechanism, that is, the development of new goods or services, the latest technological processes, the new entity or improvement of current products or services, emerging technology frameworks, and established institutions (Gerguri & Ramadani, 2010). In a similar fashion, Lichtenthaler (2011), describes open innovation as a comprehensive discovery, acquisition, and use of knowledge inside and beyond the boundaries of an enterprise throughout the innovation phase. Based on fundamental developments impacting contemporary economies, innovation has emerged as a critical aspect of business sustainability in every business sector. Hospitality SMEs have been urged to recognize an essential resource with the potential to create competitive edge within the current business environment.

According to Mihalic and Buhalis (2013), hospitality SMEs should also discover how they can access and take advantage of these resources in order to enhance their performance within today's turbulent industrial setting. Existing writings have emphasized the importance of Information technology, for example, central reservation systems(CSR), the internet and electronic distribution systems withal are deemed pretty nouvelle competitive resource (Mihalic & Buhalis, 2013). In recent years, scholars have argued that ICT and Internet can generate competitive advantage and augment firm performance (Namasivayam, Enz, & Siguaw, 2000; Porter, Michael, & Gibbs, 2001; Sirirak, Islam, Ba Khang, & Technology, 2011). To Tsai, Song, and Wong (2009) investing in ICT infrastructure is a means to improve firm performance, especially in the hotel industry. In more tangible terms, study findings indicate that companies within the hospitality regions need to

speed the ICT implementation (Mihalic & Buhalis, 2013). ICT is a supporter of innovation (open and close) in the hospitality industry (Mihalic & Buhalis, 2013). Kankam (2015) argues that ICT is one of many influencing determinants of a users' implementation of Social Networking as a communication tool. Thus, ICT infrastructure affects open innovation adoption within the hospitality industry (Kankam, 2015). In recent years, studies on innovation have paid particular attention to the connection between ICT and new product development. More often than not, large companies have the capacity to engage in R&D and hence able to adopt new technologies (open innovation). Prior research has found positive relationship between company's size as well as the speed of innovation adoption. The roles of ICT are emphasized hugely to increase the companies' capacity to function through diverse environmental and managerial boundaries (Pavitt, 2003). Similarly, Christensen and Maskell (2003) contend that the change towards a more open, collaborative and network-centered innovation practices are necessitated by the role of ICT. Hence, ICT infrastructure facilitates open innovation adoption within the hospitality industry. Faems, De Visser, Andries, and Van Looy (2010) noted that the variety of portfolios of the strategic technology partnership shows a positive influence on internal innovation initiatives to improve product innovation performance significantly.

In terms of competition, ICT companies are major corporations operating in an international environment. Efficient IT development and operation will lead to organizational performance. A highly influential company's capacity, and ability to invest in state-of - the-art technology is one of 10 determining factors between top companies and averaging companies (Singh & Ahila, 2020).

Computer based technological progress presents new business possibilities, shifting from a purely supportive function in the back office. For instance, a

business can use this technology to create an entrance barrier, to integrate costs and even, often, to change the basis of competition entirely. For instance, a business could use this technology to create a barrier to entry, to incorporate shifting costs, and even at times, to alter the basis of competitiveness completely. This illustrates why many firms took the opportunity and many others, somewhat relaxed, finally played the difficult and costly catch-up game (Miao et al., 2020).

Lai, Zhao, and Wang (2006), by utilizing a questionnaire-based mail census carried out in mainland China, examine the influences of Information Technology (IT) on the competitiveness of 3rd-party firms (3PL) in China. The research paper discovered that IT can significantly affect the competitive advantage of a company. It is important that we incorporate ICT, coordinate ICT plan and business strategic thinking, develop IT-related business skills and gain IT expertise to attain competitive advantages effectively. In terms of managerial style, It is clear that information technology now has a positive effect on most organizations' communication, organizational structures, management and operational activities (Singh & Ahila, 2020). ICT leads to improvements in command line and executive power, and may impact the centralization or decentralization of business decision-making and exercise power systems.

Development in computer-based IT has resulted in a diverse scope of technologies that managers are now using for decisions to be taken and implemented (Miao et al., 2020). These technologies were generally built up for specific reasons from the beginning and vary widely from conventional computerized information processing structures. The scope of the literature also suggests that this competitive analysis is necessary for managers to determine where the information system (IS) is suitable for their businesses, as it properly performs a supporting role in some cases and can only extravagantly contribute to the quality of the services and products of an

enterprise (Miao et al., 2020). It is the core of their competitive survival in other settings.

Recognizing the extent to which a company is capable of adapting to this economic scale can help CEO evaluate the correct level of costs and the correct management structure information system (IS). Practically almost every nook and cranny of human civilization has been affected by the information age, and no field has been more severely affected than communication. effective communication is a key component of management in an enterprise and the progress of IT has provided management with numerous instruments to maximize effective communication in their company (Jarmoszko & Gendron, 2020). These tools have brought about a paradigm shift in management information sharing that embraces management's mode of communication with its employees and customers. Information Communication Technology (ICT) provides management with the capacity to monitor extraordinary activities. IT allows workers to collaborate with others globally irrespective of the role of the manager in the organization and the size of the business which also promote innovation. For today's high-speed data transfer, the possibility in the transfer of large amounts of data in reasonably short time is seen. ICT makes it possible executives and workers to organize a range of tasks worldwide (Jarmoszko & Gendron, 2020). Conferences and seminars can be organized without highly expensive expenses with heads of various agencies worldwide. With the increase in the number of ICT tools, employees, customers and colleagues can be reached almost at any time in any place (Singh & Ahila, 2020). Smartphones, laptop, tablets and desktop computers are all advanced enough to assist phone calls, teleconferencing, social networking, e-mail management and even social media interaction. now even if managers and employees are not in the office, they will always be able to contact them through one of their many tools and related issues will be solved right away when they emerge, rather than waiting for the next working day (Sananse, 2020).

In terms of human skills, for companies and most businesses worldwide, human capital development is key (Dahiya & Das, 2020). Technology brings significant advantages to small business owners for development of human resources (Bankole Dr & Mimbi, 2017). Human capital development promotes innovation as IT makes it possible for workers to share information worldwide with each other regardless of the manager's role in the organization and the size of the business, which also promotes innovation (Miao et al., 2020). Development of human capital is an important phase of worldwide innovation. In this period, conventional approaches of developing human capital are not as applicable. With ultra-high-speed data exchange, large quantities of data can be exchanged in a fairly short timeframe. ICT facilitates directors and personnel to coordinate a variety of functions globally. With heads of different organizations internationally, meetings and workshops can be carried even without incredibly/ridiculously price/expenditures.

With the increase in the number of ICT tools, employees, customers and colleagues can be reached almost at any time in any place. Smartphones, laptop, tablets and desktop computers are all advanced enough to assist phone calls, teleconferencing, social networking, e-mail management and even social media interaction. now even if managers and employees are not in the office, they will always be able to contact them through one of their many tools and related issues will be solved right away when they emerge, rather than waiting for the next working day. Sananse (2020) found that technological changes can transform elements of expertise. The success and economic development of businesses largely hinges on the competence level its employees have and the expertise and effectiveness of its employees in promoting innovation (Miao et al., 2020).

*H2a: ICT infrastructure has significantly positive correlation with open innovation adoption in the hospitality industry*

*H2b: ICT infrastructure moderates the positive correlation between competition and open innovation adoption within hospitality industry*

*H2c: ICT infrastructure moderates the positive correlation between managerial style and open innovation adoption within the hospitality industry*

*H2d ICT infrastructure moderates the positive correlation between human skills and open innovation adoption within the hospitality industry.*

### **Relationship between management/leadership style and open innovation adoption**

An unambiguous correlation between leadership and innovation is identified (Denti & Hemlin, 2012; Närvänen, 2018). According to Mumford, Antes, Caughron, and Friedrich (2008) management plays a pivotal role in enhancing firms' creativity, Bossink (2007) contends that launching and driving innovation projects depends on leadership, and implementing innovation schemes and overcoming opposition (Gilley, Dixon, & Gilley, 2008). Yukl and Mahsud (2010) believes that leadership is a mechanism by which we can purposefully manipulate everyone else to guide, structure, and facilitate activities and relationships in a group or organization. The willingness to empower a community is part of the capacity to inspire and encourage workers to make a significant contribution to the firm's performance. Innovative leaders and friendly working environment have the potential to create and develop oriented attributes of organizational workforce (Becan, Knight, & Flynn, 2012). Becan et al. (2012) found an overflow reaction of leaders' backing of innovational thoughts as well as activities that cause workforces to strengthen their adaptive capabilities and transferring these innovational thoughts into personal adoption.

According to Simpson and Dansereau (2007) adoption of innovation depends heavily on management and leadership styles, employee empowerment and organizational climate that promotes innovation

(open and close). Becan et al. (2012) researched the implementation of innovation through a change-oriented working climate. They found that the propensity to pursue workshop-based strategies depends on entrepreneurial businesses that are innovative leaders and change-oriented workplace qualities, such as professional development, productivity, resourcefulness, and influence on others. On their part, Scherp, Pscheida, et al. (2017) stated that leadership is required for opening the innovation process and fostering open innovation continuously beyond the phase of its introduction. Moreover, using a sample of Korean SMEs, Ahn, Minshall, and Mortara (2017) demonstrated that CEOs would play a key role in promoting open innovation, including positive behavior, entrepreneurial spirit, flexibility, and education. Similarly, Elenkov, Judge, and Wright (2005) concluded that leadership can be supportive to achieve organizational innovations.

*H3: management and leadership style have positive and significant relationship with the adoption of open innovation in the hospitality industry*

### **Relationship between culture and open innovation adoption**

Culture, according to (Hofstede, 2001), is a collective programming of the mind which differentiates a group or class of people from another. Schein (1992) described an organization's culture as the basic concepts, beliefs, values, and forms of communicating directly, which contribute to an organization's specific social and psychological climate. Prior research has reported that existing cultural norms highly influenced the adoption of innovation (Herbig & Dunphy, 1998; Scherp, Mezaris, Köhler, & Hauptmann, 2017). Thus, technology adoption is influenced by cultural differences. Eseonu and Egbue (2014) believe that culture and society affect development and innovation and creativity perceptions and behaviors, which have shown an impact on decision-making. Herzog (2011) suggests that open and closed innovation frameworks are

distinct, and management should adhere to the risk-taking mindset, which promotes open innovation.

Tian, Deng, Zhang, and Salmador (2018) examine how different culturally related variables interact to improve or hinder the success of technologies in their respective clusters. According to Tian et al. (2018) the connection between culture and innovation is dynamic and distinctive. Shane (1993) argued that countries could vary in levels of innovation due to their citizens' cultural values. Mazur and Zaborek (2016) explored the connections between company culture, the application of open innovation channels, and the performance of SMEs. They reported a significant correlation between innovative culture and the context of open innovation streams. Franzo (2017) argued that the increasingly integrative culture favorably contributes to open and collaborative innovation.

However, findings of other studies have indicated a negative correlation between culture and innovation (Kaasa & Vadi, 2010a).

Yaveroglu and Donthu (2002) found a negative correlation between power distance and consumers' intent to innovate in a study that set to determine diffusion of consumer products in 19 wealthier nations. Again, Mitchell, Smith, Seawright, and Morse (2000) suggest that a high power distance as a cultural dimension has a negative influence on business creation processes. On their part, Williams and McGuire (2005) in their studies indicated a negative correlation between uncertainty avoidance and a country's economic creativity. Autio, Pathak, and Wennberg (2013), also, concluded in an empirical research on cultural practices, their association with initiative and entrepreneurial growth, grounded on Global Entrepreneurship Monitor (GEM) as well as Leadership and Organizational Behavior Effectiveness (GLOBE), that cultural practices of uncertainty avoidance have a negative association with entrepreneurship.

*H4: cultural factors have negative and significant association with open innovation adoption within the hospitality industry*

#### **The relationship between competition and open innovation adoption**

Commenting on competition, Nguyen, Van Ness, and Van Ness (2007) and Santamaría, Nieto, and Miles (2012) argue that a significant reason for a company's implementation of innovation could be the outside collaboration impact of companies' with intense competition. Overall, there seems to be some evidence to indicate that, competitors play significant roles implementing open innovation (Nicita, Ramello, & Scherer, 2005). On their part, Henry Chesbrough and Crowther (2006), postulate that companies cooperate with rivals on generating ideas and technologies. Van der Meer (2007) and West and Gallagher (2006) customers play a key role to induce the adoption of open innovation.

Prior studies have found that competition has a positive linear influence on innovation, as seen in studies of Nickell (1996) and Blundell, Griffith, and Van Reenen (1999). Moen, Tvedten, and Wold (2018) research on 380 Norwegian SMEs, whether innovation is associated with competition, and found competition to have positive correlation with innovation.

*H5: Competition has positive and significant effect on open innovation adoption*

#### **Relationship between human skills and open innovation adoption**

Zhang et al. (2012) postulated that human resources management practices have a direct effect on the adoption of innovation practices within a firm especially when they are combined with "the decentralization of decision making, delegation and

knowledge sharing and various pecuniary and non-pecuniary incentives". Becan et al. (2012) studied the innovation adoption as facilitated by a change-oriented workplace found that the tendency to adopt workshop-based interventions is contingent on innovative firm with creative leadership and change-oriented workforce attributes such as professional growth, efficacy, adaptability and influence on others. Prior studies that have noted the importance of implementing human resource strategies that can inspire innovation performance of firms (Atuahene-Gima, 1996; Laursen & Foss, 2003).

Bogers, Foss, and Lyngsie (2018) suggest that firms with a diverse human capital pool have competitive edge in terms of engaging in open innovation. Studies such as that done by Ahn et al. (2017), concluded that a paradigm shift from a closed to an open innovation process requires certain leadership traits and personal skills. In a similar fashion, Lindegaard (2010) shows that open innovation adoption calls for certain personal skills such as optimism, passion, drive, curiosity and the belief that change can be good. Hence, human skills in the adoption of open innovation is crucial because innovation process is spearheaded by people (Ahn et al., 2017), as human factors such as user adaptation, acceptance, training, and on-going support are as critical as the technical aspects of the implementation process (Delone & McLean, 2003). Delone and McLean (2003) posit that the success of implementing innovation is predicated on human resource factors.

*H6: Human skills have positive and significant relationship with open innovation adoption in the hospitality industry*

## II. Methodology

The purpose of the study was to analyze the determining factors of open innovation adoption in the Ghanaian hospitality industry: the moderating effect of ICT infrastructure. To achieve this objective, the study employed the survey research method in

the data collection process. Survey has been the dominant methodology in entrepreneurial research (Das, 2009). The empirical part was conducted in Ghana. Statistics on hospitality SMEs show an upward surge in the number of hospitality businesses (Xuhua, Spio-Kwofie, Udimal, & Addai, 2018). According to Ghana Tourism Authority (2016), there are 2969 licensed hotels in Ghana ranging from star-rated, guesthouses and budget hotels.

In total, 700 hotels throughout the country were randomly selected and contacted by phone for participation in the study, with valid contact addresses. The hotels were chosen upon meeting the requirements in succession. Hotels that have more than 5 workers (Adomako, 2018), and those with about 250 workers (Ghana Statistical Service, 2013), firms that are wholly owned and managed by individuals or group of industrialists who enjoy major ownerships (Goedhuys & Sleuwaegen, 2010), as well as companies that possess at least five years working experience (Morgan, Leech, Gloeckner, & Barrett, 2004). The questionnaire was the data collection tool. The questions were developed on a 5-point Likert scale ranging from 5 (*strongly agree*) to 1 (*strongly disagree*). 553 Ultimately, the companies answered the questionnaire run by local research firm with highly trained researchers (Boso, Story, & Cadogan, 2013; Hinson & Sorensen, 2006). They were then disseminated to the selected hotels where they were answered by managers who were operations and innovation inclined Manual (2005) states that managers are ideal respondents for innovation surveys in small firms. We took inspiration from Manual (2005), and conducted a surveyed middle and top managers working in Ghanaian hospitality SMEs. Middle managers and top managers were chosen because of their know-how of the strategic direction of their firms. 530 complete responses were received and were subsequently used in the study. The participating hospitality SMEs (Hotels) can be broken down into the following proportions per category: 5



stars (6%), 4 stars (9%), 3 stars (27%), 2 stars (23%), 1 star (17%), budget hotel (10%) and guest house (8%).

**Variables and measures**

The constructs of interest in this research were (competition, cost factors, cultural factors, managerial style, human skills and IT infrastructure). Regarding measures, the items for cost factors were adapted from (Statistics Norway, 2012), the items for cultural factors were also adapted from literature (Naqshbandi, Kaur, & Ma, 2015), we relied on the items developed by Orosz et al. (2018) to measure competition, the items for IT infrastructure were adopted from (OECD, 2015), while human skills was measured using established scales proposed by (Zopiatis & Theocharous, 2018) and to measure openness, measuring scales were obtained from earlier writings by (Yun, Park, Kim, & Yang, 2016). Finally, we adapted the scale developed by Swart (2013) to measure managerial style.

**III. Analysis**

In this analysis, the possible relationships between the constructs were tested/evaluated (competition, cost factors, cultural factors, human skills, IT infrastructure and managerial style). We employed partial least squares (PLS) with SmartPLS 3.2.8 in the analysis (Ringle, Wende, & Becker, 2015). The primary benefits of structural equation analysis far outweigh the old-fashioned multivariate analysis according to (Haenlein & Kaplan, 2004). Falk and Miller (1992) submitted that PLS is versatile when it came to upholding minimum sample criteria, determining the scale elements and the distribution of measurable variables; indeed, PLS does not require data normality and is more acceptable concerning large and small samples. The PLS Path Modeling algorithm is a classic measurement method that first examines the measurement model, such as its internal consistency, converging validity and discriminating validity. The second step involves the calculation of the structural model and requires a measure of the

collinearity of constructs and an assessment of the significance and the relationships.

**Measurement (outer) Model**

To measure all the constructs, the PLS bootstrapping method was used. The criterion suggested for the assessment of the significance of factor loadings by (Hair Jr, Sarstedt, Hopkins, & Kuppelwieser, 2014) has been observed. The composite reliability level is at a minimum agreed at 0.7 (Hulland, 1999) and at a minimum of 0.4 for the average variance extracted (Magner, Welker, & Campbell, 1996). The results for the item loadings are listed in Table 1.

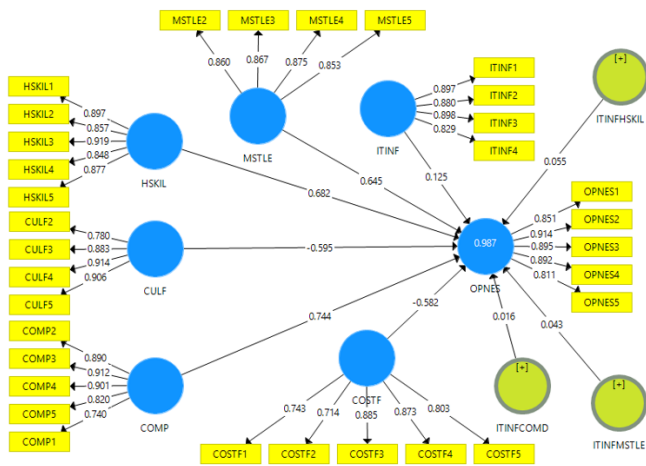
**Table 1 : Measurement Model Analysis**

<b>Constructs</b>	<b>Items</b>	<b>Loadings</b>
<b>HSKIL</b>	HSKIL1	0.897
	HSKIL2	0.857
	HSKIL3	0.919
	HSKIL4	0.848
	HSKIL5	0.877
<b>MSTLE</b>	MSTLE2	0.860
	MSTLE3	0.867
	MSTLE4	0.875
	MSTLE5	0.853
	<b>COMP</b>	COMP1
COMP2		0.890
COMP3		0.912
COMP4		0.901
COMP5		0.820
<b>ITINF</b>	ITINF1	0.897
	ITINF2	0.880
	ITINF3	0.898
	ITINF4	0.829
<b>CULF</b>	CULF2	0.780
	CULF3	0.883
	CULF4	0.914
	CULF5	0.906
	<b>COSTF</b>	COSTF1
COSTF2		0.714
COSTF3		0.885
COSTF4		0.873

OPNES	COSTF5	0.803
	OPNES1	0.851
	OPNES2	0.814
	OPNES3	0.895
	OPNES4	0.892
	OPNES5	0.811

**Figure 2.** Measurement Model

Notes: HSKIL=Human skills, MSTLE=Managerial style, COMP=Competition, ITINF=IT infrastructure, ITINFCOMD=IT infrastructure moderating (COMP), ITINFHSKIL= IT infrastructure moderating (HSKIL), ITINFMSTLE= IT infrastructure moderating (MSTLE), CULF=Cultural factors, COSTF=Cost factors, OPNES=Open Innovation



The findings on reliability and validity of the constructs employed for the analysis are presented below. The internal reliability shows how reliable the measurement components are in the estimation of the particular construct. The standard specifications for inclusion of all constructs is observed. The standard value of 0.70 is needed for Cronbach's Alpha but for our constructs all of them satisfy the requirements. To validate their inclusion, the composite reliability for constructs should be > 0.6. In this analysis, the composite reliability is > 0,6, indicating that all measurement items for their various constructs hold together well. Until their measurement items can be defined as keeping together it is necessary AVE of a construct to meet requirements of > 0.5. Again, the VIF values are clearly below the threshold of 5, which indicates that collinearity does not reach critical levels in any of the constructs (Hair, Ringle, & Sarstedt, 2011). The table 4.2 below presents the result on reliability and validity of the constructs used for the study.

**Table 2 :** Tests of Construct Reliability and Validity

Constructs	Cronbach alpha	Composite reliability	rho_A	AVE
HSKIL	0.927	0.945	0.929	0.774
MSTLE	0.887	0.922	0.891	0.746
COMP	0.906	0.931	0.907	0.731
ITINF	0.899	0.930	0.902	0.768
ITINFCOMD	1.000	1.000	1.000	1.000
ITINFHSKIL	1.000	1.000	1.000	1.000
ITINFMSTLE	1.000	1.000	1.000	1.000
CULF	0.894	0.927	0.895	0.761
COSTF	0.867	0.902	0.890	0.650

OPNES	0.922	0.941	0.923	0.763
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Notes: HSKIL=Human skills, MSTLE=Managerial style, COMP=Competition, ITINF=IT infrastructure, ITINFCOMD=IT infrastructure moderating (COMP), ITINFHSKIL= IT infrastructure moderating (HSKIL), ITINFMSTLE= IT infrastructure moderating (MSTLE), CULF=Cultural factors, COSTF=Cost factors, OPNES=Open Innovation

The Table3 below presents the result on the discriminant analysis. Discriminant Validity indicates that the measurement model of the construct is clear of unnecessary elements. The redundant elements must be detected and deleted as the measuring model must be re-run. Free parameter estimates could be limited to redundant pairs. The relationship among exogenous constructs should not surpass 0.85. The magnitude of correlation above 0.85 means that the two exogenous constructs are redundant or have substantial multi-linearity issues. The result shows that the square root of all AVE values is greater than

their latent correlations. Thus, for satisfactory discrimination the diagonal values in the respective rows and columns should be much higher than the off-diagonal values. Table 3 shows that diagonal values (AVE square root) are greater than their respective off-diagonal values and are perfectly valid for discrimination. In other words, the root of the AVE metrics for each construct is considerably greater than the latent variable correlation, and this shows that the final updated test model for all the constructs have sufficient discriminating validity. All constructs achieve the discriminating basic requirements of validity.

**Table 3.** Calculation of Goodness of Fit (GoF) Index

Constructs	AVE	R <sup>2</sup>
HSKIL	0.774	
MSTLE	0.746	
COMP	0.731	
ITINF	0.768	
ITINFCOMD	1.000	
ITINFHSKIL	1.000	
ITINFMSTLE	1.000	
CULF	0.761	
COSTF	0.650	
OPNES	0.763	0.987
Average Scores	0.819	0.987
AVE * R <sup>2</sup>	1.806	
GoF = $\sqrt{(AVE \times R^2)}$	0.899	

Source: Author's Calculation: GoF<sub>small</sub>=0.1; GoF<sub>medium</sub>=0.25; GoF<sub>large</sub> = 0.36

	1	2	3	4	5	6	7	8	9	10
COMP	<b>0.855</b>									
COSTF	0.386	<b>0.806</b>								
CULF	0.561	0.550	<b>0.872</b>							
HSKIL	0.609	0.418	0.610	<b>0.880</b>						
ITINF	0.577	0.376	0.576	0.801	<b>0.876</b>					
ITINFCOMD	-0.376	-0.409	-0.380	-0.363	0.321	<b>1.000</b>				
ITINFHSKIL	-0.340	-0.518	-0.317	-0.544	0.501	0.401	<b>1.000</b>			
ITINFMSTLE	-0.355	-0.541	-0.333	-0.504	0.459	0.572	0.592	<b>1.000</b>		
MSTLE	0.656	0.366	0.641	0.569	0.216	-	-	-	<b>0.864</b>	
						0.381	0.508	0.534		
OPNES	0.607	0.620	0.602	0.690	0.348	-	-	-	0.898	<b>0.873</b>
						0.337	0.530	0.492		

**Table 4.4:** Discriminant Validity

Notes: HSKIL=Human skills, MSTLE=Managerial style, COMP=Competition, ITINF=IT infrastructure, ITINFCOMD=IT infrastructure moderating (COMP), ITINFHSKIL= IT infrastructure moderating (HSKIL), ITINFMSTLE=IT infrastructure moderating (MSTLE), CULF=Cultural factors, COSTF=Cost factors, OPNES=Open Innovation

The Table 4 below indicates the outcome of  $R^2$  evaluating the structural model. The estimate for  $R^2$  varies from 0 to 1 with a bigger estimate showing predictive accuracy (Hair Jr et al., 2014). The percentages 0.75, 0.50 and 0.25, therefore, define the accuracy level of the measurement to be substantial, moderate and low. The accuracy of the model is measured. The  $R^2$  demonstrates the overall effect of the endogenous latent variables, and the magnitude of

variances described by the exogenous variables associated with the endogenous latent variable (Hair Jr et al., 2014).

The blindfolding has been used to validate the validity/relevance of the model for each endogenous construct.  $Q^2$  parameters extend from 0.464 to 1.000 in this analysis, suggesting small medium and large effect sizes.

**Table 5.** Result R2 and Q2

Constructs	R-SQUARE	R-SQUARE ADJUSTED	Q <sup>2</sup>	EFFECT SIZE
HSKIL			0.619	Large
MSTLE			0.536	Large
COMP			0.565	Large

ITINF			0.569	Large
ITINFCOMD			1.000	Large
ITINFHSKIL			1.000	Large
ITINFMSTLE			1.000	Large
CULF			0.559	Large
COSTF			0.464	Large
OPNES	0.987	0.987	0.605	Large

**Notes: Small: 0.0 < Q<sup>2</sup> effect size < 0.15; Medium: 0.15 < Q<sup>2</sup> effect size < 0.35; Large: Q<sup>2</sup> effect size > 0.35**  
 The Table 5 below shows *f*<sup>2</sup> effect size. It reports variations in *R*<sup>2</sup> when a given exogenous variable is

removed from the model (Hair Jr et al., 2014). The research suggests that exogenous constructions have a medium to large impact on endogenous constructions.

**Table 4.6.** Results of *f*<sup>2</sup>

Constructs	<i>F</i> <sup>2</sup>	EFFECT SIZE
HSKIL	2.289	Large
MSTLE	1.625	Large
COMP	0.524	Large
ITINF	0.100	Medium
ITINFCOMD	0.012	Small
ITINFHSKIL	0.049	Small
ITINFMSTLE	0.026	Small
CULF	0.409	Large
COSTF	1.009	Large
OPNES		

Notes: small: 0.0 < *f*<sup>2</sup> effect size < 0.15; Medium: 0.15 < *f*<sup>2</sup> effect size < 0.35; Large: *f*<sup>2</sup> effect size > 0.35

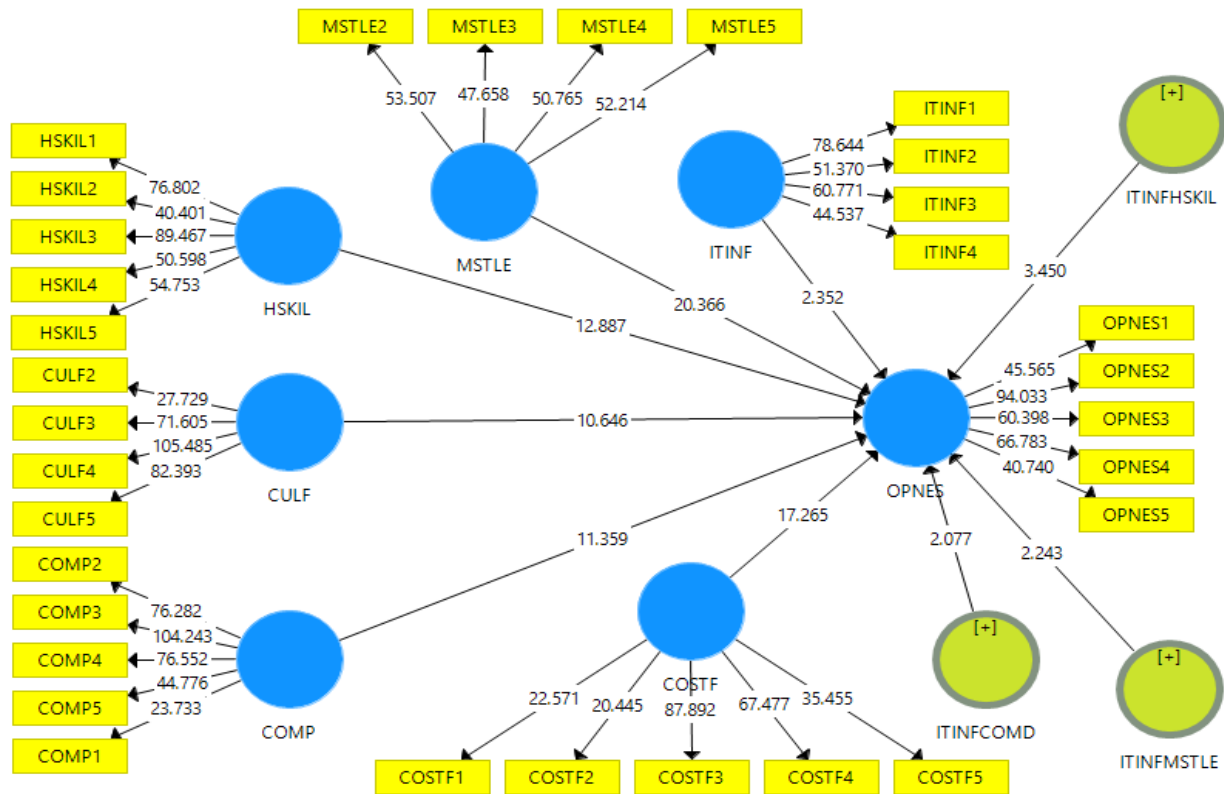


Figure II. Measurement Model Results

Testing of hypothesis (Testing of Direct Effect)

The study sought to analyze the determinants of open innovation adoption among the Ghanaian hospitality SMEs. As shown in Fig. II and Table IV, open innovation was used as the dependent variable whereas the determining factors of open innovation were used as independent variables. The results revealed that competition has a statistically significant relationship with open innovation adoption ( $\beta = 0.744$ ,  $t$ -value = 11.359,  $\rho < 0.000$ ). Regarding cost factors, we found negative but statistically significant relationship between cost factors and open innovation

adoption ( $\beta = -0.582$ ,  $t$ -value = 17.265,  $\rho < 0.000$ ). On cultural factors, the study found negative but statistically significant relationship between culture and open innovation adoption ( $\beta = -0.595$ ,  $t$ -value = 10.646,  $\rho < 0.000$ ). The results also revealed that there was a significant positive relationship between human skills and open innovation adoption ( $\beta = 0.682$ ,  $t$ -value = 12.887,  $\rho < 0.000$ ). IT infrastructure is found to openly and positively correlate with open innovation adoption ( $\beta = 0.125$ ,  $t$ -value = 2.352,  $\rho < 0.017$ ). Similarly, managerial style was found to positively influence open innovation adoption ( $\beta = 0.645$ ,  $t$ -value = 20.366,  $\rho < 0.000$ ).

Table 4.7. Structural Model Results

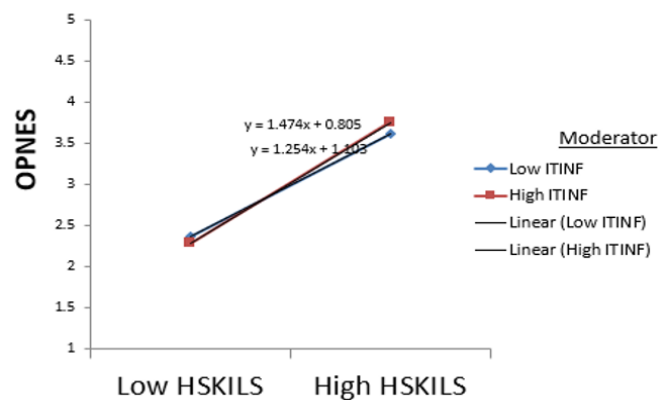
Hypotheses	Original Sample	Sample Mean	Standard Deviation	T-Statistics	P-Value
COMP → OPNES	0.744	0.739	0.066	11.359	0.000
COSTF → OPNES	-0.582	-0.577	0.033	17.265	0.000
CULF → OPNES	-0.595	-0.591	0.056	10.646	0.000

HSKIL → OPNES	0.682	0.673	0.053	12.887	0.000
ITINF → OPNES	0.125	0.135	0.053	2.352	0.017
ITINFCOMD→OPNES	0.016	0.016	0.008	2.077	0.038
ITINFHSKIL→OPNES	-0.055	-0.055	0.016	3.450	0.001
ITINFMSTLE→OPNES	0.043	0.044	0.019	2.243	0.023
MSTLE→OPNES	0.645	0.641	0.032	20.366	0.000

### Testing the moderating effect

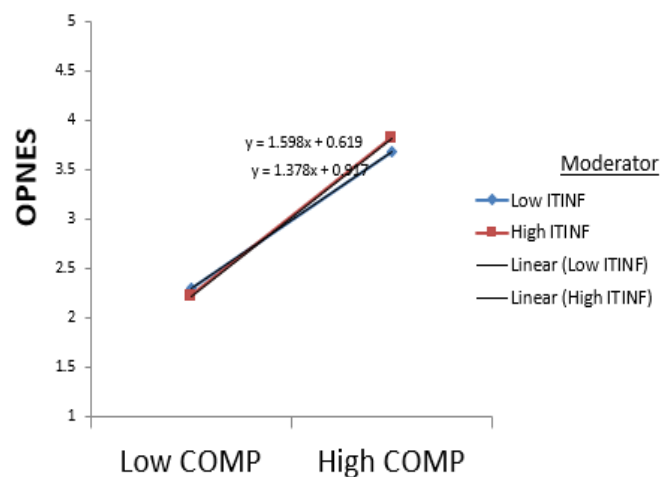
This research adopted the product-indicator technique to test for the moderating effect of ICT infrastructure on competition, human skills and managerial style. Hypothesis 2b states that ICT infrastructure moderates the positive relationship between competition and open innovation adoption in the hospitality industry, such that this relationship will be stronger when ICT infrastructure is high than when it is low. As shown in Table 4.7, the results indicate that ICT infrastructure positively moderates the relationship between competition and open innovation adoption in the hospitality SMEs in Ghana ( $\beta = 0.016$ ,  $t\text{-value} = 2.077$ ,  $\rho < 0.038$ ). Similarly, Hypothesis 2c states that ICT infrastructure moderates the positive relationship between managerial style and open innovation in the hospitality industry ( $\beta = 0.043$ ,  $t\text{-value} = 2.243$ ,  $\rho < 0.023$ ). Moreover, Hypothesis 2d states that ICT infrastructure moderates the positive relationship between human skills and open innovation in the hospitality industry ( $\beta = -0.055$ ,  $t\text{-value} = 3.450$ ,  $\rho < 0.001$ ).

The moderating role of ICT infrastructure in the relationship between human skills and open innovation



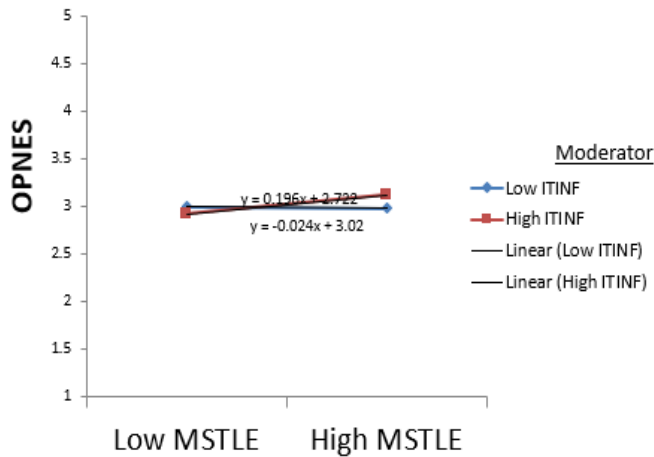
ICT infrastructure strengthens the positive relationship between human skills and open innovation adoption

Moderating role of ICT infrastructure in the relationship between competition and open innovation



ICT infrastructure strengthens the positive relationship between competition and open innovation adoption

Moderating function of ICT infrastructure in the correlation between managerial style and open innovation.



ICT infrastructure strengthens the positive relationship between managerial style and open innovation adoption

#### IV. Discussion of study results

This paper investigates the factors influencing open innovation adoption in the Ghanaian hospitality industry: the moderating role of ICT infrastructure. Open innovation is an emerging concept that has recently attracted a lot of attention, both in practice and in academia. Six determining factors of open innovation were identified through a comprehensive review of the extant literature and their influence on open innovation adoption was investigated in the Ghanaian hospitality industry. From the study, all the six hypothesized relationships were confirmed and the study provided hospitality SME managers with different factors that could facilitate open innovation adoption. In terms of the relative importance of the independent variables to open innovation adoption, past empirical studies have shown that competition has a strong relationship with open innovation adoption. The findings support earlier research by Nguyen et al. (2007) arguing, that a significant factor

for a firm’s innovation adoption is the outside cooperation effect of firms with competitors. Similarly, the result confirms the findings of Nickell (1996) and Blundell et al. (1999) who established that competition had a positive linear influence on innovation. Thus, in support with prior studies, this study strengthens the consideration given to competition as a key determinant of open innovation adoption within the hospitality industry.

Regarding cost factors, the research established a negative but statistically significant relationship between cost factors and open innovation adoption. This suggests that in spite of the important roles SMEs play, their growth is mainly restricted by many factors including inaccessibility to suitable technology; inadequate or no managerial skills and training; and most importantly, access to finance which negatively impacts on their ability to expand. This is consistent with previous findings and Abor and Quartey (2010) who have reported that one central issue fronting SMEs in their quest to innovate is the lack of resources. For SMEs operating in the hospitality sector to carry out their open innovation activities within their chronic resource-constrained environment, hospitality SME managers need to have the ability to be creative thinkers, innovative, critiques as well as be able to liaise with financial institutions in order to benefit from relationship lending.

On cultural factors, the study found negative and statistically significant relationship between culture and open innovation adoption. The finding supports the work of Kaasa and Vadi (2010b) who found that culture relates negatively with innovation. In a similar fashion, Yaveroglu and Donthu (2002) found that power distance has an adverse correlation with consumers’ intention to innovate in a study that set to determine diffusion of consumer products in 19 wealthier nations. Again, Mitchell et al. (2000) found high power distance as a cultural dimension to have negative effect on business creation processes.



The results also revealed a positive and significant correlation between human skills and open innovation adoption. The finding is in harmony with Delone and McLean (2003) who posit that, the implementation of innovation rests on human resource factors. On their part, Bogers et al. (2018) found that firms with a diverse human capital pool have competitive edge in terms of engaging in open innovation. Furthermore, Lindegaard (2010) found that open innovation adoption depends on certain personal skills such as optimism, passion, drive, curiosity and the belief that change can be good. This suggests that, human skills in the adoption of open innovation is crucial because innovation process is spearheaded by people.

IT infrastructure is proven to openly and positively influence open innovation adoption. This finding resonates with the study by Mihalic and Buhalis (2013) who postulated that ICT is a supporter of innovation (open and close) in the hospitality industry. Similarly, Christensen and Maskell (2003) contend that ICT has caused a change towards a more direct, cooperative and innovation activities based on network. Moreover, the study also resonates with previous study by Faems et al. (2010) who found that technology alliance portfolio diversity positively influence internal innovation moves, resulting in a decrease in the performance of product innovation. IT infrastructure has a major correlation with open innovation adoption, which is globally adopted by innovation academics as a key determinant affecting open innovation.

In like manner, ICT infrastructure was established to moderate human skills' association with open innovation adoption. This finding supports (Singh & Ahila, 2020) in their findings that technological changes can transform elements of expertise. In the same way, the success and economic development of businesses largely hinges on the competence level its employees have and the expertise and effectiveness of its employees

in promoting innovation (Miao et al., 2020). For companies and most businesses worldwide, human capital development is key (Dahiya & Das, 2020). Technology brings significant advantages to small business owners for development of human resources (Bankole Dr & Mimbi, 2017). Human capital development promotes innovation as IT makes it possible for workers to share information worldwide with each other regardless of the manager's role in the organization and the size of the business, which also promotes innovation (Miao et al., 2020).

The result as well indicated the correlation between competition and open innovation adoption, with ICT infrastructure playing a moderating role. This finding is in tandem with the study of Singh and Singh and Ahila (2020) who argue that efficient IT development and operation will lead to organizational performance. A highly influential company's capacity, and ability to invest in state-of-the-art technology is one of 10 determining factors between top companies and averaging companies (Singh & Ahila, 2020). The moderating effects of ICT on organizational risk and performance characteristics among manufacturing companies in Kenya are studied by (Nyambura, 2018). The relationship between organizational risks (innovation) was found to be moderated by ICT usage. The association of management style with open innovation was found to be moderated by ICT infrastructure. This is in harmony with Pavel (2018) who studied the moderating role of ICT, focusing on the relationship there is between Knowledge managerial practices and business efficiency, using proofs from Russia. The empirical study has shown that ICT is a moderator within the correlation between strategic management of knowledge and business efficiency.

The findings support the view of (Singh & Ahila, 2020) who argue that there is clear that information technology now has a positive effect on most organizations' communication, organizational structures, management and operational activities. Moreover, ICT

leads to improvements in command line and executive power, and may impact the centralization or decentralization of business decision-making and exercise power systems (Vogl, 2020). Development in computer-based IT has resulted in a diverse scope of technologies that managers are now using for decisions to be taken and implemented (Vogl, 2020). These technologies were generally built up for specific reasons from the beginning and vary widely from conventional computerized information processing structures. The study, therefore, suggests that businesses use ICT to boost their companies' performance. Also, managerial style was found to positively influence open innovation adoption. This finding is in tandem with that of Simpson and Dansereau (2007) who argued that adoption of innovation depends heavily on management and leadership styles, employee empowerment and organizational climate that promotes innovation (open and close).

The findings support the earlier work of Becan et al. (2012) who studied the innovation adoption as being necessitated by workshops that are prone to changes and found that the tendency of adopting workshop-based conciliation is contingent on innovative firms with innovative leaders as well as dynamic staff with qualities like professional development, effectiveness, flexibility and inspiration for others.

On their part, Scherp, Mezaris, et al. (2017) concluded that leadership is required for opening the innovation process and foster open innovation continuously beyond the phase of its introduction. Overall, the findings from the study indicate that competition, human skills, managerial style and IT infrastructure are dynamos of open innovation adoption in the hospitality industry. Nonetheless, a negative yet significant effect was recorded between cultural factors and open innovation adoption.

### **Theoretical Implication**

Over the last decade, Open innovation has been the catchphrase for scholars and managers alike. This present study will add to the creation of different opinions on open innovation adoption in the SMEs operating within the hospitality industry and shall also contribute to the numerous researches done in order to streamline the open innovation from a less researched perspective as there are no set of generally accepted factors affecting the adoption of open innovation within the hospitality SME (Biemans & Griffin, 2018). This research confirms that the influence of cultural factors on open innovation adoption maybe contextual, therefore, cultural dimensions may be context-specific and that cultural dimensions may openly or indirectly affect the adoption of open innovation.

The empirical writings have underemphasized the determining factors of open innovation within the hospitality business which poses a potential effect on SMEs performance in terms of collaborative effort and cost of operation. Whereas knowledge remains a vital asset, it becomes imperative that open innovation be implanted in an entire business plan that clearly recognizes external concepts, information, as well as technology as necessary to creating value.

The empirical findings suggest that developing state of art IT infrastructure impact hugely to increase the capability of firms to work over diverse geographical and administrative restrictions as well as empower the organization to possibly build a competitive edge within the current business environment. Hospitality SMEs are enabled to offer the clients and the company value, either incidentally or openly based on cultural setting.

### **Practical implication**

Managers need to concentrate even more on establishing and sustaining valuable business

relationships. Hospitality SME managers should be encouraged to create deeper connections within the finance sector and their social networks. Hospitality SME managers should, therefore, be able to think out of the box, focusing on creativity, innovation, and be able to freely link up with banking institutions so that they can enjoy relationship lending to promote their open innovation activities within their chronic resource-constrained situation.

Managers can also strive towards establishing links with a broad array of external partners, such as government, industry experts, and academic institutions and businesses, with practical solutions to safeguard significant exposure to valuable data and assets.

Training programs of a company should not just be focused on developing and enhancing workers' skills and performance but also be focused on growing their network skills and ability to team up and learn from each other.

The government could promote open innovation via the reduction of taxes and tariffs competitively and seek to urgently eradicate the issue of infrastructural constrictions. Managers must also improve their dynamic capabilities and absorption capabilities through consistent creation of courses to help develop their staff as well as keenly investing in areas like job training, and also striving to meet industrial standards and planning to boost and improve performance.

Ghanaian-based hospitality SMEs need to consider encouraging a culture of knowledge sharing among their staff by implementing immediate understanding sharing inclusion through organizational policies or by motivating and coaching staff. This could alter their habits and attitudes towards information sharing in order to promote innovation development.

## V. Conclusion

This work focused on discovering the determining factors of open innovation adoption in the Ghanaian hospitality industry. The findings reveal that competition, human skills, IT infrastructure and managerial style are very critical to hospitality SMEs open innovation adoption. Findings also reveal both cultural and cost factors as having negative, yet significant relationship with open innovation adoption. ICT infrastructure also plays a moderating role in the correlation between competition and open innovation adoption in the hospitality SMEs Ghana. Again, ICT infrastructure plays same moderating role in the correlation between management style and open innovation. Moreover, ICT infrastructure again controls the positive correlation between human skills and open innovation adoption in the hospitality small and medium size enterprises in Ghana.

## VI. Limitation and Future Research

The study was carried out in Ghana's hospitality SMEs, and this has to be carefully considered when interpreting the findings. The study may be extended to cover new economical areas. Furthermore, replicating studies in certain geographic areas will validate research findings. Future research should explore the link between open innovation and culture whilst looking at size and age as moderating influence. Future research can be done on network embeddedness as well as entrepreneurial orientation so as to find out how they influence business efficiency (Yu & Fan, 2011).

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