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Article

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Global Business & Finance Review (GBFR)

Provided in Cooperation with:

People & Global Business Association (P&GBA), Seoul

Suggested Citation: Lee, Kyoung-Joo (2020) : Understanding innovative Information Systems (IS) use of frontline employees in hotels: Proactivity, psychological empowerment, self-learning, and service quality efficacy, Global Business & Finance Review (GBFR), ISSN 2384-1648, People & Global Business Association (P&GBA), Seoul, Vol. 25, Iss. 1, pp. 48-64, <http://dx.doi.org/10.17549/gbfr.2020.25.1.48>

This Version is available at:

<http://hdl.handle.net/10419/224442>

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Understanding Innovative Information Systems (IS) Use of Frontline Employees in Hotels: Proactivity, Psychological Empowerment, Self-learning, and Service Quality Efficacy

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ABSTRACT

Purpose: As hotels make huge investments in the information systems (IS) to improve operational efficiency and service quality, understanding the pattern of employees' IS behavior is crucial to gain a high return on the investment. Although the technology acceptance model (TAM) explained the early voluntary IS use, it has limitations to explain the variety of IS behaviors in the current mandatory context.

Design/methodology/approach: Understanding the innovative information systems (IS) use as the most prominent behaviour patterns, this research proposes an integrative model to analyze the positive influence of the innovative IS behavior and to investigate its predictors. Based on a survey of 189 hotel front office employees, this study tests the research model by adopting the PLS-SEM.

Findings: As a personal positive outcome of innovative IS use, this research focuses on the service quality efficacy of service providers. As a predictor at the individual and organizational level, this study shows the positive and significant influence of the proactive personality and the psychological empowerment on the innovative IS use. Furthermore, it also found the mediation effects of users' self-learning to elucidate the path of how the predictor variables lead to innovative IS applications.

Research limitations/implications: This paper highlights the concept of innovative IS use and shows its importance in improving the hotel frontline employees' self-efficacy and the quality of services. Furthermore, it advises hotel management to select proactive employees, empower them, and promote self-learning activities to improve the innovative IS use. Future research will advance the literature by investigating the complex interactions of the key prediction variables.

Originality/value: This research not only stresses the concept of the innovative IS behavior to improve the hotel operational efficiency and service quality, but also presents an integrative model that shows the predictors of innovative IS behavior and its impact on the hotel employees' self-confidence in their service ability.

Keywords: Innovativeness, Proactivity, Psychological empowerment, Self-learning, Service quality efficacy

Received: Feb. 4, 2020; Revised: Mar. 9, 2020; Accepted: Mar. 16, 2020

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1. Introduction

Customer service in hotels is highly information-intensive and hotels have made the substantial investments to the information systems (IS) to improve operational efficiency and service quality. Recognizing the importance, numerous researchers have analyzed the potential benefits of effective IS in hotels (Legris et al., 2005; Chathoth, 2007; Bilgihan et al., 2011; Okumus, 2013). Despite the potential, hotels could reap different benefits from the IS investment and the existing literature suggested that hotels may realize the desirable productivity only when the IS are fully adopted by individual employees (Legris et al., 2005; Lam et al., 2007; Kim et al., 2008; Huh et al., 2009). Regarding individual IS behavior the technology acceptance model (TAM) has the most prominent research tradition (Davis, 1989; Legris et al., 2003; Lam, et al., 2007; Huh et al., 2009; Turner et al., 2010). The TAM stresses the importance of the perceived functional benefits of and the satisfaction with the systems to explain users' technology acceptance (Davis, 1989; Legris et al., 2003; Lam et al., 2007; Kim et al., 2008; Huh et al., 2009; Turner et al., 2010).

Despite the TAM's substantial contributions to understanding of IS adoption in the early phase of systems implementation, the model has limitations. On the one hand, the development of information technology has already moved from the early implementation phase of the voluntary use to the full adoption of the mandatory use, significantly restricting the validity of TAM (Sørebø & Eikebrokk, 2008; Hsieh et al., 2012; Laumer et al., 2016). On the other hand, the basic premise of TAM understands the IS users as simple recipient of technologies without paying attention to the innovative IS use (Nambisan et al., 1999; Wang et al., 2013; Li et al., 2013; Wang et al., 2014; Huang et al., 2017).

Addressing the limitations, this research aims at deepening our understanding of the innovative IS use and tests the research model based on a survey of hotel front-desk employees. The frontline employees play a crucial role in defining the quality of customer

service in hotels (Lee, 2018; Lee et al., 2018; Sihombing et al., 2017; Lee, 2016; Lee, 2014). Among various post-adoptive behaviors, this study focuses on the innovative IS use as it is one of the most advanced forms of user behavior (Lee et al., 2018). Although some use the system in a routine manner, others utilize it more innovatively, bringing a significant effect on work outcomes (Nambisan et al., 1999; Wang et al., 2013; Wang et al., 2014; Roberts et al., 2016; Huang et al., 2017; Lee et al., 2018). Different from the TAM that understood users as a passive recipient of technology, this study emphasizes the innovativeness of users in the process of learning and applying IS in their works (Nambisan et al., 1999; Wang et al., 2013; Li et al., 2013; Wang et al., 2014; Roberts et al., 2016; Huang et al., 2017; Lee et al., 2018).

As researchers recognize the significance, there is growing attention to the innovative IS use but the existing studies are restricted and focused narrowly on the personal absorptive capacity to explain the use (Li et al., 2013; Wang et al., 2014; Huang et al., 2017). Adding to the existing literature, this research proposes an integrative model suggesting the predictors and consequence of innovative IS use and performs an empirical test in hotels. As a positive outcome, this research suggests that the innovative IS use could enhance *service quality (SQ) efficacy* of frontline employees in hotels. Regarding the predictors, this study proposes that both the personal disposition of *proactivity* and the organizational condition of *psychological empowerment* could promote the innovativeness of frontline employees in their IS application into the work process. Finally, in an attempt to elucidate the path of how the predictor variables lead to the innovative IS use, this study suggests that the *self-learning* of employees mediates the relationship. For an empirical test of the research model, this research performed a survey of the employees in hotels' front offices. The customer services in hotels are highly information-intensive and the front desks act as a hub for customer services and centrally manage all information and data required from guest registration to checkout (Bardi, 2011).

II. Literature Review

One of the most prominent research traditions regarding individual IS behavior is the technology acceptance model (TAM) (Davis, 1989; Legris et al., 2003; Lam, et al., 2007; Huh et al., 2009; Turner et al., 2010) and the TAM encompasses two sub-constructs, such as perceived usefulness and perceived ease of use, to predict and explain individuals' use of IS in organizations. The perceived usefulness refers to the extent to which individuals believe that using a particular system would enhance their job performance, while the perceived ease of use means the degree to which individuals believe that using a particular system would be easy and free from efforts (Davis, 1989). Explaining the user' IS acceptance, the model has emphasized the perceived functional benefits of and the satisfaction with the systems as the driver of technology acceptance (Davis, 1989) and researchers have actively replicated the results (Legris et al., 2003; Lam et al., 2007; Kim et al., 2008; Huh et al., 2009; Turner et al., 2010).

To advance the model to predict the intention to IS use, Venkatesh and Davis (2000) investigated the predictors of both the perceived usefulness and perceived ease of use by focusing on the users' social context and cognitive dimension. The researchers conceptualized the interrelated social process in which an individual finds the opportunity to adopt or reject a technological system, including subjective norm, voluntariness, and image, while analyzing the influence of the cognitive instrumental processes, such as job relevance, output quality, result demonstrability, and perceived ease of use to explain the users' technology acceptance (Venkatesh & Davis, 2000).

Although the existing acceptance model made substantial contributions to the understanding of users' IS adoption in the early implementation phase, the model now faces challenges. One noticeable constraint of existing TAM studies is that the development of information technology (IT) has already passed the initial implementation phase, where employees used technological systems voluntarily. As information

systems use is so deeply integrated into the daily work processes, its use is now indispensable and mandated in work processes (Sørebø & Eikebrokk, 2008; Hsieh et al., 2012; Laumer et al., 2016). The employees have to use the systems to perform tasks, but they show different patterns of behaviors applying IS in their work process. Thus, the development of IT requires an understanding of post-adoptive behaviors in the context of mandated IS use (Jasperson et al., 2005; Hsieh et al., 2012; Sun, 2012; Li, Hsieh, & Rai, 2013; Maruping and Magni, 2015).

The other constraint of TAM is the fact that the perspective under-evaluated the innovative users as it understands the IS users as simple recipient of technologies (Nambisan et al., 1999; Wang et al., 2013; Li et al., 2013; Wang et al., 2014; Huang et al., 2017). The existing acceptance model neglects the innovative behaviors of users. Beyond simply accepting the pre-designed technological functions, users often act as an innovator in applying IS in their works (Urban & von Hippel, 1988; Nambisan et al., 1999; Franke & Piller, 2004; Dong & Wu, 2015). Although some employees use the technological systems in a routine manner, others may utilize it more innovatively, bringing a significant effect on work outcomes (Nambisan et al., 1999; Wang et al., 2013; Wang et al., 2014; Roberts, Campbell, & Vijayarath, 2016; Huang et al., 2017).

To fill the voids in existing literature, this study focuses on the innovative IS use as the most prominent pattern of IS behavior. In the mandatory context of IS, the behavior patterns of users may significantly vary from the passive and routine use to the innovative utilization with strong implications to the individual job performance and efficiency of tasks (Wang et al., 2013; Wang et al., 2014; Lee et al., 2018). Highlighting the significance of the innovative IS use, this research proposes an integrative research model in the next section that not only analyses its impact on SQ efficacy but also investigates the predictive effect of proactivity, psychological empowerment, and self-learning on the innovative IS use.

III. Theory and Hypotheses

A. Innovative IS Use and SQ Efficacy

Although the earlier research of innovation studies understood innovative behavior as a job of a few, limited group of specialists, scientists, and R&D engineers who were specialized in technology development (Scott & Bruce, 1994; Dorenbosch et al., 2005), a growing view gains large academic support that organizations should develop and use the innovativeness of all the employees rather than those of specific expertise (Dorenbosch et al., 2005). This perspective led to the concept of on-the-job innovation and investigated a variety of innovative behaviors in a personal work domain (Dorenbosch et al., 2005). The advancement of innovative behavior research took the direction of diversification and specialization in the different organizational functions and industrial sectors. For instance, extant literature in service industries conceptualized the innovative service behaviors of frontline employees (Kim & Lee, 2013; Li and Hsu, 2016; Maria et al., 2017). It investigated the invention of new solutions and the introduction of novel ideas by service providers who try to improve service quality beyond the formal role requirements (Maria et al., 2017).

Adopting the research tradition, a growing number of researcher tries to understand the significance and predictors of employees' innovative IS use (Nambisan et al., 1999; Wang et al., 2013; Li et al., 2013; Wang et al., 2014; Roberts et al., 2016; Huang et al., 2017). The concept of innovative IS use adopts the idea that the users are not simple recipient of technologies but they can apply them innovatively to solve unknown problems in their tasks (Nambisan et al., 1999; Wang et al., 2013; Li et al., 2013; Wang et al., 2014; Roberts et al., 2016; Huang et al., 2017). The technological potentials are differently realized by the extent to which users apply the technologies innovatively in their daily work process (Wang et al., 2014).

Innovative IS use refers to the behavior of applying and advancing IS in innovative ways beyond what

the systems were originally designed to perform (Nambisan et al., 1999; Wang et al., 2013; Li et al., 2013; Roberts et al., 2016; Huang et al., 2017). It involves applying IS to works in novel patterns that were not recognized prior to the application of the systems to the tasks (Wang et al., 2014). Along with the novel systems use, the innovative IS use encompasses the behaviors of improving and devising systems functions by integrating technological knowledge with the business knowledge in work context (Urban & von Hippel, 1988; Nambisan et al., 1999; Franke & Piller, 2004; Dong and Wu, 2015). Beyond the simple adoption of default functions, the innovative users can devise new, novel features in the existing technology systems in their efforts to improve the work performance (Urban & von Hippel, 1988; Nambisan et al., 1999; Franke & Piller, 2004; Dong & Wu, 2015).

Development of innovative IS use involves the process of integrating two distinctive types of knowledge; one is context-free technological knowledge and the other is task knowledge specific to a firm (Nambisan et al., 1999). To perform tasks effectively, the users not only actively apply the general technological knowledge into their work process, but also try to modify and improve it to solve the firm-specific problems (Nambisan et al., 1999). The users can apply IS innovatively by combining technological capabilities and task knowledge to solve the problems that they face in the daily works (Nambisan et al., 1999).

Frontline employees' innovative IS use is related to their SQ efficacy as it enables them to generate effective solutions to the problems, perform services with high speed and accuracy, and keep satisfactory customer interactions. SQ efficacy refers to service providers' confidence in their capabilities, skills, and expertise to provide customer services effectively and satisfactorily (Lee, 2014). Integrating the concept of self-efficacy in organizational studies (Bandura, 1977; Gist & Mitchell, 1992) and insights from SQ studies (Parasuraman et al., 1985; Berry et al., 2006), the construct of SQ efficacy represents the service providers' self-conviction about the quality of service

they provide (Lee, 2014). Self-efficacy is the perception of one's own ability to complete a given task or achieve a goal, strongly affecting work motivation and job performance (Bandura, 1977; Gist & Mitchell, 1992; Hsieh & Huang, 2014). The SQ efficacy of frontline employees encompasses both functional and interactive dimensions (Lee, 2014). While the functional SQ efficacy is associated with the accuracy, productivity, and credibility of service that frontline employees provide to customers (Lee, 2014), the interactive SQ efficacy is mainly concerned with the service customization, control of emotions, and building the long-term personal relationships with customers. Given the performance effect of technological systems in service process, the frontline employees innovative IS use is positively related to their self-confidence on the quality of service that they provide. Thus, it is predicted that the innovative IS use could enhance the SQ efficacy of frontline employees in hotels.

H1: The innovative IS use has a positive effect on the frontline employees' service quality efficacy.

B. Proactivity and Innovative IS Use

As a significant personal level predictor of innovative IS use, this research focuses on the proactive personality of frontline employees. The personal dispositions are deeply related to the patterns of IS use (Thatcher & Perrewe, 2002; McElroy et al., 2007) and proactive personality has a significant implication to the innovative IS use of frontline employees. Proactivity refers to a set of personal traits and attitudes that challenge the status quo and take initiatives to improve current conditions or to create new ones, rather than passively adapt to the present circumstances (Bateman & Crant, 1999, Crant, 2000; Seibert et al., 2001; Parker et al., 2006; Grant & Ashford, 2008; Fuller et al., 2012). Different from the traditional conceptualization that views employees as passive recipients of the reinforcement and stimuli provided by organizations, a proactive conceptualization of human behavior regards employees as agents of change and reform (Grant & Ashford, 2008). The

proactive concept presumes that employees are drivers of change in their work and their organizations, as they seek to achieve their personal and organizational goals (Bateman & Crant, 1999; Crant, 2000).

A process conceptualization of proactivity expects that proactive employees anticipate a future event and plan concrete behaviors for different phases of the action process (Gong, Cheung, Wang, & Huang, 2012; Grant & Ashford, 2008). Anticipating involves imagining possible futures and the benefits and costs brought by those futures. Planning represents preparation for a specific action so that the anticipated visions are realized into the desired situation (Grant & Ashford, 2008). Proactive employees evaluate the effects of their actions in advance. They plan and act to seize favorable opportunities while preventing undesirable ones (Grant & Ashford, 2008; Gong et al., 2012). The process of proactive planning for future events includes active feedback seeking and accumulation of information resources to ensure personal goal achievement (Grant & Ashford, 2008; Gong et al., 2012).

The proactive frontline employee may use IS more innovatively in their service process as they are actively engaged in activities of changing current work conditions to better ones (Taştan, 2013). Innovative IS use depends on both users' technological knowledge and personal motivation to innovate (Nambisan et al., 1999; Wang et al., 2014; Huang et al., 2017). The employees have diverging purpose and attitudes in their use of technological systems, which differently shape the innovative IS use in their service delivery process. The personal willingness to identify and explore new technological features is the essential driver of the innovative IS use (Nambisan et al., 1999). Proactive frontline employees initiate an action for improving the situation, rather than accept it, and try to find new technological features, novel applications, and creative integration of technological and task knowledge (Taştan, 2013). Thus, it is predictable that proactive personality is positively related to the innovative IS use of frontline employees.

H2: The proactivity has a positive effect on the innovative IS use of frontline employees.

C. Psychological Empowerment and Innovative IS Use

As an organizational condition to foster frontline employees' innovative IS use, this study analyses the influence of psychological empowerment. Psychological empowerment means the employees' perception about the extent to which they take initiative and make a personal judgment to perform their work (Spreitzer, 1995; Hornung & Rousseau, 2007; Chiang & Hsieh, 2012). Having a strong implication to the work attitudes of employees, psychological empowerment involves a set of cognitions about meaning, competence, autonomy, and impact and these cognitions are shaped by a specific work environment (Spreitzer, 1995). Autonomy facilitates employees to accept work responsibility and accountability and helps them take more active behavior attitudes (Hornung & Rousseau, 2007). Empowered employees develop self-learning behaviors, enhance intrinsic motivation in work activity, and are more resilient in the face of adversity (Hornung & Rousseau, 2007; Spreitzer, 1995). With strong concentration, autonomy, and resiliency, the empowered employees perform their job proactively and innovatively (Spreitzer, 1995).

Psychological empowerment can have a significant influence on the innovative IS use of frontline employees as it can encourage service providers to exercise initiatives and generate innovations to meet customer needs (Chow et al., 2006). Self-determination allows employees to take initiatives not only in learning technological functions and features, but also in applying them in novel ways to improve service performance. The learning behaviors enable users to acquire the IS knowledge and ability which serve as cognitive and physical resources crucial for innovative IS use (Huang et al., 2017; Wang et al., 2014; Nambisan et al., 1999). Empowerment gives the discretion to control the crucial work-related issues and apply creative solutions to the emergent problems in the systems operations. Empowered frontline employees can actively experiment with a novel way of using technological functions and features in service delivery process, while developing personal

resilience against the errors and failures prevalent in any innovative attempts. Thus, it is predictable that psychological empowerment has a positive effect on the innovative IS use of frontline employees.

H3: The psychological empowerment has a positive effect on the innovative IS use of frontline employees.

D. Mediation Effects of Self-learning

As an effort to identify the path connecting the personal dispositions and organizational conditions to the innovative IS use, this research focuses on the self-learning behavior of frontline employees. Self-learning refers to self-planned, executed, and evaluated behaviors for attaining the IS knowledge and skills needed to achieve job-related goals (Wang et al., 2014; Mayeh, Ramayah, & Mishra, 2016; Gnewuch et al., 2016). Because of the complexity of IS and the ongoing emergence of powerful and integrative applications, IS learning is important even after the initial implantation of the system (Wang et al., 2014; Mayeh et al., 2016; Gnewuch et al., 2016). Being deeply associated with individual absorptive capacity (Wang et al., 2014; Mayeh et al., 2016), IS learning is self-initiated learning intended to improve personal knowledge of an IS to ensure its effective use. In daily work processes, employees can learn IS independently by experimenting with it, exploring previously unused functions, and reading about a system's technological features in manuals (Gnewuch et al., 2016).

According to the feature-centric view of the technology, system features are the functional building blocks of IT, corresponding to the tasks that the technology is intended to support and perform (Jaspersion et al., 2005; Sun, 2012). Given that system features are functional components of the technology, some features reflect the core of the technology while others are optional (Jaspersion et al., 2005). IS learning encourages employees to develop a unique collection of system features in which they use a particular set to accomplish tasks (Jaspersion et al., 2005; Sun,

2012; Wang et al., 2014). System features that do not belong to the personal collection are unfamiliar and unknown. Therefore, the scope of the system features that an employee could use defines user's understanding of the IS (Sun, 2012).

On the one hand, the proactive personality drives frontline employees to acquire knowledge regarding technological features and functions and the accumulated knowledge plays a crucial role of advancing the innovative use of the technological systems. Employees' ongoing learning about IS not only enhances perceived ease of system use (Mayeh et al., 2016), but also promotes innovation. Proactive frontline employees are actively engaged in self-learning behavior and it helps them apply IS in novel ways when performing their work tasks (Wang et al., 2014).

On the other hand, the psychological empowerment builds up an organizational condition which gives frontline employees autonomy to take initiatives in learning technological knowledge and their mastery of an IS's technological features help them explore alternative functions to replace current features with superior ones (Sun, 2012). The strongly empowered employees could not only actively acquire technological knowledge and skills crucial for the individual task requirements and the accumulated technological ability allows employees to exploit and extend the potential benefits attainable from IS (Jasperson et al., 2005; Sun, 2012). Thus, it is predictable that frontline employees' self-learning behaviors mediate the relationship both between the proactivity and innovative IS use and the psychological empowerment and innovative IS use.

H4: Self-learning mediates the relationship between proactivity and innovative IS use of frontline employees.

H5: Self-learning mediates the relationship between psychological empowerment and innovative IS use of frontline employees.

IV. Methodology

A. Research Context

For an empirical test of the research hypotheses, this study performed a survey of employees in front offices of luxury hotels. The service providers in the front offices are the core personnel who interact face-to-face with guests, deal with their every request, and connect them to the relevant personnel in the hotel. The front office employees help guests register, and arrange for their stay. The front office is the main hub for managing customer services because not only is it the key service point with which the guests have their first and last interactions, but it also centralizes all the information required for satisfactory customer services (Bardi, 2011). From the customers' perspective, front offices are the most visible part of hotels, which may have a detrimental impact on the hotels' first image and ultimately the perceived quality of service. The service providers in the front offices play a key role in ensuring that the guests perceive hospitality and respect in their treatment and that they receive full value beyond their expectations.

From the operational perspective of the hotels, front offices take on the responsibility of communication within the hotel as the hub of guest services and most departments in the hotel transfer information through them. When front offices fail to play their role, they bear the responsibility of the unhappiness of the guests during checkout (Bardi, 2011). In hotels, IS are deeply integrated into the everyday operation of front offices and employees' IS use is an indispensable element of customer service (Bardi, 2011). Effective use of IS in luxury hotels helps in learning about guests' preferences, behaviors, and trend changes in order to customize services (Connolly, 2000). For instance, the property management system (PMS), which connects all important operations in hotels, such as reservation, registration, room status, housekeeping, and marketing and sales, is a back-bone of the hotel service process (Bardi, 2011). For front office employees to perform services properly, they

should be trained to use the PMS skillfully according to the guidelines and policies of the individual hotels.

B. Interviews, Data Collection, and Samples

For an empirical analysis of the research model, this study adopted a mixed methodology in which the quantitative approach was complemented by qualitative methods (Tashakkori & Creswell, 2007). The mixed methods refer to the research in which the researchers collect and analyze data, integrate the findings, and draw inferences by combining both qualitative and quantitative approaches in a single study (Tashakkori & Creswell, 2007). Because of the limited previous research on the innovative IS behavior in hotel context, we conducted preliminary interviews with eight managers in six hotels in Seoul, Korea before the survey of front office employees. With the goal of gaining first-hand information about IS-related behaviors of hotel employees, we interviewed not only the frontline employees who are directly involved in use the system but also managers who supervise the IS users. The list of question includes the information about 1)the general technological features and major functions of IS in front offices, 2)the different attitudes and skill of IS use among employees and the characteristics of innovative IS users in comparison to the routine users, 3)influence of the effective and innovative IS use on the job performance, service quality, and customer satisfaction, and 4)the influence of the organizational factors, such

as internal training, informal mentoring, and knowledge-sharing, on the IS behaviors. The insights from interviews were reflected in theoretical discussions, refining constructs, and improving measurements.

The survey of this research relied on the collaboration of the managers of front offices in 17 hotels in Seoul and five other provinces in Korea. After gaining the prior consent of supervisors, we performed a survey of the frontline employees who use PMS, such as front-desk staff, concierges, reservation staff, and guest relation officers. This research distributed 227 questionnaires by way of 24 managers and related staff and gained 189 responses (an 83.3% response rate) during the period from July 2016 to January 2017.

The sample’ profile characteristics are shown in Table 1. Regarding the gender, male employees accounted for 39.2 percent and females 60.8 percent. With respect to the age distribution, 26-30 for 47.6 percent and 31-35 for 26.5 percent, accounting for the largest share. Regarding the level of education, staff with a 4-year college degree accounted for the largest share of 77.8 percent. Regarding the tenure, the employees with less than 5 years accounted for the largest share of 75.1 percent.

C. Measurement

To measure the innovative IS use this study not only adopted existing questionnaire items (Wang et al., 2014), but also modified them to fit into hotel

Table 1. Sample profile

Characteristics		N	%	Characteristics		N	%
Gender	Male staff	74	39.2	Education level	High school	6	3.2
	Female staff	115	60.8		2-years of college	31	16.4
Age	20 - 25 years	29	15.3		4-years of college	147	77.8
	26 - 30 years	90	47.6	Master’s and above	5	2.6	
	31- 35 years	50	26.5	Tenure	1 - 4 years	142	75.1
	36 - 40 years	15	7.9		5 - 9 years	36	19.0
	41 - 45 years	3	1.6		10-15 years	9	4.8
46 - 50 years	2	1.1	Over than 15 years		2	1.1	

context based on the insights from the interviews made with the hotels' frontline employees. Questionnaire items asked respondents to assess applications of new technological functions, identification, and development

of new and novel usage (Wang et al., 2014), sharing new usage with other organizational members, and their idea acceptance in the organization and by peers (Table 2). According to the interview a concierge

Table 2. Construct measurement

Measurement	SFL	α /CR/AVE
<i>Proactivity</i>		.94/.95/.74
To improve performance, I often perform the tasks beyond the usual boundaries of my work.	.85	
Whenever I have been, I have been a powerful force for constructive change.	.88	
If I see something I don't like, I fix it.	.90	
I feel great pleasure when the ideas I proposed turn into reality.	.85	
I am constantly on the lookout for new ways to improve my life.	.84	
I am always looking for better ways to do things.	.86	
I love being a champion for my ideas, even against others' opposition.	.83	
<i>Psychological Empowerment</i>		.94/.95/.80
I have significant autonomy in determining how I do my job.	.89	
I can decide on my own how to go about doing my work.	.89	
I have considerable opportunity for independence and freedom in how I do my job.	.90	
I have a great deal of control over what happens in my team.	.91	
I have significant influence over what happens in my team.	.89	
<i>Self-learning</i>		.92/.94/.78
I research, on my own initiative, in order to increase my knowledge about IS.	.84	
On my own initiative, I explored several information sources concerning IS.	.90	
I communicate relevant IS knowledge with peers in order to better understand how to use IS.	.88	
I thoroughly maintain relevant IS knowledge over time.	.89	
I store new IS knowledge for future reference.	.88	
<i>Innovative IS Behavior</i>		.92/.94/.69
I always apply new IS functions whenever I find them.	.79	
I often find new ways of using the IS that can improve my work performance.	.82	
I have my own novel ways of using IS functions to support my work.	.86	
I often develop new ways of using IS functions to support my work.	.84	
I often suggest ideas for improving IS usage to supervisor and co-workers.	.87	
My ideas for improving IS functions are often accepted in the hotel.	.85	
My ideas for improving IS functions are often accepted by co-workers.	.79	
<i>Service quality efficacy</i>		.91/.93/.71
I possess the task capabilities needed to deliver excellent customer services.	.83	
I can accurately provide the service in accordance with customers' needs.	.80	
Customers assign a high credibility to my service.	.82	
During service delivery, I can properly respond to customers' emotional conditions.	.84	
During service delivery, I can accurately respond to customers' needs.	.86	
I can maintain long-term relationships with customers.	.88	

Note: AVE (average variance extracted), CR (composite reliability), SFL (standardized factor loading).

manager in a global franchised hotel (February 1, 2016), the innovative IS users are the early adopter of new software and technical functions, the proactive learner who actively study technological functions and apply them in their tasks to improve work performance and service quality, and the promotor who tries to share the software knowledge with others. In particular, as the frontline employees should share customer information and task conditions together through the systems for effective service operation, the innovative IS users are actively involved in instructing and mentoring their peers and supervisors to adopt the same technology and functions. Given the significance of the collective use of the systems, this paper reflected the insights by adding the questionnaire items, such as “I often suggest ideas for improving IS usage to supervisor and co-workers.” Furthermore, as the evaluation of users’ innovativeness in IS use can be more accurately achieved by the third-party reactions than respondents’ self-perception, this paper developed measurement item of “My ideas for improving IS functions are often accepted in the hotel,” and “My ideas for improving IS functions are often accepted by co-workers.”

As a dependent variable of innovative IS use, this research focused on the SQ efficacy of frontline employees and the measurement includes not only functional aspects of task capabilities, service accuracy, and customer credibility, but also interactional dimensions of responding customer emotions, needs, and maintain long-term relationships (Lee, 2014).

As an individual predictor of innovative IS use, this research focused on the proactivity and adopted questionnaire items from existing studies (Fuller et al., 2006; Seibert et al., 2001). The respondents were asked to evaluate improvement efforts toward the job performance and life, the power for idea realization and constructive change, and the will to change situations.

As an organizational condition to facilitate innovative IS use, this research focused on the psychological empowerment and adopted measurements from existing literature (Spreitzer, 1995). It asked respondents to evaluate their self-discretion, freedom, and control

of the job and influence in the team.

This research focused on the self-learning as mediator variable links between predictors and innovative IS use and it drew the questionnaire items from an existing study (Wang et al., 2014) and modified them for the hotel context. Although the original research evaluated various behaviors related to absorbing IS knowledge, this study selectively adopted questionnaire items with a strong emphasis on self-initiated learning. It asked respondents to assess their self-initiated study of IS knowledge, searching information sources about IS, knowledge sharing with peers, and the continuous maintenance and follow-up of new IS knowledge.

Finally, as control variable, this research input gender, tenure, and education level of employees as they can have a certain level of effect on the key variables. For gender, it input a dummy variable of 0 for male staff and 1 for female staff. For the age, it input 1 for 20-25 years, 2 for 26-30 years, 3 for 31-35 years, 4 for 36 to 40 years, 5 for 41 to 45 years, and 6 for 46 to 50 years. For the education level, 1 for high school graduate, 2 for 2 years of college, 3 for 4 years of college, 4 for the master’s or higher degree, respectively.

V. Analysis and Results

For an empirical analysis of the research model, this study adopted a two-step approach to the statistical analysis of the survey data (Lee, 2017). The first approach assessed the reliability and validity of the construct measurements and the second approach performed a path analysis to confirm the hypotheses proposed in the research model by adopting PLS-SEM. The analysis function of PLS-SEM assesses research models by performing a series of ordinary least squares (OLS) regressions with a relaxed assumption of the normal distribution (Hair, Sarstedt, Ringle, & Mena, 2012). One of the most notable characteristics of PLS-SEM is that the statistical method is very

useful and effective for small samples (e.g., samples with less than 100 observations) as it allows researchers to test the exploratory relationships with high predictive accuracy (Hair et al., 2012).

A. Data Analysis

To confirm the reliability of the measurements, this study calculated Cronbach’s α of measurements and they ranged from .91 to .94, all higher than the threshold level of .7 (Table 2). The standardized factor loadings of construct ranged from .79 to .90 and the composite reliabilities (CR) were between .93 and .95, all exceeding the cut-off level of .70. All these statistics strongly support the reliability of the measurement model.

With respect to the confirmation of the convergent and discriminant validity of a measurement, this study calculated the average variance extracted (AVE) of constructs (Hair et al., 2012). The convergent validity was confirmed by the fact that the AVEs of the constructs ranged from .69 and .80, all higher the cut-off level of .5. Furthermore, the confirmation of discriminant validity requires that “the AVEs for each construct should be higher than the squared correlation between the construct and any of the other constructs” (Fornell & Larcker, 1981). As shown in Table 3, the highest correlation between the key variables was .75, and its squared correlation was smaller than the lowest value of the AVEs (Table

2), showing that the measurement model upholds the desired discriminant validity.

B. Path Analysis

Descriptive statistics and correlations of the variables are shown in Table 3 and the analysis results show that the correlations among the major variables are positive and significant. Regarding the personal outcome of innovative IS use, this study expected in H1 that frontline employees’ innovative IS use could enhance the SQ efficacy. The analysis result supports the prediction by showing that innovative IS use has a positive and significant effect on the SQ efficacy (A: $\beta = .62$, $p < 0.001$) (Table 4).

With respect to the dispositional predictor of innovative IS use, this research predicted in H2 that the proactive personality leads to the innovative IS. The statistical analysis supports the prediction and shows that proactivity of frontline employees has a positive and significant impact on the innovative IS use (B: $\beta = .44$, $p < 0.001$). Regarding the organizational variable, this study expected in H3 that the psychological empowerment could promote the innovative IS use. The analysis results support the expectation by presenting that the psychological empowerment has a positive and significant influence on the innovative IS use of frontline employees (B: $\beta = .30$, $p < 0.001$).

As an effort to elucidate the path of how predictor

Table 3. Descriptive statistics and correlations

Variable	Means	S.D.	1	2	3	4	5	6	7
1. Gender	1.61	.48							
2. Tenure	1.32	.61	-.16*						
3. Education	2.80	.52	.04	.13					
4. Proactivity	4.87	1.06	-.12	.29**	.07				
5. P-Empowerment	4.33	1.24	-.21**	.37**	.16*	.65**			
6. Self-learning	4.70	1.15	-.10	.22**	.12	.59**	.51**		
7. Innovative IS use	4.82	1.32	-.16*	.22**	.07	.64**	.60**	.75**	
8. SQ efficacy	4.94	.97	-.09	.36**	.13	.75**	.63**	.69**	.65**

* $p < 0.05$, ** $p < 0.01$

variables lead to innovative IS use, this study suggested the mediation effect of frontline employees' self-learning behavior in H4 and H5. In general, the test of mediation effect starts with confirming a significant direct effect from the predictor variable to the dependent variable as there is no relationship to mediate without a significant direct influence (Baron and Kenny, 1986). After the confirmation of direct effect, the evaluation of the mediation effect calculates the coefficient of an indirect (mediation) effect and Sobel's z-test in order to confirm the statistical significance of the indirect effect.

First, as shown above, this study confirmed the direct effects of the proactive personality and psychological empowerment on the innovative IS use in H2 and H3 (Table 4). Second, the analysis results confirm the mediation effect in H4 by showing that proactivity has a positive and significant effect on self-learning ($C: \beta = .46, p < 0.001$) and the self-learning is positively and significantly related to innovative IS use ($C: \beta = .55, p < 0.001$) (Figure 1). Furthermore, the calculation of the mediation

effect showed that the standardized indirect coefficient of self-learning between proactivity and innovative IS use is 0.25 with Sobel's z score of 4.89 ($p < 0.001$). The proportion mediation measure, or variance account for (VAF), obtained by dividing the indirect effect by the total effect (VanderWeele, 2016) was 58.42%, indicating the partial mediation effect.

Third, the statistical analysis supports the mediation effect in H5 as it shows that psychological empowerment is positively and significantly related to self-learning ($C: \beta = .19, p < 0.05$) and self-learning has a positive and significant impact on innovative IS use ($C: \beta = .55, p < 0.001$) (Figure 1). In addition, the analysis of mediation effect presented that the standardized indirect coefficient of self-learning between psychological empowerment and innovative IS use is 0.10 with Sobel's z score of 2.31 ($p < 0.05$). The proportion mediation measure accounted for 35.37% of the relationship, showing the partial mediation effect. All these results support the mediation effects of self-learning in the relationship between the personal and organizational variables and innovative IS use

Table 4. Analysis results

	Consequence (A)		Direct model (B)		Mediation Model(C)			
	SQ efficacy		Innovative IS use		Self-learning		Innovative IS use	
	Coefficient	T-Statistics (P-value)	Coefficient	T-Statistics (P-value)	Coefficient	T-Statistics (P-value)	Coefficient	T-Statistics (P-value)
Gender	.04	.80 (.425)	-.04	.84 (.403)	.08	.07 (.944)	-.04	1.07 (.287)
Tenure	.22***	4.54 (.000)	-.02	.57 (.570)	.00	.15 (.881)	.00	.69 (.492)
Education	.05	1.07 (.287)	.00	.11 (.913)	.07	1.83 (.070)	-.03	.91 (.365)
Proactivity			.44***	6.98 (.000)	.46***	6.00 (.000)	.18***	3.03 (.000)
Psychological empowerment			.30***	4.51 (.000)	.19*	2.41 (.018)	.19***	3.78 (.000)
Self-learning							.55***	8.32 (.000)
Innovative IS use	.62***	15.38 (.000)						
R ²	.503		.472		.390		.651	

Note: * $p < 0.05$, ** $p < .01$, *** $p < .001$

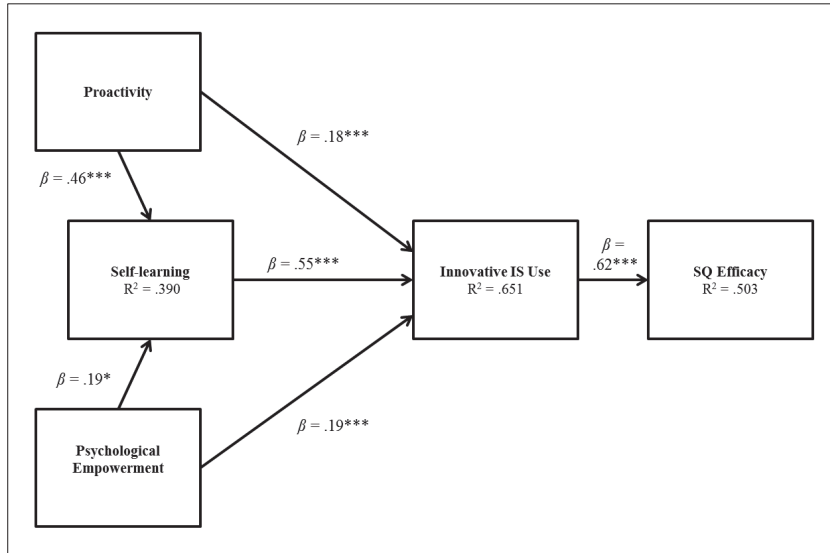


Figure 1. Analysis result of indirect effect

of frontline employees.

VI. Discussion and Conclusion

Although the TAM has made substantial contributions to understanding users' IS adoption in the early implementation phase where the systems use was voluntary (Davis, 1989; Legris et al., 2003; Lam, et al., 2007; Huh et al., 2009; Turner et al., 2010), it faces large limitations as technological development entered into the phase where the IS use is indispensable (Sørebø & Eikebrokk, 2008; Hsieh et al., 2012; Laumer et al., 2016). Reflecting the change, researchers have urged the necessity of deepening our understanding of the post-adoptive behaviors in the context where IS use is mandated (Jasperson et al., 2005; Hsieh et al., 2012; Sun, 2012; Li, Hsieh, & Rai, 2013; Maruping & Magni, 2015). Understanding it as one of the most prominent patterns of post-adoptive behavior, this research focused on the innovative IS use. This research proposed an integrative model that analyses the predictors and consequence of the innovative IS use and tested the model based

on the survey of hotels' frontline employees. The research results have following theoretical and practical implications.

A. Theoretical Implication

First, to understand the potential positive outcome of innovative IS use, this research focused on the SQ efficacy of frontline employees in hotels. Although existing literature emphasized the innovative use (Huang et al., 2017; Wang et al., 2014), it lacked the discussion about the specific consequence that the users can achieve from their innovative applications of IS. Addressing the limitation, this research suggested that the innovative IS applications can enhance users' self-confidence in their work performance. The research result shows that the frontline employees' innovative IS use could improve the efficiency of their service process and enable them to make effective interactions with customers, all of which lead to the strong self-conviction on their service quality.

Second, as a personal level predictor, existing studies stressed the importance of personal absorptive capacity as a key driver (Huang et al., 2017; Wang et al., 2014), this study elucidates a more fundamental

dimension of personal characteristics by focusing on the proactive personality of users. The personal dispositions constitute a fundamental base upon which the individual patterns of IS use grow and develop (Thatcher & Perrewe, 2002; McElroy et al., 2007). The personal willingness to explore new technological features is the fundamental driver of innovative IS applications (Nambisan et al., 1999) and the proactive IS users pursue challenging the status quo and taking initiatives to innovate technological conditions and applications to improve their work. This result replicates the insight of existing literature stressing the importance of personal disposition in predicting innovative behaviors.

Third, with respect to the organizational condition, this research investigated the positive influence of psychological empowerment on the innovative IS use. The organizational condition plays the role of encouraging some behaviors while constraining others. The organizational environment of empowerment promotes employees to actively acquire IS knowledge and gives them discretion to control and experiment with the novel ways of applying IS functions. The empowerment plays a significant role in providing users with the self-determination to use the IS innovatively, while developing personal resilience against the errors and failures unavoidable in innovative initiatives. The analysis result highlights the significance of organizational conditions and environments in the shaping of individual innovations.

Fourth, and finally, this research showed the mediation effect of self-learning that links the personal and organizational variables to innovative IS use. The mediation effect of self-learning not only replicates the finding of existing literature, but also advances the perspective in the consideration of personal and organizational characteristics. The mediatory role of self-learning is deeply associated with the existing studies that emphasized the positive influence of absorptive capacity (Huang et al., 2017; Wang et al., 2014), as they commonly suggest the importance of acquiring technological knowledge for innovative IS applications. Furthermore, the research model of this study advances existing understanding

by showing a new insight that the personal learning behavior and capability, the driver of innovative use, are under the strong influence of the personal dispositions as well as the organizational conditions.

B. Practical Implication

One of the most significant practical implications of this research is to suggest the importance of innovative IS use as it fortifies the employees' self-conviction on their capability in providing high-quality services and achieving high work performance. This research advises management that the employees' innovative IS applications could enhance their service efficiency and improve the quality of customer services. Furthermore, this research also highlights the importance of learning activities of employees to promote innovative IS use as it helps them to absorb useful technological knowledge and information crucial for applying technologies and systems innovatively. This result gives a lesson to management that it needs to devise organizational rules and support systems to encourage employees to learn and acquire the IS knowledge and training consistently.

C. Limitation and Future Research

Despite the new approach and novel insights, this research has several limitations. First, this research made a multi-level approach by considering both personal and organizational conditions to explain the innovative IS use. To deepen our understanding of the relationship among diverse variables, future research may consider the interaction effects between the dispositional variables and the organizational conditions in explaining the innovative user behaviors. Second, although this paper adopted and modified the existing measurements to evaluate the innovative IS behavior, future research will rely on a more formal approach to measure development and evaluation (Narasimhan & Das, 2001; Lewis et al., 2015). The structured approach of measurement development

includes 1) domain delineation, 2) clarification of the internal structure by Q-sort, 3) achieving consensus on the criteria priorities, 4) development of the rating criteria, and 5) test and retest of reliability (Lewis et al., 2015). Third, and finally, the empirical analysis of this research was made in the front offices of luxury hotels in Korea and the improvement of external validity in future studies needs diversifying the national and industrial contexts of empirical research.

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