



# Investigating Employee and Customer Perceptions on ICT Utilization: CRM and Policy Implications

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## Abstract

**Purpose:** The purpose of this study is to analyze factors affected by the ICT utilization with perspectives of employees (Study 1) and customers (Study 2) that are rarely approached in previous studies. In particular, this study examined how proposed factors on ICT utilization affect employee satisfaction, organization performance, customer satisfaction, and purchasing decision making. **Research design, data and methodology:** This study conducted an online survey to measure the effects. Cronbach's alpha was applied to test reliability and factor analysis was applied to check validity. Multiple regression analysis and ANOVA were applied to test hypotheses. **Results:** The results of this study found that the effects of self-development and organizational innovation on employee satisfaction were significant for study 1, while the effects of product satisfaction, promotional offers, and customer communication on purchase decision making were significant for study 2. **Conclusions:** This study provides managerial and policy implications. At the management level, it is necessary to make specific strategies to improve employee and customer satisfaction and organization performance associated with the utilization of ICT. The results of this study suggest that better policy should be prepared by government to foster utilization of ICT infrastructure and to enhance better relationships with employees and customers.

**Keywords:** ICT, Employee Satisfaction, Organizational Performance, Customer Satisfaction, Purchase Decision Making

**JEL Classification Code:** M30, M10, M28

## 1. Introduction

Information and Communications Technologies (ICT) play a pivotal role in strengthening national competitiveness and economic growth in the era of 4<sup>th</sup> Industrial Revolution. ICT covers wide range of the infrastructure and devices including data management, networking, Artificial Intelligence (AI), big data, Internet of Things (IoT), and others that are interconnected technologies and equipment fostering digital transformation. According to UN digital economy report, Guterres (2017) addressed benefits of digitalization that reach all people and proposes ways to reduce inequality of the international community.

Innovative business processes using ICT such as Supply Chain Management (SCM), Customer Relationship Management (CRM), and Knowledge Management (KM) have been supporting the decision-making of enterprises (Fulantelli & Allegra, 2003). Several studies also highlighted the relationship between ICT and economic growth. Avgerou (2003) pointed out that successful economies have applied advanced technologies and are better prepared by using ICT to develop their competitive advantage. Matei and Savulescu (2012) also observed that ICT plays a key role in the growth and competitiveness of countries by analyzing results from the ICT sectors. Jin and Cho (2015) empirically verified that ICT capacity has a significant effect on economic development, while analysis of the impact of ICT on economic growth should be considered along with other determinants such as socio-economic factors including national transparency, management of consumer inflation, and human capital. According to Chrisanthi (2003), more successful economies apply advanced technologies and are better prepared for using ICT to develop their competitive advantage. Colecchia

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and Schreyer (2002) analyzed that ICT diffusion has played a vital role in the economic development of selected OECD countries, including the U.S, Australia, Canada, Finland, and France. This helps explain why many countries have established ICT policies and invested aggressively for the development of the ICT sector.

Korea is one of the countries that invested in ICT aggressively. As a result, Korea was ranked sixteenth among 34 countries in ICT investment relative to GDP in 2017 (OECD, 2020). Moreover, the Korean government announced an investment plan for the Digital New Deal project, which included creating industrial convergence with data, network, and AI, promoting services and industries in the era of COVID-19, and developing digital education infrastructure, cities, logistics, and across the country whereby Korea could greatly transform into a digitized nation (Ministry of Economy and Finance, 2020).

Given the government ICT policy and investments, it might be essential to understand how people perceive and utilize ICT and analyze its effectiveness. However, there is lack of research in investigating individual perceptions toward ICT utilization. Therefore, the purpose of this study is to analyze the impact of ICT on both perceived work and consumption via digital transformation that plays an important role in the national economy. By considering both sides of production and consumption, this study investigated effects of ICT utilization on both perspectives of employees (Study 1) and customers (Study 2). This study investigated both aspects, employees' perspective and customers' perspective, since synergy effects of them will eventually affect the economic growth and competitiveness that are particularly related to ICT utilization. Previous studies rarely examined both sides of perspectives. Therefore, by examining both perspectives on ICT utilization, this study filled the gap in research academically. Practically, this study provides managerial implications on necessity of better relationship with employees and customers in regards to ICT utilization. This study also provides policy implications by highlighting the government's role in promoting the utilization of ICT, fostering better applications, and building proper policies.

Study 1 examined the following research questions: i) how do the effects of factors such as work efficiency, self-management, knowledge sharing, self-development, and organizational innovation on employee satisfaction and organizational performance?; ii) how do the effects of employee satisfaction affect organizational performance?; and iii) how do the effects of organizational performance affect employee satisfaction? Study 2 investigated the following research questions: i) how does the effects of factors such as purchase efficiency, product satisfaction, promotional offers, customer communication, and after-

sales service affect customer satisfaction and purchase decision making?; ii) how do the effects of customer satisfaction affect purchase decision making?; and iii) how do the effects of purchase decision making affect customer satisfaction?

## 2. Literature Review

### 2.1. Information and Communications Technology (ICT)

ICT is created by combining two forms of technology: Information Technology (IT) and Communication Technology (CT), which cover all the software and hardware technologies needed to manage and operate information for communication, and utilize information through collecting, producing, processing and preserving (Kim, 2019). According to the United Nations (2004), the ICT sector is referred to as equipment and services related to broadcasting, computing and telecommunications, all of which capture and display information electronically. ICT also affected modern society and played a significant role in leading economic development and fostering socio-economic progress (Apostol, 2011; Dimelis & Papaioannou, 2011). Thomas (2003) stated that ICT technologies are central factors for improving the competitiveness and productivity of an enterprise. There has also been evidence of the relationship between the companies' growth and ICT, implying that economic progress has been strongly correlated with ICT (Vassilios, Maya, & Georgios, 2003). Therefore, every government constantly struggled with economic development in ICT and paid significant attention to promote the ICT industry (Dobrota, Jeremic, & Markovic, 2012).

There are several studies on ICT and U.S.' economic growth. Previous studies analyzed that ICT has a positive effect on labor productivity (Jorgenson, Ho, & Stiroh, 2002; Oliner & Sichel, 2000). Cronin, Parker, Colleran, and Gold (1991) showed that IT investments have a positive impact on economic activities. There is also a comparative study of ICT and economic growth between the U.S. and major EU countries. A comparative study of manufacturing industries in the U.S. and the U.K. stated that ICT capital and output growth are positively related, and the reason the U.S. records higher growth than the U.K. was the differences in the conception or importance of ICT (Dimelis & Papaioannou, 2011; O'Mahony & Vecchi, 2005). Dahl, Kongsted, and Sørensen (2011) argued in their study that there is a positive relationship between ICT capital and output growth.

Previous studies also examined the effects of ICT investment, infrastructure, and economic activities in other countries rather than the U.S. and EU countries. Veeramacheni, Vogel, and Ekanayake (2008) proved

that India's telecommunication infrastructure promoted economic activity. Shiu and Lam (2008) showed that China's telecommunication intensity positively impacts economic growth. Hossein and Yazdan (2012) observed that Iran's economic development had been affected by ICT investment. Yoo and Kwak (2004) carried out an analysis showing a positive relationship between ICT investment and economic development in Korea. Chung (2020) analyzed that the Korean government's role, which include leadership, clear vision and policy goals, were important factors that contributed to Korea's successful transformation into an ICT society. Government driven policies have played a positive role in fostering a favorable environment for the development and diffusion of the ICT field in Korea, that not only boost investment, but also enable cultural characteristics which regard efficiency, speed, self-efficacy and subjective norms as important (Lee, 2003). Yeo, Kim, Bae, and Kim (2020) analyzed Korea's ICT policy during the period of 1960-2008 and recommended that future ICT policies should be decentralized to a local level and more dependent on private enterprises.

## 2.2. ICT for Employees

Smart work by ICT was formerly defined as a tendency to implement tasks cleverly and ingeniously (Coad, 1996). As technology advances, however, smart work refers to the use of ICT in order to organize works and undertake duties regardless of time and place (Eom, Choi, & Sung, 2014; Lee & Kim, 2010). According to Ko, Kim, and Kim (2021), ICT based smart work helped to increase operational efficiency and business competitiveness, therefore, many corporations have tried to apply smart-work framework into their business. ICT has been considered as an important factor that increases productivity especially when investing into R&D, organization assets, and employees (Brynjolfsson & Hitt, 2003). Tusubira and Mulira (2004) also found that using ICT enables to operate more efficiency, reduce cost, and increase competitiveness at workplace. For example, employees can easily share their working know-how, skills, and knowledge with co-workers (Dewett & Jones, 2001) and improve capability to solve problems by using ICT (Morgan, Morgan, & Hall, 2000). Internet which is commonly used ICT in workplace allowed employees for making the foundation of an inspiring work environment that positively influences job motivations that share the preferences of their firm (Martin, 2011). The positive experiences of ICT are enabling to work not only in the office but also at home and increasing productivity and efficiency by using ICT devices (Cardona, Kretschmer, & Strobel, 2013), and these findings are supported by numerous researchers (Kamaruzzaman, Salled, Zawawi, & Ali, 2010; Tusubira & Mulira, 2004). CRM and SCM

helped employees by improving system efficiency and interactivity. While there are numerous benefits, some previous studies also emphasized concern related to adoption of ICT (Kakabadse, Porter, & Vance, 2007). Chesley (2005) analyzed that using ICT devices might promote the connection between work and employees beyond usual working hours. Advanced technologies like ICT have been used to push employees to increase productivity and link with any time with work, while it has influenced their behavior and psychological reactions (O'Driscoll, Brough, Timms, & Sawang, 2010). As a result, the separation line between work and personal time became blurred with increasing work demands and higher stress (Carrol, Howard, Vetere, Peck, & Murphy, 2002).

## 2.3. ICT for Customers

ICT including e-commerce helped improve a company's competitiveness and efficiency, while it also provide numerous benefits to customers (Gajewska & Zimon, 2018). The advancement of technologies such as the internet, wireless networks, and 5G mobile service (Dong, 2021) helped increase customer satisfaction and loyalty through customized information on a diversity of products and reasonable prices (Park & Kim, 2003). ICT provided enhanced chances to interact with customers and help improved the level of quality services, and products to attract customers (Al-Khaffaf & Abdellatif, 2011; Xu, Thong, & Venkatesh, 2014). Customer relationship management (CRM) has been improved by integrating cutting-edge technologies such as websites, data warehousing, mobile application systems, and other related management systems (Bose, 2002). Plakoyiannaki and Tzokas (2002) addressed that by operating processes of CRM that are based on ICT, companies are able to identify, develop, and integrate customers' data, thereby assisting companies to make strong and friendly relationships for a long time and providing a significant value to customers. ICT played a critical role in the major operations of business in the way that supply chain management, knowledge management, and other activities such as strengthen competence (Al-Khaffaf & Abdellatif, 2011) to improve relationship with customers. Moreover, ICT ultimately increase empowerment by improving better understanding to the customer and manage marketing strategy, and shift business models to customer-oriented (Roberts, 2000).

## 3. Theoretical Background

### 3.1. Technology Acceptance Model

The effectiveness of ICT utilization on employees and consumers is analyzed in this research. Application of technology adoption has been supported by Technology Acceptance Model (TAM) by Davis (1989) that is rooted on TRA (Theory of Reasoned Action) (Ajzen & Fishbein, 1980). According to TAM, the factors that affect user's attitude for intention to use include perceived usefulness which is personal beliefs on using the technology enhances job performance and perceived ease of use which means utilizing technology is effortless (Davis, 1989). After Davis (1989) mentioned TAM, previous researchers continuously have studied the relationship between two factors (Hendrickson, Massey, & Cronan 1993; Subramanian 1994), and external factors affecting users' attitudes and behavioral intention such as perceived self-efficacy, facilitating conditions, and systems quality may also be added (Fathema, Shannon, & Ross, 2015).

### 3.2. Motivation Theory

Maslow's hierarchy of needs is one of the influential motivations theories in psychology comprising a five-tier model of human needs, frequently portrayed as hierarchical levels in the shape of a pyramid (McLeod, 2007). Maslow (1954) initially introduced his theory about how people satisfy numerous personal needs in the context of their work. Herzberg, Mausner, and Snydermann (1959) declared a two-dimensional paradigm of factors affecting people's attitudes towards work and found out elements affecting satisfaction and dissatisfaction with a job, and these two categories could not be dependably measured on the same field. Hackman and Oldham (1976) addressed the factors influencing satisfaction called motivators including challenging work, achievement, responsibility, opportunity toward task, participation in decision making, and sense of importance in the workplace. Vroom (1964) developed the theory based on cognitively-oriented assumptions (Lawler III & Suttle, 1973), and it is a motivation theory commonly used in the workplace (Campbell & Pritchard, 1976). In this theory by Vroom (1964), expectancy means certain act will be leaded to an outcome; instrumentality stated the belief when expectation is fulfilled, a person will take a reward, while valence is defined as the influential factors like value, needs, goals which are the probable outcome from a person's action (Isaac, Zerbe, & Pitt, 2001).

### 4. Hypotheses Developments

This study proposed factors including work efficiency, self-management, knowledge sharing, self-development, and organizational innovation on employee satisfaction

and organizational performance to measure its impacts on employee satisfaction and organizational performance for Study 1 (Figure 1).

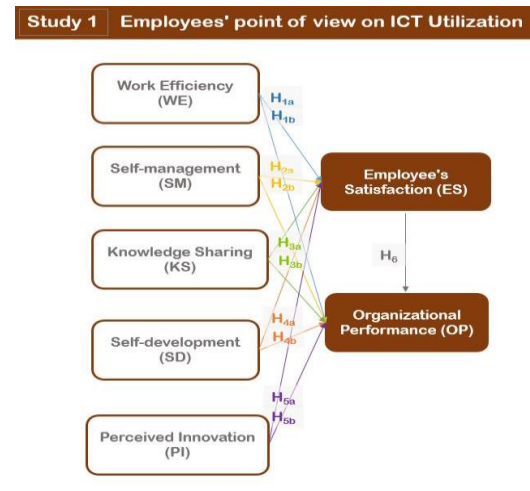


Figure 1: The Proposed Model of the Research for Study 1

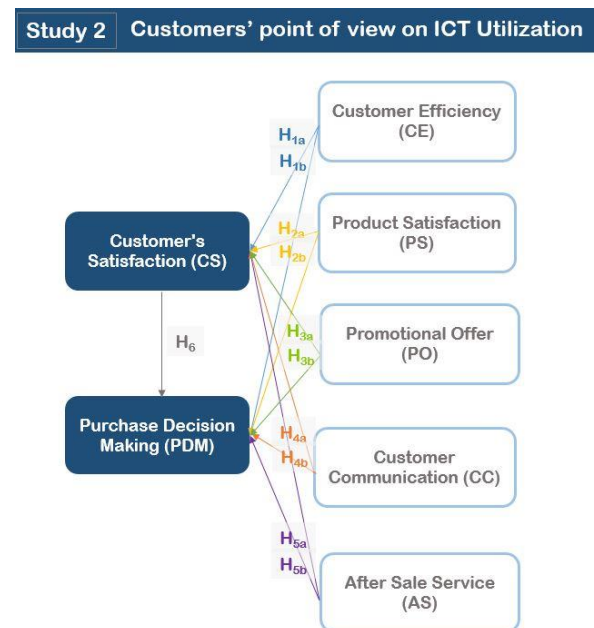


Figure 2: The Proposed Model of the Research for Study 2

This study also proposed factors including purchase efficiency, product satisfaction, promotional offers, communication with customers, and after-sales service and its impacts on customer satisfaction affect purchase decision making for Study 2 (Figure 2).



## 4.1. Study 1: Employees' Perception on ICT Utilization

### 4.1.1. Effects of Work Efficiency on Employees Satisfaction and Organizational Performance

Efficiency is explained by inputting the minimum amount of resources such as budget or effort and other input variables, then producing a specific result (Sickles & Zelenyuk, 2019). Previous researchers addressed that ICT utilization helped increase work efficiency. Pérez, Sánchez, and de Luis Carnicer (2002) examined that the advantages of telework include increasing in employees' productivity and flexibility. Adopting smart work by utilizing ICT helped reduce time to commute, enhance work productivity, and achieve the balance of life and work (Bailey & Kurland, 2002; Noonan & Glass, 2012). When it comes to the aggregate ICT investment, it has positively influenced on efficiency of the company (Becchetti, Bedoya, & Paganetto, 2003). Therefore, this research hypothesized that work efficiency would be a vital and significant variable of ICT utilization for employee satisfaction and organizational performance. This study used "a" for the hypotheses related to employee satisfaction and "b" for the hypotheses related to organizational performance.

**H1<sub>a</sub>:** The perception of work efficiency by ICT utilization affects employee satisfaction.

**H1<sub>b</sub>:** The perception of work efficiency by ICT utilization affects organizational performance.

### 4.1.2. Effects of Self-Management on Employees Satisfaction and Organizational Performance

Self-management is defined as developing personal goals, self-instructions to achieve goals, self-administering for reaching intended results, and planning for specific action or strategies (Mischel, 1973). The concept of self-management included highly motivated, proactive and initiative workers (Hackman & Oldham, 1976; Wellins, Wilson, Katz, Laughlin, Day, Price, et al., 1990) and self-managing interdependent individuals described self-regulated people whose behavior emphasized on group autonomy and allowed individual autonomy (Cohen & Ledford, 1994). Previous studies observed self-management groups positively affected their performance and attitudes (Cohen & Bailey, 1997; Guzzo & Dickson, 1996), while others investigated the relationship between self-management and leadership (Cohen, Ledford, & Spreitzer, 1996; Manz & Sims, 1987). By applying ICT, this study proposed that perceived self-management will be improved, therefore, this will result in enhanced employee satisfaction and organizational performance. Based on the consideration, this study hypothesized effects of perceived self-management by ICT utilization on employee satisfaction and organizational performance.

**H2<sub>a</sub>:** The perception of self-management by ICT utilization affects employee satisfaction.

**H2<sub>b</sub>:** The perception of self-management by ICT utilization affects organizational performance.

### 4.1.3. Effects of Knowledge Sharing on Employees Satisfaction and Organizational Performance

Knowledge sharing can be explained as sharing organizational-related information, know-how, thinking, advice, and expertise with others (Bartol & Srivastava, 2002). Lin (2007) defined it as a social interaction that influenced employees' knowledge, capability, and experiences in the workplace. Knowledge management system based on knowledge sharing is considered as a vital element in the workplace (Alavi & Leidner, 2001; Earl, 2001). Previous studies also proved that knowledge sharing is crucial since it helped enhance organizations' innovative ideas and better performance and reduce dispensable learning efforts by each employee (Calantone, Cavusgil, & Zhao, 2002; Scarbrough, 2003). Therefore, effective knowledge sharing by ICT utilization will help improve employee satisfaction and organizational performance. Based on the consideration, this study hypothesized effects of perceived knowledge sharing by ICT utilization on employee satisfaction and organizational performance.

**H3<sub>a</sub>:** The perception of knowledge sharing by ICT utilization affects employee satisfaction.

**H3<sub>b</sub>:** The perception of knowledge sharing by ICT utilization affects organizational performance.

### 4.1.4 Effects of Self-Development on Employees Satisfaction and Organizational Performance

Self-development is referred to as whole of deliberated-activities, not requiring officially by organization, but undertaking by employees to acquire and retain job-related skills and knowledge (Tough, 1978). Previous studies addressed employee's self-development by considering active and self-starting action for better performance and capability (Boyce, Zaccaro, & Wisecarver, 2010; London & Smither, 1999). It is also important element for gaining the quality of being employable and capability of career adaptation (Noe, Clarke, & Klein, 2014; Savickas, Nota, Rossier, Dauwalder, Duarte, Guichard, et al., 2009). Therefore, the value of self-development has been paid attention by organizations (Orvis & Ratwani, 2010) facing increased pressure to reduced costs of training programs (O'Toole & Lawler, 2006). By applying ICT, this study proposed that perceived self-development will be improved, therefore, this will result in enhanced employee satisfaction and organizational performance. Based on the consideration, this study hypothesized effects of perceived self-development by ICT utilization on employee satisfaction and organizational performance.

**H4<sub>a</sub>:** The perception of self-development by ICT utilization affects employee satisfaction.

**H4<sub>b</sub>:** The perception of self-development by ICT utilization affects organizational performance.

#### 4.1.5. Effects of Organizational Innovation on Employees Satisfaction and Organizational Performance

Innovation is explained as adopting or generating new into product, purchased device, system, process, policy and program (Daft, 1982; Damanpour & Evan, 1984; Zaltman, Duncan, & Holbek, 1973). Organizational innovation is defined as internally the operation of creating or borrowing the idea or behavior or others linked with an organization thereby renewing at the time of adoption (Daft, 1978; Damanpour & Evan 1984; Zaltman, Duncan, & Holbek, 1973). Battisti and Stoneman (2010) addressed the importance of interactions within different types of innovation. Evangelista and Vezzani (2010) explored the organizational performance with product, process, and organizational innovations. Mohnen and Roller (2005) argued that there are four elements to make difficult to innovation including capacity of knowledge in and outside of the company, risk management, financial aspect, and regulation. By applying ICT, this study proposed that perceived organizational innovation will be improved, therefore, this will result in enhanced employee satisfaction and organizational performance. Based on the consideration, this study hypothesized effects of perceived knowledge sharing by ICT utilization on employee satisfaction and organizational performance.

**H5<sub>a</sub>:** The perception of organizational innovation by ICT utilization affects employee satisfaction.

**H5<sub>b</sub>:** The perception of organizational innovation by ICT utilization affects organizational performance.

#### 4.1.6. Effects of Employee Satisfaction and Organizational Performance

Previous studies (Kopelman, Brief, & Guzzo, 1990; McGregor, 1960) pointed out that the satisfaction and employees' wellbeing such as social gifts or any kind of reward system can influence effectiveness by inducing productivity and organizational behavior. Koys (2003) also mentioned that employee satisfaction could an important factor in achieving financial performance in company. By applying ICT, this study proposed that employee satisfaction and organizational performance will affect each other. Based on the consideration, this study hypothesized effects of employee satisfaction on organizational performance.

**H6:** Increasing employee satisfaction by ICT utilization effects on organizational performance.

## 4.2. Study 2: Customers' Perception on ICT Utilization

### 4.2.1 Effects of Customer Efficiency on Customer Satisfaction and Purchase Decision Making

Previous studies examined positive relationship between customer efficiency and organizational performance such as loyalty and profitability (Bitner, Faranda, Hubbert, & Zeithaml, 1997; Chase 1978, 1981; Lovelock & Young 1979; Xue & Harker, 2002). Xue and Harker (2002) proposed a customer efficiency measurement framework by utilizing measures of customer outputs and input such as time and effort. Xue, Hitt and Harker (2007) also examined customer efficiency through revealed channel choice. Bayraktar, Tatoglu, Turkyilmaz, Delen and Zaim (2012) investigated that customer satisfaction and loyalty positively affected companies' competitiveness, such as larger market shares and higher profitability. By applying ICT, this study proposed that perceived customer efficiency will be improved, therefore, this will result in enhanced customer satisfaction and purchase decision making. Based on the consideration, this study hypothesized effects of perceived customer efficiency by ICT utilization on customer satisfaction and purchase decision making. This study used "a" for the hypotheses related to customer satisfaction and "b" for the hypotheses related to purchase decision making.

**H1<sub>a</sub>:** The perception of customer efficiency by ICT utilization affects customer satisfaction.

**H1<sub>b</sub>:** The perception of customer efficiency by ICT utilization affects purchase decision making.

### 4.2.2. Effects of Product Satisfaction on Customer Satisfaction and Purchase Decision Making

Previous researchers addressed the importance of product satisfaction (Burroughs & Rindfleisch, 2002; Wang & Wallendorf, 2006). Previous researches pointed out that a main explanatory variable of disconfirmation related to customer satisfaction is product satisfaction (Bearden & Teel, 1983; Oliver, 1980; Oliver & DeSarbo, 1988; Swan & Trawick, 1981). By applying ICT, this study proposed that perceived product satisfaction will be improved, therefore, this will result in enhanced customer satisfaction and purchase decision making. Based on the consideration, this study hypothesized effects of perceived product satisfaction by ICT utilization on customer satisfaction and purchase decision making.

**H2<sub>a</sub>:** The perception of product satisfaction by ICT utilization affects customer satisfaction.

**H2<sub>b</sub>:** The perception of product satisfaction by ICT utilization affects purchase decision making.

#### 4.2.3. Effects of Communication on Customer Satisfaction and Purchase Decision Making

Due to the rise of smartphones and related applications and increasing use of newly developing technologies, businesses create opportunities to enhance communication with their customers (Sarwar & Soomro, 2013). As technology evolved, there are more tools helping organization communicate effectively with their customers. For example, use of social networking sites such as Facebook made it possible to better communicate each other (Baier, Rese, & Roglinger, 2018). By applying ICT, this study proposed that perceived customer communication will be improved, therefore, this will result in enhanced customer satisfaction and purchase decision making. Based on the consideration, this study hypothesized effects of perceived product satisfaction by ICT utilization on customer satisfaction and purchase decision making.

**H3<sub>a</sub>**: The perception of customer communication by ICT utilization affects customer satisfaction.

**H3<sub>b</sub>**: The perception of customer communication by ICT utilization affects purchase decision making.

#### 4.2.4 Effects of Promotional Offers on Customer Satisfaction and Purchase Decision Making

Promotional tools including coupons, premiums, rebates and samples are considered as representative resources of marketing which also allocated significant portion of budget of total promotional offers in the company (D'Astous & Jacob, 2002). This proved that sales promotional expenditures exceeded advertising expenditures in European countries (Leeflang & van Raaij, 1995). When it comes to the effective type of promotional offers, many researchers pointed out that price discounts and bonus packs are the most attractive offers for customers (Carlson, 2018; Chen, Marmorstein, Tsiros, & Rao, 2012; Hardesty & Bearden, 2003; Palazon & Delgado-Ballester, 2009), because providing sales promotions are recognized as decreasing damages and increasing benefits (Kahneman & Tversky, 1979, 1984). By utilizing more ICT applications, businesses helped to generate customer visits and purchases (Mussol, Aurier, & Lanauze, 2019) and allow customers to purchase more products (Hardesty and Bearden, 2003; Heilman, Nakamoto, & Rao, 2002; Palazon & Delgado-Ballester, 2009). Based on the consideration, this study hypothesized effects of perceived promotional offers by ICT utilization on customer satisfaction and purchase decision making.

**H4<sub>a</sub>**: The perception of promotional offers by ICT utilization affects customer satisfaction.

**H4<sub>b</sub>**: The perception of promotional offers by ICT utilization affects purchase decision making.

#### 4.2.5. Effects of After Sales Service on Customer Satisfaction and Purchase Decision Making

Activities related to after sales service included installation product, exact warranty terms and time, timely delivery, proper feedback from customers on product or service, process on enhancing product or service, and whole work fulfilling as well as satisfying customers' need (Choudhary, Asif, Choudhry, Siddique, & Mughal, 2011). Many studies emphasized the importance of after-sale service in the business. Saccani, Johansson and Perona (2007) mentioned that it is linked with profitability and competitiveness of company, since after sales service are proved to be significant as a profitable indicator. In addition, proper after sales service had significant impact on customer satisfaction and organizational performance (Shaharudin, Elias, & Mansor, 2009). Providing continuous after sales service is vital to assist marketing strategy and increase customer loyalty, extending service, and productivity of organization in a long period, because it is secured the market power (Saccani, 2006; Shamami & Kheiry, 2019). By applying ICT, this study proposed that perceived after-sales service will be improved, therefore, this will result in enhanced customer satisfaction and purchase decision making. Based on the consideration, this study hypothesized effects of perceived after-sales service by ICT utilization on customer satisfaction and purchase decision making.

**H5<sub>a</sub>**: The Perception of after-sales service by ICT utilization affects customer satisfaction.

**H5<sub>b</sub>**: The Perception of after-sales service by ICT utilization affects purchase decision making.

#### 4.2.6. Effects of Customer Satisfaction and Purchase Decision Making

Previous studies showed how many customers are satisfied and how much their expectations are fulfilled, therefore ultimately, customer satisfaction links with customer loyalty and company's performance (Bayraktar, Tatoglu, Turkyilmaz, Delen, & Zaim, 2012; Loveman, 1998). Regarding the customer purchase decision making, Hellier, Geursen, and Carr (2003) mentioned that service quality, equity and value, customer satisfaction, past loyalty, expected switching cost, and brand preference are the factors influencing customer purchase intention. Adoption of ICT helped enhance both customer satisfaction and purchase decision making. Based on the consideration, this study hypothesized effects of customer satisfaction by ICT on purchase decision making.

**H6**: Increasing customer satisfaction by ICT utilization effects on purchase decision making.

### 5. Methodology

This research explored factors affected by ICT utilization with perspectives of both employees and

customers. By considering proposed factors, this study conducted an online survey. This study applied online survey anonymously using Qualtrics, efficiently creating and distributing questionnaires items and collecting responses without any errors. This study applied back translation by checking reliability of different versions of the survey developed in English and Korean. This survey was distributed to 335 participants randomly through web sites including SNS. Total 272 respondents were completed the survey, therefore, the response rate was 81%. The questionnaire was divided into four parts including warm-up questions, employees' perspectives, customers' perspectives, and demographic questions. The questionnaire consisted of total 41 questions. By using warm up questions, participants who haven't had any work experience were excluded answering the survey. This survey adopted a 5-point Likert scale in which 1 demonstrated 'strongly disagree' and 5 indicated 'strongly agree' for main questions. The respondents were asked to answer the questions on their daily experience usage of ICT. The warm-up questions helped recall customer's ICT usage when they make purchase decision, and main questions related to each variable for customers' perception. The survey included demographic questions such as gender, age, residence, marriage, education level and occupational status, and additional questions to verify the field of working, working experience, position in the organization annual income. To check reliability, this study conducted Cronbach's alpha tests. For variables asking employees' perception, Cronbach's alpha for work efficiency was 0.875, self-management was 0.748, knowledge sharing was 0.868, self-development was 0.825, organizational innovation was 0.841, employee satisfaction was 0.735, and organizational performance was 0.818. For variables asking customers' perception, Cronbach's alpha for purchase efficiency was 0.853, product satisfaction was 0.844, promotional offers was 0.919, customer communication was 0.876, after sales service was 0.863, customer satisfaction was 0.730, and purchase decision making was 0.724.

## 6. Data Analysis

### 6.1. Demographics

Among 272 respondents, 51.5% were male, and 48.5% were female. Regarding the age distribution of the respondents, 34.9% of the respondents were 20s, 36.4% were 30s, 23.9% were 40s, 3.3% were 50s, and 1.5% were 60s. In terms of occupation, 19.1% were employed at small and medium-sized firms, 15.1% were employed at public sector, 11.4% were employed at educational field, 6.6% were employed at large sized firms, 8.1% owned

business, etc. In terms of educational background, 59.2% of respondents hold a bachelor's degree, 17.2% hold a master's degree, 13.2% hold a high school diploma, etc. In terms of income, 52% of respondents had an annual income between 3,000,000 and 39,999,999won, 47% had an annual income less than 3,000,000won, 35% had an annual income between 4,000,000 and 49,999,999won, 26% had an annual income between 5,000,000 and 59,999,999won, 16% 35% had an annual income greater than 6,000,000won.

In terms of working experience, 27.8% of respondents have worked between 5 and 10 years, 20.3% of respondents have worked less than 3 years, 18.7% of respondents have worked between 3 and 5 years, 18.7% of respondents have worked between 10 and 15 years, and 14.5% of respondents have worked more than 15 years.

### 6.2. Validity Testing

To check the validity of the major variables, this study applied factor analyses with the extraction method and with a varimax rotation of Kaiser Normalization. The same method was used for the study 1 and 2. The overall items used in the survey came out with values of factor loadings all above 0.7, with all Eigen values greater than 1.00. Table 1 and 2 summarized the results of factor analysis for the study 1 and 2 respectively. The results showed that most of communalities were between 0.5 and 0.9 for both cases of study 1 and 2.

**Table 1:** Component Matrix for Study 1

| Items | Component Matrix |       |       |       |       |
|-------|------------------|-------|-------|-------|-------|
|       | 1                | 2     | 3     | 4     | 5     |
| WE3   | 0.826            |       |       |       |       |
| WE4   | 0.808            |       |       |       |       |
| WE5   | 0.803            |       |       |       |       |
| WE1   | 0.766            |       |       |       |       |
| SM3   |                  | 0.787 |       |       |       |
| SM5   |                  | 0.741 |       |       |       |
| SM4   |                  | 0.741 |       |       |       |
| SM1   |                  | 0.732 |       |       |       |
| KS3   |                  |       | 0.817 |       |       |
| KS2   |                  |       | 0.801 |       |       |
| KS6   |                  |       | 0.799 |       |       |
| KS1   |                  |       | 0.765 |       |       |
| SD5   |                  |       |       | 0.804 |       |
| SD2   |                  |       |       | 0.773 |       |
| SD6   |                  |       |       | 0.769 |       |
| SD1   |                  |       |       | 0.764 |       |
| OI6   |                  |       |       |       | 0.878 |
| OI5   |                  |       |       |       | 0.861 |
| OI2   |                  |       |       |       | 0.852 |
| OI1   |                  |       |       |       | 0.792 |

\* WE: Work Efficiency; SM: Self-Management;  
KS: Knowledge Sharing; SD: Self-Development;  
OI: Organizational Innovation



**Table 2:** Component Matrix for Study 2

| Items | Component Matrix |       |       |       |       |
|-------|------------------|-------|-------|-------|-------|
|       | 1                | 2     | 3     | 4     | 5     |
| PE5   | 0.813            |       |       |       |       |
| PE3   | 0.767            |       |       |       |       |
| PE4   | 0.762            |       |       |       |       |
| PE6   | 0.754            |       |       |       |       |
| PS5   |                  | 0.794 |       |       |       |
| PS6   |                  | 0.779 |       |       |       |
| PS2   |                  | 0.764 |       |       |       |
| PS3   |                  | 0.762 |       |       |       |
| PO2   |                  |       | 0.869 |       |       |
| PO5   |                  |       | 0.853 |       |       |
| PO3   |                  |       | 0.852 |       |       |
| PO6   |                  |       | 0.842 |       |       |
| CC4   |                  |       |       | 0.860 |       |
| CC2   |                  |       |       | 0.793 |       |
| CC1   |                  |       |       | 0.778 |       |
| CC3   |                  |       |       | 0.770 |       |
| AS5   |                  |       |       |       | 0.857 |
| AS6   |                  |       |       |       | 0.819 |
| AS4   |                  |       |       |       | 0.819 |
| AS1   |                  |       |       |       | 0.719 |

\* PE: Purchase Efficiency; PS: Product Satisfaction; PO: Promotional Offers; CC: Customer Communication; AS: After Sales Service

### 6.3. Hypotheses Testing

This study applied factor scores for regression analyses to test hypotheses of study 1. Table 3 and 4 represented the result of multiple regression analysis for study 1. For the effects of factors on employee satisfaction, the results of ANOVA from the regression analysis showed significant at 0.01 level with  $F = 56.889$  ( $r\text{-square} = .567$ ). For the effects of factors on organizational performance, the results of ANOVA from the regression analysis showed significant at 0.01 level with  $F = 53.949$  ( $r\text{-square} = .554$ ). Table 3 showed that the effects of self-management, self-development, and organizational innovation on employee satisfaction were significant.

**Table 3:** Effects of Factors on Employee Satisfaction

| Variable (Independent → dependent)                      | Standardized Coefficient (t-value-Sig) |
|---|--|
| Work Efficiency → Employee Satisfaction (H1a)           | 0.090 (1.375)                          |
| Self-Management → Employee Satisfaction (H2a)           | 0.114 (2.010**)                        |
| Knowledge Sharing → Employee Satisfaction (H3a)         | -0.098 (-1.413)                        |
| Self-Development → Employee Satisfaction (H4a)          | 0.291 (4.135***)                       |
| Organizational Innovation → Employee Satisfaction (H5a) | 0.451 (6.342***)                       |

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

Additionally, both study 1 and 2 confirmed that there is

no multicollinearity. The results of correlation analysis also showed that there is no strong relationships between independent variables, while correlation coefficients with dependent variables were higher than 0.70, particularly between variables showed significant from regression analysis. Table 4 showed that the effects of self-development and organizational innovation on organizational performance were significant.

**Table 4:** Effects of Factors on Organizational Performance

| Variable (Independent → dependent)                           | Standardized Coefficient (t-value-Sig) |
|--|--|
| Work Efficiency → Organizational Performance (H1b)           | 0.095 (1.426)                          |
| Self-Management → Organizational Performance (H2b)           | 0.089 (1.554)                          |
| Knowledge Sharing → Organizational Performance (H3b)         | 0.024 (0.342)                          |
| Self-Development → Organizational Performance (H4b)          | 0.188 (2.621***)                       |
| Organizational Innovation → Organizational Performance (H5b) | 0.458 (6.340***)                       |

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

Table 5 showed that the results of the regression analysis of H6 of study 1. The results showed that both effects of employee satisfaction on organizational performance and organizational performance on employee satisfaction were significant.

**Table 5:** Effects of Employee Satisfaction on Organizational Performance

| Variable (Independent → dependent)                      | Standardized Coefficient (t-value-Sig) |
|---|--|
| Employee Satisfaction → Organizational Performance (H6) | 0.904 (31.788***)                      |

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

This study also applied factor scores for regression analyses to test hypotheses of study 2. Table 6 and 7 represented the result of multiple regression analysis for study 2. For the effects of factors on customer satisfaction, the results of ANOVA from the regression analysis showed significant at 0.01 level with  $F = 66.583$  ( $r\text{-square} = .556$ ). For the effects of factors on purchase decision making, the results of ANOVA from the regression analysis showed significant at 0.01 level with  $F = 53.949$  ( $r\text{-square} = .554$ ). Table 6 showed that the effects of product satisfaction, promotional offers, customer communication, and after sales service on customer satisfaction were significant.

**Table 6:** Effects of Factors on Customer Satisfaction

| Variable (Independent → dependent)                                | Standardized Coefficient (t-value-Sig) |
|---|--|
| Purchase Efficiency → Customer Satisfaction (H1 <sub>a</sub> )    | 0.015<br>(0.243)                       |
| Product Satisfaction → Customer Satisfaction (H2 <sub>a</sub> )   | 0.203<br>(3.285 <sup>***</sup> )       |
| Promotional Offers → Customer Satisfaction (H3 <sub>a</sub> )     | 0.309<br>(5.437 <sup>***</sup> )       |
| Customer Communication → Customer Satisfaction (H4 <sub>a</sub> ) | 0.216<br>(2.964 <sup>***</sup> )       |
| After-sales Service → Customer satisfaction (H5 <sub>a</sub> )    | 0.129<br>(1.878 <sup>*</sup> )         |

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

Table 7 showed that the effects of product satisfaction, promotional offers, and customer communication on purchase decision making were significant.

**Table 7:** Effects of Factors on Purchase Decision Making

| Variable (Independent → dependent)                                   | Standardized Coefficient (t-value-Sig) |
|--|--|
| Purchase Efficiency → Purchase Decision Making (H1 <sub>b</sub> )    | 0.000<br>(0.007)                       |
| Product Satisfaction → Purchase Decision Making (H2 <sub>b</sub> )   | 0.264<br>(4.199 <sup>***</sup> )       |
| Promotional Offers → Purchase Decision Making (H3 <sub>b</sub> )     | 0.304<br>(5.275 <sup>***</sup> )       |
| Customer Communication → Purchase Decision Making (H4 <sub>b</sub> ) | 0.204<br>(2.760 <sup>***</sup> )       |
| After sales Service → Purchase Decision Making (H5 <sub>b</sub> )    | 0.089<br>(1.270)                       |

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

Table 8 showed that the results of the regression analysis of H6 of study 2. The results showed that both effects of customer satisfaction on purchase decision making and purchase decision making on customer satisfaction were significant.

**Table 8:** Effects of Customer Satisfaction on Purchase Decision Making

| Variable (Independent → dependent)                    | Standardized Coefficient (t-value-Sig) |
|---|--|
| Customer satisfaction → Purchase Decision Making (H6) | 0.932<br>(42.391 <sup>***</sup> )      |

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

## 7. Conclusion

### 7.1. Findings

The purpose of this study is to analyze the impact of ICT

utilization on employees' (study 1) and customers' perception (study 2). This study filled the gap as previous studies rarely examined both employees' and customers' perception, while this study investigated both perspectives as employees and customers by applying different factors for each side. This study found that the effects of self-management, self-development, and organizational innovation on employee satisfaction were significant. Among significant factors of study 1, the effect size of organizational innovation on employee satisfaction was higher than other effects and the effect size of self-development and self-management were higher after the effect size of organizational innovation. For the effect size on organizational performance, the effect of organizational innovation was also higher than other effects, followed by the effect size of self-development. Among significant factors of study 2, the effect size of promotional factors on customer satisfaction was higher followed by product satisfaction and customer communication. For the effect size on purchase decision making, the effect of promotional factors was also higher than other effects, followed by the effect size of product satisfaction and customer communication. Therefore, for study 1, H2<sub>a</sub>, H4<sub>a</sub>, H5<sub>a</sub>, H4<sub>b</sub>, H5<sub>b</sub>, and H6 were accepted, while for study 2, H2<sub>a</sub>, H3<sub>a</sub>, H4<sub>a</sub>, H2<sub>b</sub>, H3<sub>b</sub>, H4<sub>b</sub>, and H6 were accepted.

### 7.2. Managerial Implications

The findings provide managerial implication. According to employees' perception (study 1), the work efficiency and knowledge sharing through ICT utilization did not affect employee satisfaction and organizational performance. Previous research has shown that ICT utilization is useful for work efficiency and knowledge sharing and it leads to organizational performance as well as employee satisfaction, while other studies provide concerns of ICT applications. The findings of this study's results implied that ICT can be used without restrictions on time and space, as the connectivity to share knowledge is one of the attributes of ICT. Therefore, employees might feel that certain aspects of ICT included limitations and negative aspects if it is convincing that working anytime and anywhere or sharing of knowledge without proper limitation of time and space. Therefore, at the organizational management level, it is necessary to make specific guideline not to misuse of benefits of ICT. The notion of efficiency and the level of knowledge sharing that employees expect should be also specified to improve employee satisfaction and organizational performance. This study also found that the effect of self-management (H2) through ICT utilization on employee satisfaction was significant, while the effect on organizational performance was not significant. Considering the separate perception of employees regarding individuals and

organizations, the results showed differently as self-management through ICT utilization is an individual level, while organizational achievements is an business level. Nevertheless, it is necessary to establish an ICT utilization plan that considered both employee satisfaction and organizational performance, since increasing employee satisfaction by ICT utilization affects the organizational performance as H6 showed.

The results of the customer perception (study 2) showed that purchase efficiency by ICT utilization does not affect customer satisfaction and purchasing decision making. This is contrary to the argument that the purchase efficiency examined in previous studies has a positive effect on customer satisfaction and purchase decision making. A possible reason for this is that the utilization of ICT might generate information overload problems to consumers. Therefore, as a part of managerial implication related to customer relationship management, it is necessary to provide customized services in a timely manner to enhance customer satisfaction. The effect of after sales service by utilizing ICT on customer satisfaction showed significant, while the effect on purchase decision making was not significant. After sales service by ICT utilization might not be a priority consideration among the consideration sets, when customers consider to decide to purchase products. The results showed implication that the importance of ICT utilization in the customer point of view should be more emphasized. Since product satisfaction, promotional provision, and communication with customers by ICT utilization affect both customer satisfaction and purchasing decision making, it is necessary to establish an appropriate managerial strategy by considering those aspects. The results of this study provided how to enhance employee and customer satisfaction by ICT utilization that are pivotal for CRM. In particular, how to improve economic growth by increasing effects on employee satisfaction, organizational performance, customer satisfaction, and purchase decision making should be considered importantly.

### 7.3. Policy Implication

The results of this study provide policy implications. The results of this study suggested that better policy should be prepared by government to foster utilization of ICT infrastructure. In order to accelerate perceived impacts of ICT utilization by employees and customers, proper policy should be prepared. The government's role in promoting the use of ICT can be improved by building ICT infrastructure and fostering better applications. That might be also improved with enhanced national competitiveness and expanded government driven ICT infrastructure. The Korean government was evaluated as having a very favorable infrastructure for digital

transformation (Bianchini & Kwon, 2021).

### 7.4. Limitation and future study

Although this study has derived significant results on the effect of ICT utilization on the employees' and consumers' side, there are several limitations. The sample size could be increased in future research. Second, future analysis might consider by classifying respondents' characteristics, such as work characteristics and age groups. Therefore, a research specializing in segmented groups might be conducted in future research. Future research might also consider to perform qualitative research through in-depth interviews to investigate the relationship between ICT utilization and variables.

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