Analysis of the Impact of ICT Utilization on Employee and Customer : Focusing on Employee Satisfaction, Organizational Performance, Customer Satisfaction, and Purchase Decision Making

By

YU, Eun Hye

THESIS

Submitted to

KDI School of Public Policy and Management

In Partial Fulfillment of the Requirements

For the Degree of

MASTER OF PUBLIC MANAGEMENT

2021

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Approval as of December, 2021

Abstract

***Keywords**: ICT, Employee satisfaction, Organizational performance, Smart work, Customer satisfaction, Purchase decision making, e-commerce, Technology Acceptance Model(TAM)*

In the 4.0 Industrial Revolution era, ICT plays a very important role in the national economy, and governments in each country are investing huge budgets to promote "digital transformation" to expand and spread ICT infrastructure. Korea is no exceptional. In July 2020, the "Digital New Deal" was declared, preparing for digital transformation and transformation into a ‘contactless economy’. Then, how do we perceive changes in life through ICT utilization that enables such digital? To confirm this, the effects of producer (STUDY 1) and customer (STUDY 2) side among the three main economic entities, the government, households, and companies, were analyzed. In other words, in order to understand the perception of ICT utilization of both employees (production) and customers (consumption), 272 respondents participated this research survey. And five independent variables and two dependent variables were used, a total of 12 hypothesis tests were conducted for each study. Like most previous studies, ICT utilization had a positive effect on employee satisfaction and organizational performance in the side of production, and positively influenced consumer satisfaction and purchase decision-making from the customer perspective. However, the ‘efficiency’ variable through ICT utilization was rejected in each study, it is presumed that the attributes of ICT, which is connected without restrictions on time and space, hinder the ‘efficiency’ of people in their 20s and 30s, who account for 71% of this research survey.

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I. Introduction

1.1. Background of the Study

Information and Communications Technologies (ICT) play an important role in strengthening national competitiveness and economic growth in the 4.0 Industrial Revolution (IR) era. ICT covers the infrastructure and devices related to Data, Networking, Artificial Intelligence (AI), and more specifically, Big data, 5G, Cloud, Internet of Things (IoT), SW, Self-driving cars, and other interconnected technologies or equipment fostering digital transformation. According to the United Nations (2020) Digital Economy Report, ICT has delivered enormous opportunities and overcame challenges with unprecedented speed and scales, transforming our lives and societies. It can also provide new market opportunities because real-time information has been helping to build a closer relationship with customers. In addition, 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 (Giovanni & Mario , 2003).

Several studies prove the positive relationship between ICT and economic growth. For example, one of them points out that more successful economies have more advanced technologies and are better prepared for using ICT to develop their competitive advantage (Chrisanthi, 2003). Similarly, other research observes that ICT plays a significant role in the growth and competitiveness of countries by analyzing results from the ICT sector of EU Member states from 2006 to 2010 (Ani & Carmen, 2012). Likewise, ICT capacity empirically verifies that it has a significant effect on economic development; however, analyzing the impact of ICT on economic growth should be considered along with other determinants and socio-economic factors such as national transparency, management of consumer inflation, and human capital (Jin and Cho, 2015). Finally, another study focusing on ICT diffusion reveals that it has

played a vital role in the economic development of nine OECD countries, including the U.S, Australia, Canada, Finland, France, and other members (Alessanda and Paul, 2001). This explains why many countries competitively establish ICT policies on a mid-long-term basis and expand investment in the ICT sector.

In this sense, Korea is one of the countries that invest aggressively in ICT and Research and Development (R&D). As a result, Korea was ranked sixteenth among 34 countries in ICT investment relative to GDP in 2017 (OECD, 2020a). Moreover, the Korean government recently announced an investment plan for the Digital New Deal project, which includes creating industrial convergence with data, network, and AI as well as promoting 'UNTACT[1]' industries, making digital education infrastructure, SOC, cities, logistics, and across the country whereby Korea could greatly transform into a digitized nation (KOR. 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 no research investigating individual perceptions toward ICT utilization. Therefore, the purpose of this study is to analyze the impact of ICT utilization on employees (employee satisfaction, organizational performance) and customers (customer satisfaction and purchasing decision making). To this end, the study is divided into two parts: the employees' perception of ICT utilization and customers' one.

1.2. Development of Research Questions

[1] A newly created word in Korea which means contactless

Ultimately, this paper investigates four research questions in each study:

[Study 1]

Q1. How does ICT utilization affect worker satisfaction in terms of five factors; 1) Work Efficiency (WE) 2) Self-Management (SM) 3) Knowledge Sharing (KS) 4) Self-Development (SD) 5) Organizational Innovation (IN)?

Q2. How does ICT utilization affect organizational performance in terms of five factors; 1) Work Efficiency (WE) 2) Self-Management (SM) 3) Knowledge Sharing (KS) 4) Self-Development (SD) 5) Organizational Innovation (IN)?

Q3. How does increasing employee satisfaction by ICT utilization affect organizational performance?

Q4. How does increasing organizational performance by ICT utilization affect employee satisfaction?

[Study 2]

Q1. How does ICT use affect consumer satisfaction in terms of five factors; 1) Purchase Efficiency (PE) 2) Product Satisfaction (PS) 3) Promotional Offers (PO) 4) Customer Communication (CC) 5) After-sales Service (AS)?

Q2. How does ICT use affect Purchase Decision Making in terms of five factors; 1) Purchase Efficiency (PE) 2) Product Satisfaction (PS) 3) Promotional Offers (PO) 4) Customer Communication (CC) 5) After-sales Service (AS)?

Q3. How does increasing consumer satisfaction by ICT utilization affect Purchase Decision Making?

Q4. How does increasing Purchase Decision Making by ICT utilization affect consumer satisfaction?

The rest of the manuscript has been organized as follows. Section II describes the precedent research on ICT, especially focusing on the positive and negative effects for both employees and customers. The theoretical backgrounds related to technology acceptance and satisfaction are presented in Section III. Section IV develops the hypothesis. Next is the methodology part, which describes how the survey has been conducted and constructed fooling scales of the factors. The variables are tested in Section VI. Finally, this paper ends with findings and implications in Section VII.

Ⅱ. Literature Review

2.1. Information and Communications Technology (ICT)

2.1.1. Definition and Scope of ICT

Information and Communications Technologies (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 G. , 2019). According to the United Nations (2004) Economy and Social Council Report, the ICT sector is referred to as "equipment and services related to broadcasting, computing and telecommunications, all of which capture and display information electronically" (p.2).

It has a wide scope of goods and services; from initial technologies such as LEDs, semiconductors, and other digital devices to new potential fields in big data, the internet of

things (IoT), and other related techniques (Park, Kim, Kim, Chang, & Jeong, 2016). As technology boundaries are gradually breaking down and new technologies are being developed, the definition or scope of ICT can change over time, while the importance of ICT is consistently emphasized in many studies.

ICT broadly affects modern society and plays a significant role in leading economic development and fostering socio-economic progress (Apostol DM, 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). In other words, ICT as a structural part of the economy is a very important phenomenon, so much so that every government over the world constantly struggles with constant economic development in ICT and pays significant attention to promoting the ICT industry (Dobrota, Jeremic, & Markovic, 2012).

2.1.2. Importance of ICT

There are several studies on ICT and U.S.' economic growth. Studies have shown that ICT has a positive effect on labor productivity (Oliner & Sichel, 2000; Jorgenson & Stiroh, 2002; Oliner & Sichel, 2002). In particular, Stiroh (2005) examined the relationship between productivity and quantity with ICT capital coefficients. In addition, some studies, such as Cronin et al. (1991), have shown that IT investments have a positive impact on economic activities. On the other hand, Stiroh (2002) observed that the elasticity of ICT capital in US manufacturing had a negative impact. Brendt et al. (1992,) in examining the negative impact of ICT, noted that the contribution of ICT capital to productivity growth was negatively affected.

There is also a comparative study of ICT and economic growth between the U.S. and

major EU countries. In the 1990s, the U.S. had higher economic growth and labor productivity than the EU because of the lack of investment in ICT -from the UE- (Inklaar et al., 2005; Van Ark et al., 2008; Strauss et al., 2011; Timmer et al., 2011). Similarly, 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 (O'Mahony & Vecchi, 2005; Dimelis & Papaioannou, 2011). Lastly, Dahl et al. (2011) argued in their study that there is a positive relationship between ICT capital and output growth. The research mentioned above is summarized in Table 1.

Table 1. Research on the effectiveness of ICT in US and EU

Findings * (+) Positive effect / (-) Negative effect	Researcher (Yr.)	Country	Period
Productivity effects of ICT (+)	Oliner and Sichel (2000)	U.S.	1974-1999
	Jorgenson and Stiroh (2002)	U.S.	1959-1999
	Oliner and Sichel (2002)	U.S.	1974-2001
Coefficients of ICT Capital in the Production (+)	Stiroh (2005)	U.S.	1987-2000
Economy Activity and IT Investment (+)	Cronin et al (1991)	U.S.	1958-1988
Elasticity of ICT capital in Manufacturing (-)	Stiroh (2002)	U.S.	1984-1999
Contribution of ICT Capital and Productivity Growth (-)	Berndt et al. (1992)	U.S.	1968-1986
ICT Contribution: U.S > EU 4* * France, Germany, Netherlands, U.K.	Inklaar et al. (2005)	U.S. & EU4	1979-2000
Labor Productivity: U.S > EU 15 ⇨ Reason: Lower ICT investment in EU 15	Van Ark et al. (2008)	U.S. & EU15	1973-2006
ICT Capital and Productivity Growth : U.S > EU 15	Strauss et al. (2011)	U.S. & EU15	1995-2007
Productivity Growth since the 1990s : U.S > EU 15 ⇨ Reason: Failing ICT investment in EU 15	Timmer et al. (2011)	U.S. & EU15	1980-2005
ICT capital on output growth (+)	O'Mahony and Vecchi (2005)	U.S & U.K.	1976-2000
	Dimelis and Papaioannou (2011)		1989-2000
	Dahl et al. (2011)	EU 8	1970-2004

Notes: Own elaboration based on references

There is also research on ICT investment, infrastructure, and economic activities in countries other than the U.S. and EU. First, Yoo and Kwak (2004), carried out an analysis showing a positive relationship between ICT investment and economic development in Korea; while Ishida (2015) also demonstrated the same thing in the case of Japan. It has also been proven that India's telecommunication infrastructure promotes economic activity in the country (Veeramacheneni et al., 2008). Studies have also shown that China's telecom intensity positively impacts economic growth (Shiu & Lam, 2008). Also, Hossein and Yazdan (2012) observed that Iran's economic development had been affected by ICT investment.

In addition, there is some research on Korea. Certain studies have mentioned 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 (Chung, 2020). According to Garter (2002), government-led policies in Korea were critical contributors to the creation of a global powerhouse of ICT. Government-led 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 concluded that it was implemented without considering labor productivity, environment, and inequality in the ICT sector; and they recommended that future ICT policies should be decentralized to a local level and more dependent on private enterprises. The studies discussed above are organized in Table 2 as follow:

Table 2. Research on ICT in Other Countries

Findings * (+) Positive effect / (-) Negative effect	Researcher (Yr.)	Country	Period

IT Investment and Economic Development (+)	Yoo and Kwak (2004)	Korea	1965-1998
	Ishida (2015)	Japan	1980–2010
Economy Activity and Telecom Infrastructure (+)	Veeramacheneni et al. (2008)	India	1970–2005
Teledensity and Economic Growth (+)	Shiu and Lam (2008)	China	1978–2004
ICT development and Economic Growth (+)	Hossein and Yazdan (2012)	Iran	1980–2010
Contribution of government role in ICT (+)	Chung (2020)	Korea	-
ICT Investment and diffusion (+)	Lee (2003)		1997-2001
ICT development without three factors	Yeo et al. (2014)		1960-2008

Notes: Own elaboration based on references

Besides, there has been a comparative analysis of ICT effectiveness between developing and developed countries. Dewan and Kraemer (2000) observed that ICT capital and GDP growth had a positive influence in developed countries, but insignificant correlation was found in developing countries. Similarly, Pojola's (2002) study surveyed ICT and economic development of 42 countries but found no significant relationship. Most studies have shown that ICT contributions to economic growth are more prominent in developed countries than in developing countries (Dedrick et al., 2013; Papaioannou & Dimelis, 2007; Yousefi, 2011). Other studies have also noted that telecom infrastructure positively impacts economic development (Datta, 2004; Dutta, 2001; Pradhan et al., 2014). Table 3 summarizes the studies mentioned above.

Table 3. Comparative Studies on Effectiveness of ICT

Findings * (+) Positive effect / (-) Negative effect	Researcher (Yr.)	Country	Period
ICT capital stock on GDP growth : Developed countries (+), Developing countries (insignificant)	Dewan and Kraemer (2000)	36 Country	1985-1993
ICT and Economic Growth: insignificant	Pohjola (2002)	42 Country	1985-1999
ICT capital stock and productivity growth : Developed > Developing	Papaioannou and Dimelis (2007)	42 Country	1993-2001
1. Growth Contribution of ICT : Developing > Developed 2. FDI Contribution: Relatively Low	Papaioannou and Dimelis (2007)	42 Country	1993-2001

ICT Capital Investment and Output Growth in Developing Countries (+)	Yousefi (2011)	62 Country	2000-2006
Contribution of ICT Growth : Developed > Developing	Dedrick et al. (2013)	45 Country	1994-2007
Telecom Infrastructure and Economic Growth (+)	Datta (2004)	22 OECD	1980-1992
	Dutta (2001)	30 Country	1970-1993
	Pradhan et al. (2014)	G-20	1991–2012

Notes: Own elaboration based on references

2.2. ICT for Employees

2.1.1. Smart Work

Smart work 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 (Lee & Kim, 2010, Eom et al., 2014). More specifically, it means using the function of mobility or wireless environment rather than simply replacing it with ICT thereby improving processes and creating value (Ko et al., 2018). According to Ko (2021), ICT-based smart-work helps to increase operational efficiency and business competitiveness, in this reason, many corporations have tried to apply smart-work framework into their business since the mid-2000's. To reflect this trend, there are many researchers who studied smart work like below.

Table 4. Research on Smart work

Perspective	Researcher (Yr.)	Findings
Study on technologies enabling smart work	Coenen and Kok (2014)	A research on the relationship between hot-desking and spreading of telework.
	Corso et al. (2011)	The role of ICT assisting smart working in workplace.
	Kim et al. (2018)	Analysis of the relationship between the intention to continuous smart work and the ICT-based smart work environment.
	Koh et al. (2014)	. Security architecture to protect against security attacks in a smart work environment
	Mazmanian et al. (2005)	Relationship between ICT utilization and work process based on wireless e-mail.
Research on the	Chandola et al. (2019)	The characteristics of employees are most affected by the

relationship between employees and smart work		flexible working system.
	Ko and Kim (2018)	Different decision to the type of flexible work system according to gender.
	Reyt and Wiesenfeld (2015)	Integration of employees based on using mobile devices and computing.
	Sørensen et al. (2005)	The relationship between smart work based on mobile environment and employee motivation.
	Wheatley (2017)	An empirical study on the analysis of gender, , life satisfaction, working and free time in flexible working system.
Analysis on organizational factors regarding smart work	Hoeven and Zoonen (2015)	A study about organizational expectations (psychological climate) and TASW (technology-assisted supplemental work)
	Peretz et al. (2018)	Empirical study on the relationship between flexible working system and organizational/ industrial features with technological advancement, market trend, percentage of female and older employees.
	Schlosser (2002)	An empirical research on how user adapts new types of communication, business process, social context, and self-impressions which affected by the newly emerging technologies utilization.
	Vanajan et al. (2020)	An empirical analysis on whether organizational culture implementing flexible working system had positive effect on reduce work restrictions of older staffs
Others	Coad (1996)	Qualitative research on the relationship among learning-oriented, performance-orientated and smart work.
	Leonardi (2011)	Research for investigating that creating flexible routines and adapting technologies affect to human and material agencies.
	Mann (2012)	Study on the factors that lead successful smart work in the work place are ICT (Information and Communication Technologies), HR (Human Resources), and layout
	Raguseo et al. (2016)	Analysis of smart work with ICT, HR, and office design

Notes: From Ko, E. J., Kim, A. H., & Kim, S. S. (2021)

2.2.2. Positive effects of ICT for employee

ICT has been considered as an important factor that increases productivity especially when investing into R&D, organization assets, and employees (Brynjolfsson & Hitt, 2003). In the same way, some research found that using ICT enables to operate more efficiency, reduce cost, and increase competitiveness at workplace (Tusubira & Mulira, 2004). For example, employees can easily share their working know-how, skills, and knowledge with co-workers (Dewett & Jones, 2001; Madden and Jones, 2008) and improve capability to solve problems

by using ICT (Morgan, Morgan, & Hall, 2000).

Typically, Internet which is commonly used ICT SW in workplace allows for making the foundation of an inspiring work environment that positively influences workers´ motivations that share the preferences of their firm (Martin, 2011). Also, Skype, which is another ICT SW, expands telephone-like conversations to more in a face-to-face manner (Ljung & Wahlforss, 2006). Likewise, the utilization of technology and the internet has helped flexible working, allowing family members flexibility with work hours (Casey, 2012).

That's why working mothers mentioned that using the internet is beneficial to balance work and life because of taking care of business remotely and spending more time with family (Moore, 2006). In other casess related to a way of running business, e-commerce has influenced to speedily connect between suppliers and consumers and improve conducting business transactions (Clayton & Criscuolo, 2002).

Given the above, 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 and SW (Cardona, Kretschmer & Strobel, 2013), and these findings are supported by numerous researchers (Tusubira, Mulira, 2004; Mortagy, Boghikian-Whitby & Mortagy, 2005; Kamaruzzaman, Salled, Zawawi, & Ali, 2010; Kimathi, 2012). However, some studies emphasize both positive and negative effects of ICT (Brough, Timms & Sawang, 2010; Kakabadse, Porter & Vance, 2007; Zorn, Hector & Gibson, 2008; O'Driscoll, Casey, 2012; Day, Scott & Kelloway, 2010;)

2.2.3. Negative effects of ICT for employee

Unfortunately, using ICT devices such as cell phones, laptops, and other communication tools might promote the connection between work and employees beyond usual working hours (Chesley, 2005). In other words, advanced technologies like ICT have

been used to push employees to increase productivity and link with any time with work, so 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 becomes blurred, increasing work demands and hours and feeling higher stress and difficulty **(**Carrol, Howard, Vetere, Peck & Murphy, 2002).

ICT helps implement the flexible work policy via telecommuting; however, it might deepen family-to-work conflict if employees could not be away from their working trap at home. (Golden, Veiga and Simsek, 2006). Hence, this extended work time zone can cause stress for employees and their families by reducing the time-sharing with family to continuous working issues (Chesley, 2005). Consequently, changes in working experiences accompanied with ICT have adverse effects on employees thereby generating unintended problems both psychologically and physically (Coovert & Thompson, 2003; Morgan et al., 2000; Day et al., 2010 ; Korunka & Vitouch, 1999).

The aforementioned findings could be explained as the term technostress, defined as adverse psychophysical effects of ICT use at work (Fuglseth & Sørebø, 2014). According to Bord (1984), an eminent scholar who studies about technostress states this phenomenon is 'The disease of modern people caused by not being able to adapt wisely to new technologies.'. For instance, while people use their computer or mobile phone, they lose track of time or feel connected to their workplace at all times **(**Carrol et al., 2002, Seymour, 2005; Ainley, Enger & Searle, 2008). To sum up, ICT has changed the method to operate organization as well as employees' daily activities), however, it did not result in the only positive way (Rincon, Vecchi & Venturini, 2012).

2.3. ICT for Customers

2.3.1. E-Commerce

E-commerce promotes a company's competitiveness and efficiency by using electronic systems rather than traditional ways like paper works. Therefore, it benefits not only business mans but also customers (Gajewska & Zimon, 2018; Tseng & You, 2005). Moreover, following the advancement of technologies such as the internet, wireless networks, and 5G mobile service (Dong, Z., 2021), e-commerce has become realistically easy to adapt into their business and accessible on a mass scale (Gajewska et al., 2019). Therefore, companies may increase customer satisfaction and loyalty through well-designed web sites or mobile pages, customized information on a diversity of products and reasonable prices (Park & Kim, 2003).

2.3.2. Positive effects of ICT for customer

ICT provides companies with chances to interact more actively with their customers, thus corporations are competitively introducing high-quality services, a wide range of newly launching services, and products to attract customers (Kimiloglu & Zarali, 2009; Al-Khaffaf & Abdellatif, 2013; Xu, Thong & Venkatesh, 2014). One of the effective methods for utilizing ICT in the business is e-commerce, which ie Internet-based communications, and electronic commerce (Leech & Chinworth, 2001). Indeed, the importance of e-commerce such as mailing service, web site is supported by researchers (Carlson & Zmud, 1999; Frederick & Schefter, 2000; Luhmann, 1979). Similarly, how people perceive quality of website is effected to customers' trust in C2C[2] e-commerce (Jones & Leonard, 2008); e-commerce helps to build long-term customer relationships (Chen & Ng, 2004).

In addition, Customer relationship management (CRM) is regarded as a useful instrument to integrate cutting-edge technologies such as websites, data warehousing, mobile

[2] Acronym referencing to customer to customer

application systems, and other related management systems. (Bose, 2002). It is defined as managing and analyzing past, current, and future customers (Bardicchia, 2020). In practice, the operating processes of CRM are based on ICT, which helps identify, developing, integrate customers' data, thereby assisting companies to make strong and friendly relationships for a long time and providing a significant value to customers (Plakoyiannaki & Tzokas, 2002). Similarly, previous research states that CRM can be viewed as a sophisticated application and a set of comprehensive knowledge including analyzed data from buyers' behavior, hidden trends, and consumption pattern, and tools of maximizing organizational performance, and a significant value to customers (Peppard, 2000; Chen & Popovich, 2003; Light, 2003; Ngai, 2005; Lambert, 2010).

Besides, ICT has played a critical role in the major operations of business in the way that Supply Chain Management (SCM), Knowledge Management (KM), and other activities which strengthen their competence (Al-Khaffaf & Abdellatif, 2013). Moreover, ICT ultimately make it possible to increase empowerment by improving better understanding to the customer and manage marketing strategy, and shift business models to customer-oriented (Roberts, 2000).

2.3.3. Negative effects of ICT for customer

Advances in ICT mostly fosters business competition through pushing the creation of new business models to attract and provide better service to customers, thus it could be one of the challenges for ICT service providers to manage their brands (Lyytinen & Rose 2003). Similarly, the effectiveness of ICT is not proved to be a positive outcome in the aspect of social presence (Weisberg, Te'eni & Arman, 2011). Social presence is considered a vital factor in the social context, when social messages are delivered, computer modeling has been widely used to measure its ability. (Short, Williams & Christie, 1976). Nevertheless, some researchers point out that customers feel lower levels of social presence in online shopping compared to

traditional commerce and it influences the negative effect on trust (Blau, 1964; Weisberg et al., 2011)

The second challenge that ICT provider faces is security of e-payment systems. According to Kim, Tao, Shin, & Kim (2010), about 95% of customers are fear about privacy or security issues when they use credit cards in online shopping. Other researchers also mentioned that the security problem had not been completely removed despite emerging advanced technology and adapting diversity of mechanisms to protect privacy information (Chou, Lee, & Chung, 2004; Dai & Grundy, 2007; Kousaridas, Parissis, & Apostolopoulos, 2008). Therefore, e-logistic firms must continuously deal with security issues and develop strategies whereby customers feel their information is being kept secure and trustworthy (Changchit, Garofolo, & Gonzalez, 2009; Chen, & Barnes, 2007).

The last one is the partnership issue. Generally, ICT has positively influenced not only on the products, but also services and created new types of a partnership between consumers and suppliers via various websites (Waseem-Ul-Hameed, Azeem, Aljumah, & Adeyemi, 2018). However, Chen & Ng (2004) found that the quality of the partnership has not significantly affected attracting customers despite the finding that ICT influences CRM performance, partnership quality, and customer lock-in.

III. Theoretical Background

3.1. Technology Acceptance Model (TAM)

The effectiveness of ICT utilization on workers and consumers is analyzed in this reseach, respectively. Therefore, it is assumed that participants in the research questionnaire have an open mind for technology acceptance. Technology acceptance, here, refers to the mechanism by Technology Acceptance Model (TAM).

Davis (1989) was firstly developed TAM (Technology Acceptance Model), and it is rooted on TRA (Theory of Reasoned Action) (Ajzen and Fishbein, 1980). According to TAM, the factors that affect user's attitude for intention to use are two, first element is Perceived Usefulness (PU) which is personal beliefs on using the technology enhances job performance; second one is Perceived Ease of Use (PEOU) which means utilizing technology is effortless (Davis, 1989). In other word, this model is about how people become to adapt and accept technologies.

After Davis (1989) mentioned TAM, some researchers continuously have studied the relationship between two factors (Hendrickson, Massey & Cronan 1993; Subramanian 1994; Szajna 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. Employee Satisfaction

3.2.1. Maslow's Hierarchy of Needs

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, S., 2007). Maslow (1954) initially introduced his theory about how people satisfy numerous personal needs in the context of their work. More specifically, there are five stages- Physiological needs, Safety needs, Love and social belonging needs, Esteem needs, Self-actualization-from bottom to top, and each person is ready to move upper stage only if the lower-level needs are fulfilled (Huitt, W., 2007).

3.2.2. Herzberg's Two Factors Theory

Herzberg (1959) declared a two-dimensional paradigm of factors affecting people's

attitudes towards work. He found out elements affecting satisfaction and dissatisfaction with a job, and these two categories could not be dependably measured on the same field (Herzberg et al., 1959). The factors influencing satisfaction called Motivators which include challenging work, achievement, responsibility, opportunity toward meaningful task, participation in decision making, sense of importance in the workplace, and other factors related positive satisfaction; while Hygiene factors that does not give positive satisfaction like salary, job security, welfare, work conditions, insurance, vacations (Hackman, J. R., & Oldham, G. R., 1976). Likewise, Herzberg (1959) argues that Hygiene factors must be eliminated to make a satisfactory working environment.

3.2.3. Expectancy Theory

Vroom (1964) firstly developed this theory based on cognitively-oriented assumptions (Lawler III, E. E., & Suttle, J. L., 1973), and it is a motivation theory commonly used in the workplace (Campbell and Pritchard, 1976). He referred motivation as a process of doing choices among alternative forms of voluntary activities, and this process is operated by interacting with three variables: expectancy (E), instrumentality (I) and Valence (V) (Chiang, C. F., & Jang, S. S., 2008). In this theory, expectancy means certain act will be leaded to an outcome; instrumentality stated the belief when expectation is fulfilled, a person will take a reward; valence defined the influential factors like value, needs, goals which are the probable outcome from a person's action (Isaac, R. G., Zerbe, W. J., & Pitt, D. C., 2001). Furthermore, Vroom (1964) asserted motivational force is the multiplication of three elements. Therefore, if each element reaches its maximum value, it is the greatest motivation, but if each element has at least one zero, it is not the motivation (Vroom, 1964).

3.3. Customer Satisfaction

3.3.1. Expectancy Disconfirmation Paradigm

Expectancy Disconfirmation Paradigm (EDP), developed by Oliver (1977, 1980), is a cognitive theory considered the most promising theoretical framework adapted in several research fields like marketing, customer studies, and information systems (Bhattacherjee, 2001). This paradigm explains satisfaction as a function of three variables: perceived performance, disconfirmation of beliefs, expectations (Oliver 1977, 1980). According to his research, EDP infers that customers buy goods and services with expected performance before purchasing them, and that expectation level becomes criteria to evaluate the goods and services. Once the product or service has been used, therefore, outcomes are judged by expectations, and customer's satisfaction would be confirmed if post-purchase performance matches the expectation. At the same time, disconfirmation could be occurred if not coincides (Oliver 1977, 1980).

3.3.2. The Comparison Level Theory

Unlike the EDP (Oliver 1977, 1980) which emphases the main element of customer satisfaction is perceived expectation, LaTour & Peat (1979) asserted that customer satisfaction could be influenced by experience based on norms playing a role as a standard, other customer's feedback or other external factors like advertisement, experience and that of other customers. In other words, their Comparison Level Theory (CLT) implies that diverse comparison levels from situationally induced expectations might mainly affect customer satisfaction (LaTour & Peat, 1979).

3.3.3. The Attribution Theory

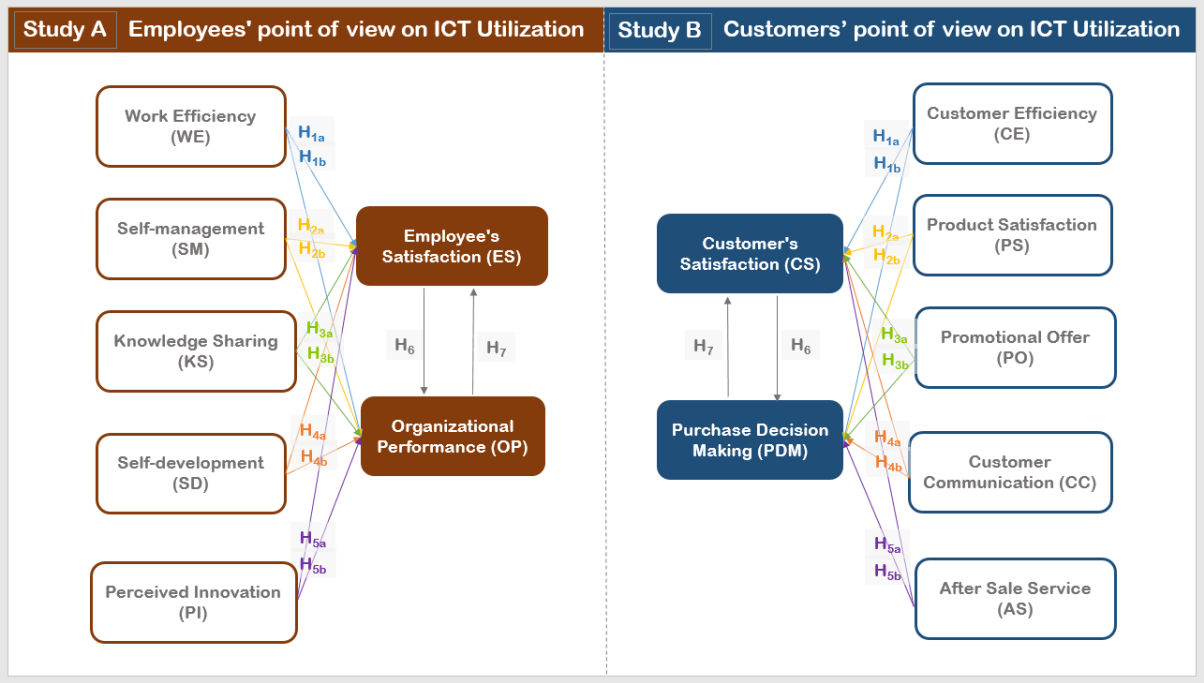
Past models of attribution theory focused on anticipating consumers' reactions (Huang and Smith, 1996). However, Weiner, Frieze and Kukla's (1971) developed Attribution Theory,

which emphasizes dissatisfaction and complaining behavior than in satisfaction. Specifically, this theory assert that customer purchasing process works by the mechanism in attributional operation engaging customers, not pre-expectation, norm or standards (Bitner, 1990). According to this theory, customers are as rational group of people who find exact reasons of purchase as successes or failure outcomes (Folkes, 1984).

Ⅳ. Hypotheses Developments

Five variables were derived from previous reviews for each study, and the following research model was developed.

Figure 1. Research Model



[Study 1] Employees' Perception on ICT Utilization

4.1. Effects of Work Efficiency by ICT Utilization 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). Some researchers argued that ICT utilization helps to increase work efficiency. For example, the advantages of telework are the increase in employees' productivity and flexibility (Perez, Sanchez & Carnicer, 2002). Likewise, adopting smart work by utilizing ICT helps to reduce time to commute, enhances work productivity, and achieves 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 vital and significant variables of ICT utilization for employee satisfaction and organizational performance (for the rest of the parts, a: employee satisfaction, b: organizational performance)

$H1_a$: The perception of work efficiency by ICT utilization affects employee satisfaction.

$H1_b$: The perception of work efficiency by ICT utilization affects organizational performance.

4.2. Effects of Self-Management by ICT Utilization 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). Several researchers mentioned self-management in the workplace. For instance, the concept of self-management includes highly motivated, proactive and initiative workers (Hackman's, 1986; Wellins st al., 1990) and self-managing interdependent individuals describe self-regulated people whose behavior emphasizes group autonomy and allows individual individual autonomy (Cohen & Ledford, 1994). Typically, some studies

observed self-management groups positively affect their performance and attitudes (Guzzo & Dickson, 1996; Cohen & Bailey, 1997), while others investigate the relationship between self-management and leadership (Manz & Sims, 1987; Cohen, Ledford & Spreitzer, 1996). Based on the statement above, following hypothesis are developed:

$H2_a$: The perception of self-management by ICT utilization affects employee satisfaction.

$H2_b$: The perception of self-management by ICT utilization affects organizational performance.

4.3. Effects of Knowledge Sharing by ICT Utilization 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). Similarly, another researcher states it defines as a social interaction that influences employees' knowledge, capability, and experiences in the workplace (Lin, 2007). Furthermore, knowledge management system bases on knowledge sharing which is considered a vital element in the workplace (Alavi & Leidner, 2001; Earl, 2001); because it provides chances to maximize organizational capacity thereby generating competitive advantage of business (Reid, 2003). Likewise, aseveralstudies have proven that knowledge sharing is crucial since it helps organizations produce innovative ideas and better performance and reduce dispensable learning efforts by each employee (Calantone et al., 2002; Scarbrough, 2003). That's why, ultimately, effective knowledge sharing not only individual level but also organizational is emphasized by researchers (Fisher & Fisher, 1998; Tobin, 1998). Thus, this paper hypothesized the followings:

$H3_a$: The perception of knowledge sharing by ICT utilization affects employee satisfaction.

$H3_b$: The perception of knowledge sharing by ICT utilization affects organizational performance.

4.4. Effects of Self-Development by ICT Utilization on Employees Satisfaction and Organizational Performance

Definition of self-development is referred 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). Another concept is employee self-development whereas active and self-starting action for better performance and capability (Boyce, Zaccaro, & Wisecarver, 2010; London & Smither, 1999) as well as the important element for gaining the quality of being employable and capability of career adaptation (Noe, Clarke, & Klein, 2014; Savickas et al., 2009). Hence, the value of self-development has been paid attention to the organizations (Orvis & Ratwani, 2010) facing increased pressure to reduced costs of training programs (O'Toole & Lawler, 2006). Based on the statement above, fourth hypotheses are developed the following:

$H4_a$: The perception of self-development by ICT utilization affects employee satisfaction.

$H4_b$: The perception of self-development by ICT utilization affects organizational performance.

4.5. Effects of Organizational Innovation by ICT Utilization on Employees Satisfaction and Organizational Performance

Innovation is explained that adopting or generating new into product, purchased device, system, process, policy and program (Daft, 1982; Damanpour & Evan, 1984; Zaltman, Duncan,

& Holbek, 1973). Likewise, 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 (Thompson, 1965; Zaltman et al., 1973, Daft, 1978; Damanpour & Evan 1984). Especially, Schumpeter (1934) is a widely acknowledged researcher who creates five types of innovations in two ways which are process and product innovation: when it comes to process innovations, it includes new methods of production and using new sources for raw material or semi-finished products; on the other hands, there are three types of product innovations: a new quality of productions, opening a new market, and a new industry structure like establishing a new market position. (Harvey, Kiessling & Moeller, 2010).

There are several studies investigating innovation. For instance, Battisti and Stoneman (2010) observe the interactions within different types of innovation; Evangelista and Vezzani (2010) explore the organizational performance following product, process, and organizational innovations; Mohnen and Roller's (2005) argue there are four elements to make difficult to innovation: capacity of knowledge in and outside of the company, risk management, financial aspect, and regulation. As can be seen, organizational innovation is the essence in workplace. Therefore, this paper hypothesized the followings:

$H5_a$: The perception of organizational innovation by ICT utilization affects employee satisfaction.

$H5_b$: The perception of organizational innovation by ICT utilization affects organizational performance

4.6 Effects of ICT Utilization on Employee Satisfaction and Organizational Performance

The majority of research states that satisfaction and performance are not strongly related each other (Baryfield & Crockett, 1995; Laffaldano & Muchinsky, 1985; Locke, 1976; Christina & Dogan, 2009); however, it might be measurement problems (Fisher, 1980) which includes restriction to approach organizational performance (Bhagat, 1982; Herman, 1973), personal features (Steers, 1975) or other reasons (Laffaldano & Muchinsky, 1985; Porter & Lawler, 1968). Other studies point out that the satisfaction and employees' well-being such as social gifts or any kind of reward system can influence effectiveness by inducing productivity-related behavior (Kopelman, Brief & Guzzo, 1990; McGregor, 1960; Roethlisberger, 1959). Similarly, Koys (2003) mentions that employee satisfaction could an important factor in achieving financial performance in company. Overall, the relationship between employee satisfaction and organizational performance still appears to be unclear. Thus, the following hypothesis is established in this study:

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

H7: Increasing organizational performance by ICT utilization effects on employee satisfaction

[Study 2] Customers' Perception on ICT Utilization

4.1. Effects of Customer Efficiency by ICT Utilization on Customer Satisfaction and Purchase Decision Making

Previous studies repot that positive relationship between customer efficiency and organizational performance such as loyalty and profitability (Chase 1978, 1981; Lovelock and

Young 1979; Bitner et al. 1997; Xue and Harker, 2002). Typically, according to Xue and Harker (2002,), customer efficiency defines as follow:

> *Customer efficiency:* Customer A is evaluated as more efficient than Customer B if Customer A consumes fewer inputs to produce at least the same amount of certain outputs as Customer B, or if Customer A produces more outputs using at most the same amount of certain inputs as Customer B (p259).

Xue and Harker (2002) proposed a customer efficiency measurement (CEM) framework whereby utilizing directly measures to customer outputs as well as input such as time and effort; on the other hand, Xue, Hitt and Harker (2007) examine customer efficiency through revealed channel choice which is a different approach. Instead, Bayraktar, Tatoglu, Turkyilmaz, Delen & Zaim (2012) investigate that customer satisfaction and loyalty (CS&L) positively affect companies' competitiveness, such as larger market shares and higher profitability. Accordingly, the previous findings lead to hypothesize the followings (for the rest of the hypotheses, a: customer satisfaction, b: purchase decision making):

$H1_a$: The perception of customer efficiency by ICT utilization affects customer satisfaction.

$H2_b$: The perception of customer efficiency by ICT utilization affects purchase decision making.

4.2. Effects of Product Satisfaction by ICT Utilization on Customer Satisfaction and Purchase Decision Making

Thanks to the advancement of ICT such as microchips, software, hardware, sensors, and other related technologies, products in the market are more useful and –'smart-'; because,

business can easily access customers' data via new forms of collecting, processing, and producing tools (Rijsdijk, Hultink & Diamantopoulos, 2007). Hence, product satisfaction becomes an important issue since the customer who is dissatisfied with the product can limit their sharing attitude toward business (Anderson, Engledow & Becker, 1979).

That is why some researchers mention on product satisfaction (Burroughs and Rindfleisch, 2002; Wang and Wallendorf, 2006); and other studeis argue that examining the relationship between product satisfaction and equity perceptions regarding the parties to the transaction (Fisk and Coney, 1982; Fisk & Young,1985; Mowen & Grove ,1983). Moreover, prior research points out that a main explanatory variable of disconfirmation is variables related to make satisfaction decrease on disconfirmation and product satisfaction (Swan & Trawick, 1981; Bearden & Teel, 1983; Oliver, 1980; Oliver & DeSarbo, 1988). Therefore, our second hypotheses are set according to the literature above:

$H2_a$: The perception of product satisfaction by ICT utilization affects customer satisfaction.

$H2_b$: The perception of product satisfaction by ICT utilization affects purchase decision making.

4.3. Effects of Customer Communication by ICT Utilization on Customer Satisfaction and Purchase Decision Making

The customers' behavior of communication has changed with the rise of smartphones and applications since the 2010s, in addition, increasing use of newly developing technologies helps create opportunities chances in their business (Sarwar and Soomro, 2013). Likewise, as technology evolves, there are more tools helping organization effective communication with customers, for example, WhatsApp or Facebook which makes it possible to take and receive the messages with others (Baier, Rese & Roglinger, 2018) or improved way to deliver speech

or text (Shankar, 2018). And besides that, chatbots, considered as a potential tool for the future consumer services (della Cava, 2016); in this sense, a chatbot is an on-line based chatting application which utilize voice or text messages rather than providing direct contact with a live human agent (EST, 2020). Based on the argument above, this study developed following hypotheses:

$H3_a$: The perception of customer communication by ICT utilization affects customer satisfaction.

$H3_b$: The perception of customer communication by ICT utilization affects purchase decision making.

4.4. Effects of Promotional Offers by ICT Utilization on Customer Satisfaction and Purchase Decision Making

Coupons, premiums, rebates an,d samples are considered as representative resources of marketing wh,ich allocated siga nificant portion of budthe get of total promotional offers in the company (D'Astous & Jacob, 2002). This proves that promotional expenditures exceed advertising expenditures in European countries (Leeflang & van Raaij, 1995). Especially, when it comes to the effective type of promotional offers, many researchers point out that price discounts and bonus packs are the most attractive factors for customers (Carlson, 2018; Chen, Marmorstein, Tsiros & Rao 2012; Hardesty and Bearden, 2003; Palazon and Delgado-Ballester, 2009); because providing sales of discounts are recognized as decreasing damages and increasing benefits (Kahneman and Tversky, 1979, 1984).

In addition, regarding the function of promotional offers, they helps to generate customer visits and purchases and well-known products and brands over a limited period (Mussol, Aurier & Lanauze, 2019). Moreover, promotional offers assist to establish long-run relationship with customers (Kim, 2019); the extra money saved allows customers to buy more

products (Heilman, Nakamoto & Rao, 2002; Palazon and Delgado-Ballester, 2009; Hardesty and Bearden, 2003). Namely, promotion tools are the vital element that affects customers' purchase (Kuo, Chuang, Huang & Wu 2019). Therefore, based on this this academic background, it is hypothesized the followings:

$H4_a$: The perception of promotional offers by ICT utilization affects customer satisfaction.

$H4_b$: The perception of promotional offers by ICT utilization affects purchase decision making.

4.5. Effects of After-Sale Service by ICT Utilization on Customer Satisfaction and Purchase Decision Making

Activities related to after-sale service include installation product, exact warranty terms and time, timely delivery, proper feedback from customers on product or service they purchased, process on enhancing product or service; and whole work fulfilling as well as satisfying customers' need (Ali, Muhammad, Rashid, Zafarullha & Asif, 2011). Many studies emphasize the importance of after-sale service in the business. For examples, Saccani, Johansson & Perona (2007) mention that it is linked with profitability and competitiveness of company, since spare parts and after-sales service are proved to be three times more important in profitable indicator than the original purchases during the life cycle of a product, especially in the case of manufacturing industries.

Also, after-sale service helps to retaining and making strong relationship with customer whereby one of the essential factors in customer relationship marketing (CRM) (Kotler and Armstrong, 2010). In addition, proper after-sale service has significant impact on customer satisfaction and organizational performance (Shaharudin, Elias, & Mansor, 2009); Providing

after-sale service continuously is vital to assist marketing strategy and increase customer loyalty, extending service, productivity of organization in a long period, because it is secured the market power (Roya & Bahram, 2019; Saccani, 2006; Vitasek, 2005). Thus, in present study, it is hypothesized the followings:

$H5_a$: The perception of after-sale service by ICT utilization affects customer satisfaction.

$H5_b$: The perception of after-sale service by ICT utilization affects purchase decision making.

4.6. Effects of ICT Utilization on Customer Satisfaction and Purchase Decision Making

Internet helps to easily and quickly convey plenty of information to customers; providing better information has positively influenced the customers (Lee, Strong, Kahn & Wang, 2002; Lurie & Mason, 2007). Similarly, when it comes to the relationship between information quality and customer satisfaction towards their decision making, unconscious thought plays a role of moderator when customers purchase goods or service via online, thus, researchers claims that websites design is the worthwhile factor in e-commerce (Gao, Zhang, Wang & Ba, 2012).

In this context, other variables to be considered in online shopping are ease of use and fun and several exogenous elements like traits of customer and product, previous experience and trust, situational factors (Monsuwe, Dellaert & Ruyter, 2004). Another important explanation is related to customer satisfaction. It shows how many customers are satisfied and how much their expectations are fulfilled; ultimately, customer satisfaction is links with customer loyalty and company's performance (Bayraktar et al., 2012; Loveman, 1998).

According to the studies, customer satisfaction is positive effected by perceived quality (Fornell, Michael, Eugene, Jaesung & Barbara, 1996); the image such as a consequence of

being reliable, contribution to society, professional and innovation, and adding prestige to its user is also vital dimension of customer satisfaction model (Martensen, Kristensen & Gronholdt, 2000). Finally, regarding the customer purchase decision making, research mentions that service quality, equity and value, customer satisfaction, past loyalty, expected switching cost, and brand preference are the factors influencing customer purchase intention (Hellier et al., 2003).

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

H7: Increasing purchase decision making by ICT utilization effects on customer satisfaction.

Ⅴ. Methodology

This research analyzes the elements that affect the economic growth by ICT in the aspect of both employees and customers. Therefore, the perceptions and experiences of employees and customers associated to each factor mentioned in previous section need to be studied to find the relations the factors – work efficiency, self-management, knowledge sharing, self-development, organizational innovation for employees' point of view; purchase efficiency, product satisfaction, promotional offers, customer communication, after sales service for customers' viewpoint.

In this regard, this study conducted an online survey via an anonymous link from Qualtrics, efficiently creating and distributing questionnaires and collecting responses without any errors. Furthermore, the validity of the questionnaire between the two versions of the languages was verified by back translation. This survey was distributed to 335 participants through web site and SNS, and total 272 respondents completed the survey; the response rate

is 81%. When it comes to employee's part only for participants having a work experience including the part-time job, 240 respondents conducted the survey, therefore, respondents with work experience accounted for 88.2% of the total.

The questionnaire consisted of total 41 questions but participants who haven't had any work experience including the part-time job have to skip questions for employees' part and mark only 24~28 questions for customers'; it was divided into four parts; common warm-up questions for both employees and customers, employees' perspective, customers' perspective and demographic questions. Especially, this survey adopted a 5-point Likert scale in which 1 demonstrates 'strongly disagree' and 5 indicates 'strongly agree'.

The respondents were asked to answer the questions on their daily experience usage of ICT in part 1. Part 2 is only for the people with work experience. There are three warm-up questions for investigating ICT experience in the workplace and six main questions related to each variable for perception of employees. Next, from seven to eleven questions to help recall customer's ICT usage when they purchase items, and six main questions related each variable for customers' perception in Part 3. Lastly, this survey finalized six demographic questions such as gender, age, residence, marriage, education level and occupational status, and four additional questions only for the employed respondents to verify the field of working, working experience, position in the organization annual income.

Finally, to check reliability, this study conducted Cronbach's alpha tests in Table 5 and 6.

Table 5. Construct Scales of the Factors of ICT Utilization from employees' perception

Factors	Statements	Data Items
Work Efficiency	1. Improving work efficiency by utilizing ICT is important for workers. 2. ICT utilization helps me reduce the time required to do the same work. 3. ICT utilization helps me do more work in the same period of time. 4. ICT utilization helps me achieve better results in the same period of time.	

	5. ICT utilization has a positive effect on business efficiency. 6. Increasing operational efficiency by ICT utilization is useful for improving the performance of the organization. ⇨ **Cronbach's Alpha**	**0.875**
Self-Management	1. Systematic self-management by utilizing ICT is important for workers. 2. ICT utilization is useful for business schedule management. 3. ICT utilization is useful for personal health management. 4. ICT utilization is useful for human network management. 5. ICT utilization has a positive effect on self-management. 6. Self-management by ICT utilization is useful for improving the performance of the organization. ⇨ **Cronbach's Alpha**	**0.748**
Knowledge Sharing	1. Sharing knowledge by utilizing ICT is important for workers. 2. ICT utilization helps me share work know-how in the workplace. 3. ICT utilization help me share my work experience with others. 4. ICT utilization is useful for acquiring business knowledge in other fields. 5. ICT utilization has a positive impact on knowledge sharing. 6. Knowledge sharing by ICT utilization is useful for improving the performance of the organization. ⇨ **Cronbach's Alpha**	**0.868**
Self-Development	1. Self-development by utilizing ICT is important for workers. 2. ICT utilization helps me improve job related skills. 3. ICT utilization helps me improve communication skills. 4. ICT utilization helps me acquire knowledge. 5. ICT utilization has a positive impact on self-development. 6. Self-development by ICT utilization is useful for improving the performance of the organization. ⇨ **Cronbach's Alpha**	**0.825**
Organizational Innovation	1. Organizational innovation by utilizing ICT is important for workers. 2. The advantages of ICT utilization are useful for organizational innovation. 3. ICT utilization does not conflict with social norms. 4. If I learn how to use ICT well, I will continue to use it. 5. ICT utilization has a positive impact on organizational innovation. 6. Organizational innovation by ICT utilization is useful for improving the performance of the organization. ⇨ **Cronbach's Alpha**	**0.841**
Employee Satisfaction	1. Increasing worker satisfaction by ICT utilization helps to improve the performance of the organization. 2. Increasing worker satisfaction by ICT utilization helps for economic growth. ⇨ **Cronbach's Alpha**	**0.735**
Organizational Performance	1. Increasing worker satisfaction by ICT utilization helps to improve the performance of the organization. 2. Improving the performance of the organization t by ICT utilization is helpful for economic growth. ⇨ **Cronbach's Alpha**	**0.818**

Table 6. Construct Scales of the Factors ICT Utilization from customers' perception

Factors	Statements	Data Items
Purchase Efficiency	1. Improving purchasing efficiency by utilizing ICT is important for customers. 2. ICT utilization helps me reduce the time required to search information of the product or service . 3. ICT utilization helps me search more information of the product or service in the same period of time. 4. ICT utilization helps me search better information of the product or service in the same period. 5. ICT utilization has a positive effect on purchasing efficiency. 6. Increasing purchasing efficiency by ICT utilization is useful for purchasing decision making. ⇨ **Cronbach's Alpha**	**0.853**
Product Satisfaction	1. Improving product satisfaction by utilizing ICT is important for customers. 2. ICT utilization is helpful to produce more convenient products to the costumers. 3. ICT utilization helps to create customized products. 4. ICT utilization helps to create more sophisticated products. 5. ICT utilization has a positive impact on product satisfaction. 6. Increasing product satisfaction by ICT utilization is useful for purchasing decision making. ⇨ **Cronbach's Alpha**	**0.844**
Promotional Offers	1.Providing promotion by utilizing ICT is important for customers. 2.ICT utilization is useful for providing coupons, mileage to customers. 3.ICT utilization is useful for accumulating coupons, managing mileages or points to customers. 4.Providing promotional services by ICT utilization is helpful to purchase. 5.ICT utilization has a positive impact on the promotional offer. 6.Providing promotion by ICT utilization is useful for purchasing decision making. ⇨ **Cronbach's Alpha**	**0.919**
Customer Communica -tion	1.Customer communication by utilizing ICT is important for customers. 2.ICT utilization helps sellers effectively respond to customer inquiries. 3.ICT utilization helps customers share their purchasing experience with others. 4.ICT utilization is helpful for communication between sellers and customers. 5.ICT utilization has a positive impact on customer communication. 6.Communicating with customers by ICT utilization is useful for purchasing decision making. ⇨ **Cronbach's Alpha**	**0.876**
After sales Service	1. After sale service utilizing ICT is important for customers. 2.ICT utilization is helpful to check the progress of the delivery to the purchased goods. 3.ICT utilization is useful for the refund or exchange conveniently. 4.ICT utilization helps to improve the after sale service. 5.ICT utilization has a positive effect on the after sale service. 6.After sale service using ICT by ICT utilization is useful for purchasing decision making. ⇨ **Cronbach's Alpha**	**0.863**
Customer Satisfaction	1. Increasing customer satisfaction by ICT utilization helps purchase decision making. 2. Increasing customer satisfaction by ICT utilization is helpful for economic growth . ⇨ **Cronbach's Alpha**	**0.730**
Purchase Decision Making	1. Increasing customer satisfaction by ICT utilization helps purchase decision making. 2. Increasing purchasing decision making by ICT utilization is useful for economic growth . ⇨ **Cronbach's Alpha**	**0.724**

Ⅵ. Data Analysis

6.1. Demographics

Among 272 respondents, 51.5% are male, and 48.5% are female. Regarding the age distribution of the respondents, 34.9% were twenties, 36.4% were thirties, 23.9% were forties, 3.3% were fifties, 1.5% were over sixties. When it comes to Occupation Field or Status, 19.1% were Small and Medium-sized firms with the highest number of respondents, 18.8% were students, 15.1% were Public field, 11.4% Educational field. For more details on other variables such as education, marital status and employment of the respondents, the sample's demographics are listed in Table 7.

Table 7. Demographic Information of Survey

Variables	Category	Total (N=272)	
		Percentage (%)	Frequency
Gender	Male	51.5	140
	Female	48.5	132
Age	20~29	34.9	95
	30~39	36.4	99
	40~49	23.9	65
	50~59	3.3	9
	Over 60	1.5	4
Occupation Field/Status	Own business	8.1	22
	Educational field	11.4	31
	Medical field	4.0	11
	Public field	15.1	41
	Religious field	1.8	5
	Legal field	2.2	6
	Small and Medium-sized firms	19.1	52
	Big Corporation	6.6	18
	Foreign Company	0.7	2
	PR and Broadcasting Company	1.5	4
	Student	18.8	51
	Housekeeper	2.2	6
	Part-time job	1.5	4
	Preparing for employment	6.3	17
	No occupation	0.7	2
Residence	Seoul, Gyonggi and Incheon	55.5	151
	Gangwon	4.4	12
	Gyeougsang	2.6	7

	Jeolla	29.0	79
	Chungchenong	7.4	20
	Jesu	0.4	1
	Abroad	0.7	2
Marital status	Marriage	41.2	112
	Unmarried	58.8	160
Education Level	Graduated from high school or less	13.2	36
	College (2~3yrs.)	8.1	22
	University (4 yrs. and over)	59.2	161
	Master's degree	17.3	47
	Doctoral degree	2.2	6

Among 272 respondents, 69.5% were employees who answered detailed-questionnaires regarding information for employees such as specific job, working experience, organizational position, annual income. Results of the survey are listed in Table 8.

Table 8. Additional Information on Employees

Variables	Category	Total (N=189)	
		Percentage (%)	Frequency
Specific job	Administrative affair	29.1	55
	Marketing and Sales	8.5	16
	Design, Art, Cook and Entertainment	9.0	17
	Research	11.6	22
	Construction, Process Mgt., Quality Mgt.	6.9	13
	Finance and accounting	7.4	14
	Service	16.9	32
	Other	10.6	20
Working Experience	Less than 3 years	20.3	38
	3 year ~ Less than 5 years	18.7	35
	5 year ~ Less than 10 years	27.8	54
	10 year ~ Less than 15 years	18.7	35
	15 year ~ Less than 20 years	7.5	14
	Over 20 years	7.0	13
Organizational Position	CEO, General Manager	13.2	25
	Manager	13.2	25
	Middle Manager	19.6	37
	Assistant	39.7	75
	Work alone	14.3	27
Annual Income	Less than 30 million won	47	24.9
	30 million ~ Less than 40 million won	52	27.5
	40 million ~ Less than 50 million won	35	18.5
	50 million ~ Less than 60 million won	26	13.8

	60 million ~ Less than 70 million won	8	4.2
	70 million ~ Less than 80 million won	8	4.2
	Over 80 million won	13	6.9

6.2. Validity Testing

To develop a validity test, the present research executed a factor analysis for the determinants data items, utilizing main components as the extraction method and varimax rotation of Kaiser Normalization. The same method was used for survey items of study 1 and 2. The altogether items utilized in the research resulted in values above 0.6. Consequently, the items with the high loadings are essential to personify the assemble of each variable. Table 9 and 10 summarized the factor analysis result from the study 1 and 2 respectively.

Table 9. Component Matrix: Employees' Perception
(Work Efficiency, Self-Management, Knowledge Sharing, Self-Development, Organizational Innovation)

Category		Components				
Factors	Scale Items	1	2	3	4	5
WE_3	ICT utilization helps me do more work in the same period of time.	0.826				
WE_4	ICT utilization helps me achieve better results in the same period of time.	0.808				
WE_5	ICT utilization has a positive effect on business efficiency.	0.803				
WE_1	Improving work efficiency by utilizing ICT is important for workers.	0.766				
WE_2	ICT utilization helps me reduce the time required to do the same work.	0.763				
WE_6	Increasing operational efficiency by ICT utilization is useful for improving the performance of the organization.	0.750				
SM_3	ICT utilization is useful for personal health management.		0.787			
SM_5	ICT utilization has a positive effect on self-management.		0.741			
SM_4	ICT utilization is useful for human network management.		0.741			
KS_3	ICT utilization help me share my work experience with others.			0.817		
KS_2	ICT utilization helps me share work know-how in the workplace.			0.801		
KS_6	Knowledge sharing by ICT utilization is useful for improving the performance of the organization.			0.799		
KS_1	Sharing knowledge by utilizing ICT is important for workers.			0.765		

KS_4	ICT utilization is useful for acquiring business knowledge in other fields.			0.750		
KS_5	ICT utilization has a positive impact on knowledge sharing.			0.724		
SD_5	ICT utilization has a positive impact on self-development.				0.804	
SD_2	ICT utilization helps me improve job related skills.				0.773	
SD_6	Self-development by ICT utilization is useful for improving the performance of the organization.				0.769	
SD_1	Self-development by utilizing ICT is important for workers.				0.764	
SD_4	ICT utilization helps me acquire knowledge.				0.710	
SD_3	ICT utilization helps me improve communication skills.				0.600	
OI_6	Organizational innovation by ICT utilization is useful for improving the performance of the organization.					0.878
OI_5	ICT utilization has a positive impact on organizational innovation.					0.861
OI_2	The advantages of ICT utilization are useful for organizational innovation.					0.852
OI_1	Organizational innovation by utilizing ICT is important for workers.					0.792
OI_4	If I learn how to use ICT well, I will continue to use it.					0.632
OI_3	ICT utilization does not conflict with social norms.					0.513

Table 10. Component Matrix: Customers' Perception
(Purchase Efficiency, Product Satisfaction, Promotional Offers, Customer Communication, After sales Service)

Category		Components				
Factors	Scale Items	1	2	3	4	5
PE_5	ICT utilization has a positive effect on purchasing efficiency.	0.813				
PE_3	ICT utilization helps me search more information of the product or service in the same period of time.	0.767				
PE_4	ICT utilization helps me search better information of the product or service in the same period of time.	0.762				
PE_6	Increasing purchasing efficiency by ICT utilization is useful for purchasing decision making.	0.754				
PE_2	ICT utilization helps me reduce the time required to search information of the product or service .	0.749				
PE_1	Improving purchasing efficiency by utilizing ICT is important for customers.	0.714				
PS_5	ICT utilization has a positive impact on product satisfaction.		0.794			
PS_6	Increasing product satisfaction by ICT utilization is useful for purchasing decision making.		0.779			
PS_2	ICT utilization is helpful to produce more convenient products to the costumers.		0.764			
PS_3	ICT utilization helps to create customized products.		0.762			

PS_4	ICT utilization helps to create more sophisticated products.		0.714			
PS_1	Improving product satisfaction by utilizing ICT is important for customers.		0.704			
PO_4	Providing promotional services by ICT utilization is helpful to purchase.			0.869		
PO_2	ICT utilization is useful for providing coupons, mileage to customers.			0.853		
PO_5	ICT utilization has a positive impact on the promotional offer.			0.852		
PO_3	ICT utilization is useful for accumulating coupons, managing mileages or points to customers.			0.842		
PO_6	Providing promotion by ICT utilization is useful for purchasing decision making.			0.839		
PO_1	Providing promotion by utilizing ICT is important for customers.			0.811		
CC_4	ICT utilization is helpful for communication between sellers and customers.				0.860	
CC_2	ICT utilization helps sellers effectively respond to customer inquiries.				0.793	
CC_1	Customer communication by utilizing ICT is important for customers.				0.778	
CC_5	ICT utilization has a positive impact on customer communication.				0.770	
CC_6	Communicating with customers by ICT utilization is useful for purchasing decision making.				0.769	
CC_3	ICT utilization helps customers share their purchasing experience with others.				0.751	
AS_5	ICT utilization has a positive effect on the after sale service.					0.857
AS_6	After sale service using ICT by ICT utilization is useful for purchasing decision making.					0.819
AS_4	ICT utilization helps to improve the after sale service.					0.819
AS_1	Aftercare utilizing ICT is important for customers.					0.719
AS_2	ICT utilization is helpful to check the progress of the delivery to the purchased goods.					0.705
AS_3	ICT utilization is useful for the refund or exchange conveniently.					0.697

6.3. Hypotheses Testing

[Study 1] Employees' Perception on ICT Utilization

This study applied factor scores for regression analyses. Table 8 represents the results of multiple regression analysis for factors that determine employee satisfaction. The results demonstrate that the model is statistically significant at the at .000 level with F=56.889 (r-square=.567), indicating the self-management, self-development and organizational innovation

are found to be significant factors affecting employee satisfaction.

Table 11. Effects of Determinants of Employee Satisfaction

NO.	Variable (Independent → Dependent)	Standardized Coefficient	*t*-value	*Sig. (p)*
H1$_a$	Work Efficiency → Employee Satisfaction	.090	1.375	.171
H2$_a$	Self-Management → Employee Satisfaction	.114	2.010	.046**
H3$_a$	Knowledge Sharing → Employee Satisfaction	-.098	-1.413	.159
H4$_a$	Self-Development → Employee Satisfaction	.291	4.135	.000***
H5$_a$	Organizational Innovation → Employee Satisfaction	.451	6.342	.000***

*** p < 0.01, ** p <0.05, * p < 0.1 denotes statistical significance

For the effect of the organizational performance by ICT utilization, the results of the regression analysis are presented in Table 9. The results find the model significant at the .000 level with F=53.949 (r-square= .554). This results indicate that the five variables affect organizational performance. Among the five variables, it was found that self-development and organizational innovation significantly affect the organizational performance whereas work efficiency, self-management and knowledge sharing were found to be not significantly related with social adjustment.

Table 12. Effects of Determinants of Organizational Performance

NO.	Variable (Independent →Dependent)	Standardized Coefficient	*t*-value	*Sig. (p)*
H1$_b$	Work Efficiency → Organizational Performance	.095	1.426	.155
H2$_b$	Self-Management → Organizational Performance	.089	1.554	.122
H3$_b$	Knowledge Sharing → Organizational Performance	.024	.342	.733
H4$_b$	Self-Development → Organizational Performance	.188	2.621	.009***
H5$_b$	Organizational Innovation → Organizational Performance	.458	6.340	.000***

*** p < 0.01, ** p <0.05, * p < 0.1 denotes statistical significance

Table 13 shows that the results of the regression analysis of H6 and H7. The results find the models significant at the level of .000 with F=1010.448 (r-square = .817). Based on the

findings, H6 and H7 were significantly accepted.

Table 13. Effects of Determinants of Employee Satisfaction and Organizational Performance

NO.	Variable (Independent →Dependent)	Standardized Coefficient	*t*-value	*Sig. (p)*
H6	Employee Satisfaction → Organizational Performance	.904	31.788	.000***
H7	Organizational Performance → Employee Satisfaction	.904	31.788	.000***

*** p < 0.01, ** p <0.05, * p < 0.1 denotes statistical significance

The results of the hypotheses testing on employees' perception of five variables by ICT utilization can be summarized as following.

Table 14. Summary of Hypothesis Testing Results (Employee)

Category		Hypothesis Tested	Result
H1	**Work Efficiency → Employee Satisfaction(a), Organizational Performance(b)**		
	$H1_a$	The perception of work efficiency by ICT utilization affects employee satisfaction.	Not Accepted
	$H1_b$	The perception of work efficiency by ICT utilization affects organizational performance.	Not Accepted
H2	**Self-Management → Employee Satisfaction(a), Organizational Performance(b)**		
	$H2_a$	The perception of self-management by ICT utilization affects employee satisfaction.	Accepted
	$H2_b$	The perception of self-management by ICT utilization affects organizational performance.	Not Accepted
H3	**Knowledge Sharing → Employee Satisfaction(a), Organizational Performance(b)**		
	$H3_a$	The perception of knowledge sharing by ICT utilization affects employee satisfaction.	Not Accepted
	$H3_b$	The perception of knowledge sharing by ICT utilization affects organizational performance.	Not Accepted
H4	**Self-Development → Employee Satisfaction(a), Organizational Performance(b)**		
	$H4_a$	The perception of self-development by ICT utilization affects employee satisfaction.	Accepted
	$H4_b$	The perception of self-development by ICT utilization affects organizational performance.	Accepted
H5	**Organizational Innovation→ Employee Satisfaction(a), Organizational Performance(b)**		
	$H5_a$	The perception of organizational innovation by ICT utilization affects employee satisfaction.	Accepted

	$H5_b$	The perception of organizational innovation by ICT utilization affects organizational performance.	Accepted
H6	**Employee Satisfaction → Organizational Performance**		
	Increasing employee satisfaction by ICT utilization effects on organizational performance.		Accepted
H7	**Organizational Performance → Employee Satisfaction**		
	Increasing organizational performance by ICT utilization effects on employee satisfaction		Accepted

[Study 2] Customers' Perception on ICT Utilization

This study applied factor scores for regression analyses. The regression results on Table 12 indicate that the models were significant at the .000 level with F = 66.583 (r-square = .556). Thus, it was found that customer satisfaction is affected by the five variables. Specifically, customer satisfaction is found to be significantly related with product satisfaction, promotional offers, customer communication and after-sale service whereas purchase efficiency were found to be not significantly related with customer satisfaction.

Table 15. Effects of Determinants of Customer Satisfaction

NO.	Variable (Independent → dependent)	Standardized Coefficient	*t*-value	*Sig. (p)*
$H1_a$	Purchase Efficiency → Customer Satisfaction	.015	.243	.808
$H2_a$	Product Satisfaction → Customer Satisfaction	.203	3.285	.001***
$H3_a$	Promotional Offers → Customer Satisfaction	.309	5.437	.000***
$H4_a$	Customer Communication → Customer Satisfaction	.216	2.964	.003***
$H5_a$	After-sales Service → Customer satisfaction	.129	1.878	.062*

*** p < 0.01, ** p <0.05, * p < 0.1 denotes statistical significance

Table 16 shows the results of regression analysis for elements that determine purchase decision making. Overall, the ANOVA analysis indicated that the models was significant at .000 level with F=63.389 (r-square = .544). Given the Table 13, the results indicate that hypothesis 2, 3 and 4 are accepted, but not the hypothesis 1 and 5. In other words, product

satisfaction, promotional offers and customer communication affect purchase decision making as independent variables.

Table 16. Effects of Determinants of Purchase Decision Making

NO.	Variable (Independent → dependent)	Standardized Coefficient	*t*-value	*Sig. (p)*
$H1_a$	Purchase Efficiency → Purchase Decision Making	.000	.007	.994
$H2_a$	Product Satisfaction → Purchase Decision Making	.264	4.199	.000***
$H3_a$	Promotional Offers → Purchase Decision Making	.304	5.275	.000***
$H4_a$	Customer Communication → Purchase Decision Making	.204	2.760	.006***
$H5_a$	After sales Service → Purchase Decision Making	.089	1.270	.205

*** p < 0.01, ** p <0.05, * p < 0.1 denotes statistical significance

Table 17 represent the results of regression analysis based on factor analysis for each item of the variables to test the relationship between customer satisfaction and purchase decision making. According to the ANOVA, it finds the model is significant at .000 level with F = 1796.973 (r-square =.869). Based on the finding, hypothesis 6 and 7 is accepted.

Table 17. Effects of Determinants of Customer Satisfaction and Purchase Decision Making

NO.	Variable (Independent → dependent)	Standardized Coefficient	*t*-value	*Sig. (p)*
H6	Customer satisfaction → Purchase Decision Making	.932	42.391	.000***
H7	Purchase Decision Making → Customer satisfaction	.932	42.391	.000***

*** p < 0.01, ** p <0.05, * p < 0.1 denotes statistical significance

In conclusion, the result of hypotheses testing of five variables by ICT utilization is summarized in Table 18.

Table 18. Summary of Hypothesis Testing Results (Customer)

Category		Hypothesis Tested	Result
H1	**Purchase Efficiency → Customer satisfaction(a), Purchase Decision Making(b)**		
	$H1_a$	The perception of customer efficiency by ICT utilization affects customer satisfaction.	Not Accepted
	$H1_b$	The perception of customer efficiency by ICT utilization affects purchase decision making.	Not Accepted

H2	**Product Satisfaction → Customer satisfaction(a), Purchase Decision Making(b)**		
	$H2_a$	The perception of product satisfaction by ICT utilization affects customer satisfaction.	Accepted
	$H2_b$	The perception of product satisfaction by ICT utilization affects purchase decision making.	Accepted
H3	**Promotional Offers → Customer satisfaction(a), Purchase Decision Making(b)**		
	$H3_a$	The perception of customer communication by ICT utilization affects customer satisfaction.	Accepted
	$H3_b$	The perception of customer communication by ICT utilization affects purchase decision making.	Accepted
H4	**Customer Communication → Customer satisfaction(a), Purchase Decision Making(b)**		
	$H4_a$	The perception of promotional offers by ICT utilization affects customer satisfaction.	Accepted
	$H4_b$	The perception of promotional offers by ICT utilization affects purchase decision making.	Accepted
H5	**After sales Service → Customer satisfaction(a), Purchase Decision Making(b)**		
	$H5_a$	The perception of after-sale service by ICT utilization affects customer satisfaction.	Accepted
	$H5_b$	The perception of after-sale service by ICT utilization affects purchase decision making.	Not Accepted
H6	**Customer satisfaction → Purchase Decision Making**		
	Increasing customer satisfaction by ICT utilization effects on purchase decision making.		Accepted
H7	**Purchase Decision Making → Customer satisfaction**		
	Increasing purchase decision making by ICT utilization effects on customer satisfaction.		Accepted

Ⅶ. Conclusion

7.1. Findings

The purpose of this study is to analyze the impact of ICT utilization on employees (employee satisfaction, organizational performance) and customers (customer satisfaction and purchasing decision making). To this end, the study was divided into two parts: the employees' perception on ICT utilization and customers' one.

[Study 1] Employees' Perception on ICT Utilization

Previous research has derived that ICT utilization affects work efficiency (H1), self-management (H2), knowledge sharing (H3), self-development (H4), and organizational innovation (H5). Regression analysis was conducted how five factors affect employee satisfaction (a) and organizational performance (b). Moreover, the relationship between employee satisfaction and organizational performance through ICT utilization (H6, H7) was also analyzed.

As a result of the study, employees satisfied with self-management (H2a), self-development (H4a), and organizational innovation (H5a) through ICT utilization. When it comes to organizational performance, it was found that ICT utilization affected self-development (H4b) and organizational innovation (H5b). Finally, the satisfaction of employees through ICT utilization influenced the performance of the organization (H6), and so did the organizational performance through ICT utilization (H7).

[Study 2] Customers' Perception on ICT Utilization

Literature review has shown that the use of ICT affects purchasing efficiency (H1), product satisfaction (H2), promotional offers (H3), customer communication (H4), and after sale service (H5). Similar with the study 1, regression analysis was conducted how five factors affect customer satisfaction (a) and purchase decision making (b). In addition, the relationship between customer satisfaction and purchase decision making through ICT utilization (H6, H7) was analyzed.

Based on the results from the regression analysis, product satisfaction (H2a), promotional offers (H3a), customer communication (H4a), and after sale service (H5a) through

ICT utilization were found to be significant in determining customer satisfaction. In the case of purchasing decision-making, product satisfaction (H2b), promotional offers (H3b), customer communication (H4b) through ICT utilization were affected. Lastly, increasing customer satisfaction through ICT utilization had a positive impact on purchasing decision making (H6), and inversely increasing purchasing decision making through ICT utilization also influenced on customer satisfaction (H7).

7.2. Managerial Implication

[STUDY 1]

According to employees' point of view, the work efficiency (H1) and knowledge sharing (H3) through ICT utilization did not affect worker satisfaction and organizational performance. This is somewhat the opposite result of previous research. 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. The reason for this is that ICT can be used without restrictions on time and space, and the 'connection' which is one of the attributes of ICT's promotes knowledge sharing. There are many reasons for the difference between the results of this study and previous study, one of which is speculation, it seems to be due to the difference between the concept of efficiency and knowledge sharing. In fact, more than half of the survey participants in this study are in their 20s and 30s, and it is convincing that working anytime anywhere or sharing of knowledge without limitation of time and space has a negative impact on individuals. Therefore, at the organizational management level, it is necessary to correctly understand the notion of efficiency and the level of knowledge sharing that employees want, and to devise measures to improve not only workers' satisfaction but also organizational performance.

One interesting result is that self-management (H2) through ICT utilization affects employee satisfaction but does not affect organizational performance. The sixth hypothesis (H6) of this study in study 1, which is that employees' satisfaction with increasing ICT utilization affects organizational performance, is not applicable to self-management factors. This can also be found in the characteristics of people in their 20s and 30s, who account for more than half of the survey participants. Considering the characteristics that thinking separately between individuals and organizations, it is presumed that self-management through ICT utilization is an individual field and recognizes it separately from organizational achievements.

Nevertheless, it is necessary to establish an ICT utilization plan that considers both workers' satisfaction and organizational performance since increasing employee satisfaction by ICT utilization affects the organizational performance (H6) and increasing organizational performance by ICT utilization affects employee satisfaction (H7). In particular, self-development (H4) and organizational innovation (H5) are the factors that affects both worker satisfaction and organizational performance by ICT utilization, it is important to formulate a management plan.

[STUDY 2]

Result of analysis of the customer side shows that Purchase Efficiency (H1) 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. One of the reasons for this is that the utilization of ICT provides too much information to consumers. Therefore, as a managerial implication, it is necessary to provide customized information in a timely manner rather than indiscriminate information from the sellers' perspective.

Interestingly, After-sales Service (H5) by utilizing ICT affects customer satisfaction, but

does not affect purchasing decisions. In other words, after-sale service by ICT utilization may not be a priority consideration when customers decide to purchase something.

As a result, the importance of ICT utilization in the customer point of view should not be overlooked. Because customer satisfaction affects purchase decision-making (H6), while purchase decision making also affects customer satisfaction (H7). In particular, product satisfaction (H2), promotional provision (H3), and customer communication (H4) by ICT utilization affect both customer satisfaction and purchasing decision-making, so it is necessary to establish a business plan in consideration of these factors.

7.3. Policy Implication

The government's role in promoting the use of ICT can be explained in two directions: building ICT infrastructure and spreading to use. That will be a very important task in terms of improving national competitiveness.

The first role is to expand government-led ICT infrastructure. In this regard, the Korean government is evaluated as having a very favorable infrastructure for digital transformation (Bianchini, M., & Kwon, I., 2021). In fact, Korea has established 5G network for the first time in the world and is also at the top of digital government maturity (OECD, 2020). Moreover, high-speed Internet is inexpensive and widely available (Bianchini, M., & Kwon, I., 2021). In addition, Korea government declared a ‘contactless economy’ and actively promoted a ‘digital new deal’ policy to actively respond to pandemic triggered by COVID-19, putting huge investments into digital transformation. As a result, it can be seen that high-quality soil for ICT utilization has already been prepared.

Nevertheless, it can be seen that the ICT utilization has not been deeply rooted in the aspect of employees (production side) and customers (consumption side). For example, in the

side of producer among economic actors, SMEs did not know the concept of smart work or telecommuting, and the investment burden was the highest (Korea Federation of SMEs, 2020). Then, what about the customer aspect? The e-commerce market, for example, is growing in size, driven by online sales by large companies (KOSTAT, 2019). Considering that SMEs account for a large proportion of the Korean economy, SMEs are still experiencing a digital gap (Bianchini, M., & Kwon, I., 2021). Taken together, the government's large-scale investment described at the outset has not been well delivered to economic players such as SMEs. Here, we face the task of spreading the ICT utilization as the second role of the government. And for effective spread, as in this study, it will be necessary to analyze which part will be a positive factor for the spread and establish a comprehensive plan through more closely analyzing employee perception (producer side) and customer view (customer side) according to ICT use.

7.4. Limitation and future study

Although this study has derived significant results on the effect of ICT utilization on the workers´ and consumers´ side, there are several limitations. First, the sample size is small to analyze the relationship between variables. Therefore, it is expected that more generalized results will be obtained through the responses of more survey participants in future studies.

Second, the group participating in the survey was further subdivided, and the group's characteristics could not be closely analyzed. For example, in the case of STUDY 1, workers could be subdivided into administrative, small, and medium-sized enterprises, education, medical filed and so on, and if STUDY 2 could be divided into two groups whether they are relatively familiar or unfamiliar with ICT use, such as 10s to 40s or 50s to 60s. However, this study could not be conducted in this way because the sample size of a specific group was too

small to secure reliability in the analysis results. Therefore, it is expected to be very interesting if research specializing in segmented groups is implemented in future research.

Finally, it would have been a more valuable study if qualitative research was conducted along with the present study through in-depth interviews to investigate the relationship between ICT utilization and variables. Therefore, if future research considers the qualitative method, more meaningful results are expected to be analyzed.

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Appendix

< A Survey on Impact of ICT Utilization on Employees and Customers >

Please take 10 minutes to help investigating the impact of Utilization on Employees and Customers. Participation in this survey must be voluntary and the data collected will also be kept anonymously.

The intents of this work are academic research and policy implication purposes only. Your response to this survey are strictly confidential and will not be revealed to anyone other than the researcher.

Your contribution is very important to make convenient and innovative digital society where employees and consumers deeply feel the benefits of ICT.

I would really appreciate for your participation in this survey.

☺ Contact information: thankyou@kdis.ac.kr

Part A (Warm-up Questions). Here are warm up questions. Please tick (√) where relate to you the most.

A. Have you ever **used ICT** such as a smart phone, table PC, smart watch, mobile app, Internet or other ICT devices or services?

○ Yes ○ No

B. Have you ever **used ADVANCED ICT** such as a smart home AI appliance (Samsung BigsBe, KE Giga Gini, SKT Ari, etc.), Drone, 3D printer or other advanced ICT device or service?

○ Yes ○ No

C. How much do you **feel comfort** when you use ICT?

○ Very discomfort ○ Discomfort ○ Neutral ○ Comfort ○ Very comfort

D. Do you agree that **using ICT gives you benefit**?

○ Strongly disagree ○ disagree ○ Neutral ○ Agree ○ Strongly agree

E. Do you have **working experience more than 3 months**?

○ Yes => Go part B-1,2 ○ No =>Skip part B-1,2

Part B-1 (For Employees: Warm-up Questions) Please tick (√) where relate to you the most as a worker.

A. Do you **actively use ICT** when you work?

* ICT use : 1) Using the Personal Computer or Smart Phone or Tablet PC or more advanced ICT devices 2) Accessing Internet and mobile apps or Intranet or more advanced ICT services

○ Strongly disagree ○ disagree ○ Neutral ○ Agree ○ Disagree

Part B-2 (For Employees: Main Questions) Please tick (√) where relate to you the most as a worker. For each statement below, you are requested to respond to the following:

① Strongly disagree ② Disagree ③ Neutral ④ Agree ⑤ Strongly agree

Work Efficiency						
A	I think work efficiency is important for employee.	①	②	③	④	⑤
B	I spent less time doing the same work with ICT use.	①	②	③	④	⑤
C	I handled much more quantity of work for the same period time with ICT use.	①	②	③	④	⑤
D	I handled much more quality of work for the same period time with ICT use.	①	②	③	④	⑤
F	Overall, I agree that ICT positively affects work efficacy.	①	②	③	④	⑤
G	I agree that work efficiency by ICT helps to increase organizational performance.	①	②	③	④	⑤
Self-Management						
A	I think self-management is important for employee.	①	②	③	④	⑤
B	I got help managing my daily schedule with ICT use.	①	②	③	④	⑤

C	I got help managing my health with ICT use.	①	②	③	④	⑤
D	I got help financial management with ICT use.	①	②	③	④	⑤
F	Overall, I agree that ICT positively affects work efficacy.	①	②	③	④	⑤
G	I agree that self-management by ICT helps to increase organizational performance.	①	②	③	④	⑤
Knowledge Sharing						
A	I think knowledge sharing is important for employee.	①	②	③	④	⑤
B	I felt ICT helped to share my know-how with co-works.	①	②	③	④	⑤
C	I felt ICT helped to share my experience at workplace.	①	②	③	④	⑤
D	I felt ICT helped to share best practice among different fields of the activity.	①	②	③	④	⑤
F	Overall, I agree that ICT positively affects knowledge sharing.	①	②	③	④	⑤
G	I agree that knowledge sharing by ICT helps to increase organizational performance.	①	②	③	④	⑤
Self-Development						
A	I think self-development is important for employee.	①	②	③	④	⑤
B	I felt that using ICT helped to improve my job related skills.	①	②	③	④	⑤
C	I felt that using ICT helped when I learned foreign language.	①	②	③	④	⑤
D	I felt that using ICT helped to develop myself.	①	②	③	④	⑤
F	Overall, I agree that ICT positively affects knowledge sharing.	①	②	③	④	⑤
G	I agree that self-development by ICT helps to increase organizational performance.	①	②			⑤
Organizational Innovation						
A	I think innovation is important for employee.	①	②	③	④	⑤
B	I felt that workplace got relatively advantage from ICT.	①	②	③	④	⑤
C	I felt that using ICT was not conflict with social trend.	①	②	③	④	⑤
D	I felt ICT became familiar once I knew what it was and learned how to use it.	①	②	③	④	⑤

F	Overall, I agree that ICT positively affects knowledge sharing.	①	②	③	④	⑤
G	I agree that innovation by ICT helps to increase organizational performance.	①	②	③	④	⑤
Additional Questions						
A	I agree that employee satisfaction by ICT helps to increase organizational performance.	①	②	③	④	⑤
B	I agree that employee satisfaction by ICT helps to the economic growth.	①	②	③	④	⑤
C	I agree that organizational performance by ICT helps to the economic growth.	①	②	③		⑤

Part C (For Customers: Warm-up Questions) Please tick (√) where relate to you the most as a customer.

A. Which Items do you mostly purchase with ICT use?

○ Clothes ○ Food delivery ○ Daily supplies ○ Electronic devices

○ Others ( )

B. How many time do you search purchasing items in a week?

○ 1 time ○ 2 times ○ 3 times ○ 4 times ○ 5imes and more

C. How many time do you purchase items in a week?

○ 1 time ○ 2 times ○ 3 times ○ 4 times ○ 5imes and more

D. Have you ever posted a product review on the web page or App? ○ Yes ○ No

D-1. (Only Yes) Why do you posted a product review?

○ To express personal feelings (satisfaction, dissatisfaction, joyful, etc.) about a product

○ To give useful information for others ○ To get mileage points when I post a review

○ To actively communicate with sellers ○ Others ( )

D-2. (Only Yes) Do you agree that this commuication channel will help future purchases?

① Strongly disagree ② Disagree ③ Neutral ④ Agree ⑤ Strongly agree

E. Have you ever received online promotions such as discount coupons and mileage? ○ Yes ○ No

E-1. (Only Yes) Do you agree that online promotions have a positive impact on purchases?

① Strongly disagree ② Disagree ③ Neutral ④ Agree ⑤ Strongly agree

F. Have you ever used an online customized-order site? ○ Yes ○ No

F-1. Do you agree that creating online customized-order is more convenient than offline?

① Strongly disagree ② Disagree ③ Neutral ④ Agree ⑤ Strongly agree

G. Will you actively use ICT for future purchases?

① Strongly disagree ② Disagree ③ Neutral ④ Agree ⑤ Strongly agree

Part C (For Customers: Main Questions) Please tick (√) where relate to you the most as a customer. For each statement below, you are requested to respond to the following:

① Strongly disagree ② Disagree ③ Neutral ④ Agree ⑤ Strongly agree

Purchas Efficiency						
A	I think purchase efficiency is important for customer.	①	②	③	④	⑤
B	I spent less time when I purchase with ICT use.	①	②	③	④	⑤
C	I could search more list of purchase items with ICT use.	①	②	③	④	⑤
D	I could get information on the purchase items with ICT use.	①	②	③	④	⑤
F	Overall, I agree that ICT positively affects purchase efficiency.	①	②	③	④	⑤
G	I agree that purchase efficiency by ICT helps to purchase decision making.	①	②	③	④	⑤
Product Satisfaction						

A	I think product satisfaction is important for customer.	①	②	③	④	⑤
B	I felt ICT helped to produce more convenient items.	①	②	③	④	⑤
C	I felt ICT helped to create more customized-items.	①	②	③	④	⑤
D	I felt ICT helped to make more sophisticated-items.	①	②	③	④	⑤
F	Overall, I agree that ICT positively affects product satisfaction.	①	②	③	④	⑤
G	I agree that product satisfaction by ICT helps to purchase decision making.	①	②	③	④	⑤
Promotional Offers						
A	I think promotional offers is important for customer.	①	②	③	④	⑤
B	I felt using ICT helped to deliver discount coupons to the customers.	①	②	③	④	⑤
C	I felt that promotion with ICT use increased frequency of purchases.	①	②	③	④	⑤
D	I felt more convenient when I managed frequency coupons with ICT use.	①	②	③	④	⑤
F	Overall, I agree that ICT positively affects promotional offers.	①	②	③	④	⑤
G	I agree that promotional offers by ICT helps to purchase decision making.	①	②	③	④	⑤
Customer Communication						
A	I think customer communication is important for customer.	①	②	③	④	⑤
B	I could get the answer on my inquiries from the seller with ICT use.	①	②	③	④	⑤
C	I could share user experience to other customers with ICT use.	①	②	③	④	⑤
D	I felt that using ICT helped to communicate between customers and sellers.	①	②	③	④	⑤
F	Overall, I agree that ICT positively affects customer communication.	①	②	③	④	⑤
G	I agree that customer communication by ICT helps to purchase decision making.	①	②	③	④	⑤
After Sale Service						
A	I think after-service is important for customer.	①	②	③	④	⑤
B	I felt convenient when I could check delivery status of purchased-items with ICT use.	①	②	③	④	⑤

C	I felt convenient when I return purchased-items with ICT use.	①	②	③	④	⑤
D	I felt using ICT improved after sale srvice.	①	②	③	④	⑤
F	Overall, I agree that ICT positively affects after-service.	①	②	③	④	⑤
G	I agree that after-service by ICT helps to purchase decision making.	①	②	③	④	⑤
Additional Questions						
A	I agree that customer satisfaction by ICT helps to purchase decision making.	①	②	③	④	⑤
B	I agree that customer satisfaction by ICT helps to the economic growth.	①	②	③	④	⑤
C	I agree that purchase decision making by ICT helps to the economic growth.	①	②	③	④	⑤

Part D. Here are the **Demographic Questions**. Please tick (√) where relate to you the most.

1. **Gender:** ○ Male ○ Female

2. Age: x

○ x≤25 ○ 26< x ≤35 ○ 35<x ≤45 ○ 46<x ≤55 ○ 56<x ≤65 ○ 66≤x

3. Area of residence:

○ Seoul ○ Gyonggi ○ Chungchenong ○ Gyeougsang ○ Jeolla ○ Jesu
○ Others

4. **Marital status:** ○ Married ○ Unmarried

5. Educational level:

○ Graduated from high school or less ○ Graduated college (2~3 yr.)
○ Bachelor's degree (4~5yr.) ○ Master's degree ○ Doctoral degree

6. **(Optional)Average annual salary: x**

○ Not applicable ○ x ≤KRW 30 M ○ KRW 30 M < x ≤ KRW 40 M
○ KRW 40 M < x ≤ KRW 50 M ○ KRW 50 M < x ≤ KRW 60 M
○ KRW 60 M < x ≤ KRW 70 M ○ KRW 70 M < x

7. **(Employee only) Specific job:**

○ Administrator ○ Marketer ○ Sales person ○ Teacher

○ Broadcasting ○ Doctor & Nurse & Pharmacist ○ Lawyer

○ Accountant ○ Artist & Designer ○ religious person

○ Solider ○ Freelancer ○ Manufacture

8. **(Employee only) Total working experience(yr.):**

○ x ≤5 ○ 6<x ≤10 ○ 11<x≤15 ○ 16<x≤20 ○ 21≤x

9. **(Employee only) Working position:**

○ CEO ○ Work alone ○ Low in the team ○ Middle in the team

○ Team Manager ○ Student ○ Unemployed ○ Housewife

○ Self-employed ○ Public Sector ○ Educational Sector ○ Medical Sector

○ SMEs (Small and Medium size enterprise) ○ Big Company ○ Foreign Company

This is end of the survey.

Thank you for your cooperation ☺