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Firms' Switching Intention to Cloud Based Digital Trade: Perspective of the Push-Pull-Mooring Model

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Abstract

Purpose – In recent times, the international trade environment has been changing rapidly, centering on the online market. In the post-COVID-19 era, small and medium-sized trading companies are facing the problem of not being properly provided with overseas market research, market trend analysis, and trade-related information. Cloud-based digital trade is being sought as an alternative to solve these problems; however, there is a lack of research on the intention to switch to digital trade among small and medium-sized trading companies. Therefore, this study empirically analyzes the intention to switch to digital trade based on the migration theory, and through this, attempts to identify each factor that affects the intention to switch to digital trade.

Design/methodology – In this study, in order to identify factors influencing intention to switch to digital trade and innovation resistance of small and medium-sized trading companies, through previous research on migration theory and the PPM (Push, Pull, Mooring) model, each variable was selected for the purpose of the study. Based on this, a research model was established for the factors affecting switching to digital trade of small and medium-sized trading companies and empirically analyzed. In addition, considering the differences in the innovation propensity and maturity of information infrastructure of trading companies as the recipients of innovation, this study analyzes the moderating effect of the mooring effect and seeks ways to establish specific strategies according to the degree.

Findings – As a result of empirical analysis, the pull effect was found to have the greatest influence on intention to switch to digital trade. However, the pull factor was found to have an effect on user resistance, and it was confirmed that it was a factor simultaneously inducing positive and negative consumption behaviors among users. In addition, it was found that the higher the company's innovation propensity, the higher the pull effect's influence on the intention to switch, and analysis showed that the push effect had no influence. In addition, companies with high information infrastructure maturity were expected to have a relatively high level of intention to switch compared to companies with low information infrastructure maturity, and the difference between the two groups was found not to be statistically significant.

Originality/value – This study is a timely study in that it demonstrated the effect on the switching to cloud-based digital trade for small and medium-sized trading companies and that the cloud system related to digital trade is in full swing. There are academic implications in that it revealed that the pull effect is an important factor in the intention to switch to cloud service. Practical implications were presented in that small and medium-sized trading companies suggested ways to increase the value of the cloud system for switching to digital trade and a way to increase the switching ratio by minimizing the mooring effect. In addition, the study argues that active institutional support from the government is needed to activate cloud service.

Keywords: Cloud Service, Digital Trade, Innovation Resistance Theory, PPM Model
JEL Classifications: C31, M16, M19

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1. Introduction

The current distribution environment, including global trade, is rapidly changing to mainly online. Each stage of trade, such as overseas market research and customer credit inquiry, which can be said to be the starting stage of trade, is becoming rapidly digitalized. In addition, the business environment is changing significantly due to the recent development of ICT technology. The development of such ICT technology is positioned as the most important factor in the Fourth Industrial Revolution. The increase of remote and 'face-to-face online' conduction of business due to the pandemic is leading the digitalization of trade (Borchert et al., 2021).

However, in the midst of such a change in the corporate environment, small and medium-sized trading companies that lack human and material resources are not receiving adequate information such as domestic and foreign market research, trend analysis, and cooperation with related organizations and institutions, so cloud service-based digital trade is being sought as a way to solve these problems and quickly respond to changes in the corporate external environment. ICT technology is rapidly spreading not only in industries such as finance and auctions, but also in the distribution industry. In addition, the overall flow of international logistics, exports, and imports related to international trade is changing in ways that are different from before. ICT is being used in many fields of business model development such as decision-making, purchasing, production, and customer management through the development of information and communication technology and the use of cloud computing, as well as entry into the global market (Baek Eun-Young and Oh Keun-Yeob, 2020).

For the above reasons, the ratio of transactions through the online market to the total size of the global B2C market was about 21.7% in 2019, recording a growth of about 4% compared to the previous year (Mira, 2021).

Due to rapid changes in the external environment and intensifying competition, domestic companies are emphasizing innovation in order to quickly adapt to the changing environment. In particular, in international trade, technological innovation and adaptation are recognized as necessary conditions for cost reduction, and related research is being conducted as of recently. However, there is still a serious lack of empirical research related to digital trade, and studies that subdivide the industry related to digital trade are very rare (Ignatova et al., 2020).

Research related to digital trade mainly focuses on data and information security research and research on domestic e-commerce revitalization methods, with most of the research being done on large companies that have led this (Chai et al., 2018).

In particular, regarding acceptance of switching to digital trade, factors related to acceptance of innovative technologies are mainly studied using the Theory of Reasoned Action (TRA), the Theory of Planned Behavior (TPB), and the Technology Acceptance Model (TAM) (Mira and Polanco, 2020).

However, the research based on the above discussions falls short in explaining the dynamic switching-related behavior of companies utilizing cloud-based digital trade. Furthermore, previous studies have overlooked the resistance to innovative technology of cloud-based digital trade among companies that passively and arbitrarily deal with the current situation brought about by the pandemic.

This study intends to analyze firms' intention to switch to innovative technology by using

the PPM model that comprehensively reflects the characteristics of existing traditional trade, the characteristics of digital trade, and the innovative tendencies of companies utilizing digital trade. Although numerous studies on the digital trade have been conducted before, this study differs from these studies in two aspects. First, this study used the PPM model in terms of switching rather than the technology acceptance model (TAM), which has often been used as a theoretical basis for user acceptance in establishing the research model. Second, this research topic was set up as the cloud-based digital trade which has been recently popularized among small and medium sized trade firms in Korea. While the PPM model has been widely used in studies related to switching to digital trade, it has been rarely used in B2B models such as cloud-based digital trade.

Through this, this study intends to identify factors influencing cloud-based digital trade switching behavior, and to classify the relative influence of each factor related to intention to switch. Moreover, in order to verify the moderating effect according to the innovation tendency of a company, we aim to present practical implications that have not been suggested in previous studies by identifying the differences between the routes. Therefore, this study intends to identify the meaningful factors affecting the switching of the traditional trade method to cloud service-based digital trade, focusing on the PPM model of the migration theory. Thus, this study is anticipated to provide a theoretical basis for follow-up studies to analyze the transition to relatively new cloud-based digital trade. In addition, in practice, it will provide strategic guidelines for practitioners of cloud-based digital trade for the small and medium sized trade firms in Korea.

2. Literature Review and Hypothesis Development

2.1. Digital Trade

As the Internet became popular in the 1990s, provision or brokerage of tangible goods or services in a virtual environment under the term e-commerce, together with related payment and logistics service industries, were developed. All such transactions between countries in a virtual environment are referred to as digital trade (Mira and Polanco, 2020).

The US International Trade Commission (ITC) states that the Internet plays an important role in the ordering, production, transportation of companies in the US economy and international trade, and it has been determined that digital technology is essential for strengthening corporate competitiveness. Although not new, the term 'digital trade' is drawing attention as the world embraces the digital economy shift in international trade. Digital Trade is a concept that encompasses electronic trade, global e-commerce, e-payments, digital industry and digital technology trade.

The rapid development of ICT technology has provided a new trade paradigm not only to individuals who use it, but also to companies conducting international trade. The digitization of international trade has provided opportunities to transcend time and space for trading companies, and through the reduction of related costs and improvement of efficiency, it is possible to provide companies with a competitive edge in adapting to overseas markets. For this reason, advanced countries, including Korea, are providing institutional support so that companies can actively utilize digital trade (Azmeh, Foster and Echavarri, 2020).

Korea is also enacting procedures through conjuring definitions related to digital trade in the Foreign Trade Act and the Trade Infrastructure Development Act for the revitalization of

digital trade.

Such digital trade exchanges information related to not only electronic trade of goods and services, but also various trade-related information such as market research and credit rating inquiry for overseas customers, with digitalization taking place at each stage of the value chain related to international supply (Ismail, 2020).

In digital trade, the transaction procedures of two or more countries are processed using ICT technology, which is different from the traditional international trade process, and necessary information, such as municipal information and transaction-related information, is provided at the same time as the consumer searches, and is not constrained by time and space (Mira and Polanco, 2020).

In addition, complex tasks such as authentication, reports and approvals of government agencies and logistics and settlement between trade-related companies, and completed within a single system (Ismail, 2020).

While digital trade has the advantage of securing competitiveness by reducing transaction costs, it has the disadvantage of requiring initial investment in infrastructure. In the case of small businesses that do not properly invest in infrastructure, opportunities to enter overseas markets may decrease. Regarding this, institutional support from the state should be made available.

2.2. Cloud Service

2.2.1. Cloud Service

Cloud computing refers to a service that can use infrastructure, software, and platforms stored in advance in an online connected data center that can be used to the required extent at the time needed. The term cloud service was first used while proposing a business model in which the resources required for ICT technology can be borrowed as needed without purchasing an expensive license (Borangiua et al., 2019). Since then, companies have struggled to cut costs due to the global economic crisis, and cost reduction through process innovation is now being sought. In this trend, cloud services have developed rapidly, and the global digital trade platform, Amazon Web Service (AWS) accounts for more than 90% of Amazon's total operating profit (Dutta and Dutta, 2019). In digital trade, it is important for companies to communicate and share information in real time to make quick decisions, which can be interpreted to mean that the introduction of cloud services is crucial for the activation of digital trade. In other words, cloud service is making rapid progress alongside the Fourth Industrial Revolution, and is a vital element for corporate innovation (Pedone and Mezgár, 2018).

Cloud Service is not a new technology by any means, but a technology that allows multiple services to be utilized based on existing information system technology (Borangiua et al., 2019). In other words, cloud service can be said to be a newly researched field according to the development of a new business model in line with the development and spread of ICT technology. From the point of view of a company, it is a method in which the information that a company wants to consume can be used only through an Internet connection without acquiring additional technology.

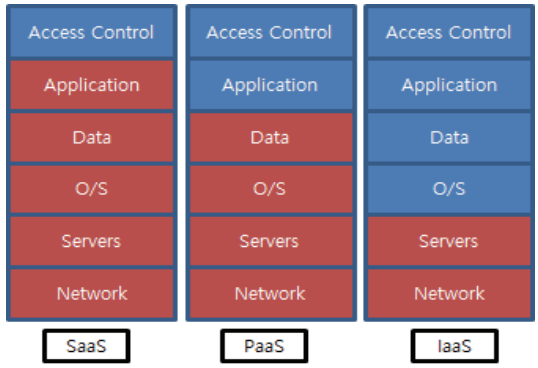
Conventional computing provides 'on-premises service', and cloud service can be classified into IaaS, PaaS, and SaaS according to the scope of information provided.

IaaS (Infrastructure as a Service) provides only storage space such as storage and server among IT resources, and the user has to solve the rest. In a slightly broader category, there is

PaaS (Platform as a Service) that provides a usage system and platform for software development. And finally, there is SaaS (Software as a Service) that supports all data and software required by users on the network. This is shown in Fig. 1.

As such, companies can utilize this information without the need for additional training, thereby securing competitiveness through cost reduction.

Fig. 1. Cloud Services



Note: 1. Blue: Customers have control
2. Red: Customs don`t have control

Source: Pedone and Mezgár (2018).

2.2.2. Cloud-based Digital Trade

Cloud-based digital trade is an efficient and systematic method of trade to identify and utilize distributed information according to the diversification and specialization of overseas market information in order to adapt to the rapidly changing overseas market environment by applying the cloud concept (Willemyns, 2019).

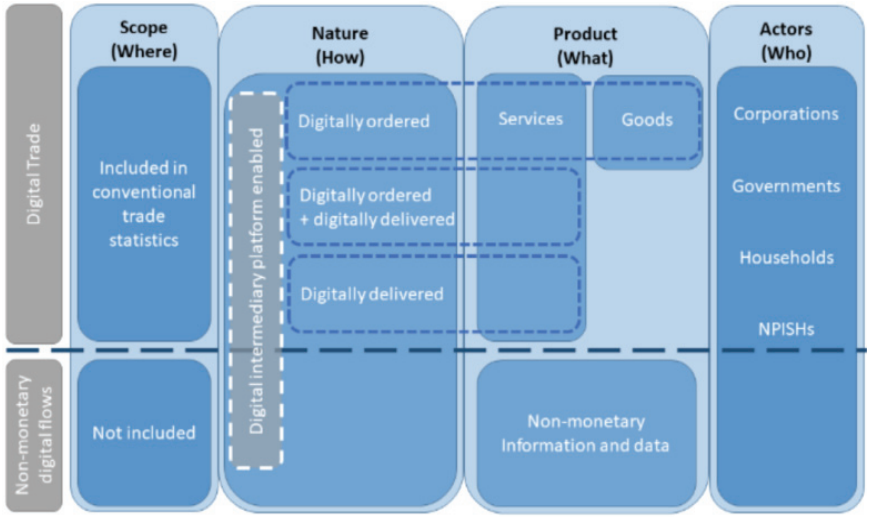
In addition, Korea is currently basing its operating paradigm on Government 4.0, which uses cloud-based data as its core, and information is provided through network management for revitalization of complex trade using cloud technology. Through this, companies can utilize information necessary to enter the global market, such as overseas market information, customs information, and requirements.

A diagram of cloud-based digital trade as it is currently used is shown in Fig. 2.

2.3. PPM Model

The success of ICT or Online-service is determined by the number of users who continuously use it (Cheng et al., 2019). In the meantime, research has been steadily conducted to identify factors related to the intention of continuous use of online-service. In addition, many studies have been conducted to identify factors affecting user retention by lowering the conversion intention of users who have accepted online-service (Cheng et al., 2019). In this study, based on the PPM theory, what factors act on the conversion intention of cloud service users and how the conversion intention is formed in order to identify the behavioral process after the user accepts the cloud-based digital trade.

Fig. 2. Cloud-based Digital Trade



Source: Willemyns(2019).

In the Law of Migration Theory published by Ravenstein in 1885, it was presented that pull factors and push factors influence people's decision to migrate.

A push factor is a negative factor that causes people to move from their original area to another area, whereas a pull factor refers to an attractive factor in the area to which they want to move. Ultimately, people's decision-making on migration is made by the interaction of these push factors and pull factors (Hou et al., 2011). Longino (1992) emphasized the mooring factor that promotes or hinders migration decision-making, and Moon (1995) extended the mooring factor proposed by Longino (1992) to the PPM model by combining it with Push-Pull theory to explain the migration phenomenon of people. Since then, the PPM theory has been used as a major framework to systematically explain the switching process of customers (Hou et al., 2011). In particular, the PPM theory has been widely applied to studies to identify factors related to the conversion intention of online service customers such as e-mail service, SNS, mobile application, and cloud service (Zhang et al., 2008; Fei & Bo, 2014; Peng et al., 2016; Kim et al., 2018; Cheng et al., 2019).

2.3.1. Push Factors

Push factors are defined as factors that cause people to leave their existing residences (Hsieh et al., 2012). In this study, we intend to examine the negative factors perceived by users of conventional trade methods to accommodate innovative technologies.

The most representative push factor in the acceptance of and switching to innovative technologies is the decrease in reliability of the existing system. Reliability is the degree to which the performance or function of an information system can be effectively utilized or an IT infrastructure system can be trusted. In many studies on intention to switch a company's IT infrastructure system, reliability was found to be a factor influencing the intention to switch, such as the perceived promise and the expertise required to solve the problem.

Reliability is also the most important factor in the marketing field. This study argues that reliability is the most basic characteristic in all social situations that require interdependence and cooperation (Zaltman and Moorman, 1988). Users who use a service or system whose reliability is lowered switch to a new information system, and this can be seen as a positive factor. It is thought that this should be included among push factors as a decrease in reliability in the information system related to trade can cause serious business interruption.

Moreover, the current business environment requires fast work processing, and there is an increasing demand for speed that can remove the complexity of capital expenditure and bring about quick results. It is possible to secure business agility only when it is possible to rapidly respond to sudden changes in the acceptance of IT resources (Benlian and Hess, 2011). Cloud technology provides efficiency in the utilization of computing resources and flexibility throughout system operation due to system virtualization technology and the ability to automate computing resource management.

In addition, the biggest difference from the existing server-client (C/S) method or network computing is flexibility. In other words, it is possible to quickly and appropriately respond to a surge in computational demand without a large investment in the early stage of system introduction (Benlian and Hess, 2011).

If we look at the previous studies such as those mentioned above, because there is no choice but to use IT resources limitedly in the existing trade environment, the scalability and flexibility enabling flexible response to sudden increases in IT resource usage are low. That is, the rigidity is high. Factors that increase rigidity can be viewed as a negative factor in user satisfaction, and such negative factors can be expected to affect the dissatisfaction factor, so it was determined that they should be included among push factors, and the following hypotheses were established.

As seen in previous studies on push factors, low reliability and rigidity can be expected to affect the intention to switch to innovative technology, so it was decided that it should be included among push factors, and the following hypotheses were established.

H1: Push factors will have a positive effect on the intention to switch to cloud-based digital trade.

H1-a: Deterioration of reliability will have a positive effect on the intention to switch to cloud-based digital trade.

H1-b: Rigidity will have a positive effect on the intention to switch to cloud-based digital trade.

2.3.2. Pull Factors

In studies on user switching behavior, pull factors are explained as "alternative attractiveness" (Hsieh et al., 2012). The higher the attractiveness of alternatives than the current trade method, the more likely consumers are to present switching behavior. Cost factor is an important introduction factor for cloud services. According to the results of a recent study, users of public institutions and private companies cited factors that reduce IT resource management cost as the main reason for adopting cloud service (Handarkho and Harjoseputro, 2020). Cloud service, which is an alternative that can reduce costs for businesses, has the advantage of making it possible to obtain services at a minimum initial cost, building the service faster and lowering the maintenance cost compared to existing methods (Susanty, Handoko and Puspitasari, 2020). According to the Gartner Group, in the

total cost of ownership (TCO) model, informatization costs can be reduced by managing not only direct costs such as capital, management, and technical support costs, but also indirect costs such as user operating costs, service interruption and loss costs due to malfunction, which suggests that accurate cost-effectiveness analysis is possible (Cappuccio, Keyworth and Kirwin, 1996). In an era in which economic and social activities are complex and diversified, the creation, processing and management of vast amounts of information is essential. Considering that changes in the IT environment are continuously required due to these environmental changes, and the costs required for IT operation are continuously increasing, companies not only have great advantages in terms of operational efficiency and cost efficiency to use cloud services, but can also respond quickly and flexibly in a rapidly changing business environment (Fareghzadeh, Seyyedi and Mohsenzadeh, 2019). In a study on personal user preference factors and acceptance intention of cloud storage, (Arya and Dave, 2017) stated that the more the cost of capacity expansion increases, the lower the efficiency, and cost reduction is the most important introduction factor.

In addition, system maintenance can be defined as modifying and changing the system to correct errors in the system, improving performance, or adapting to the changed business environment after business development is completed. Most of the information systems for efficient business processing and competitiveness enhancement have been introduced in corporate organizations, but it is true that continuous activities are required to maintain and manage information systems. Currently, many companies are putting a lot of effort into maintaining the existing system rather than putting forward the effort required to build a new system (Priya, Kumar and Kannan, 2019). Such efforts and activities are costly, and in the current situation, costs are even higher than the cost of developing a new information system. Through continuous maintenance of the system, the system will become more stable and the maintenance cost will decrease accordingly, and in reality, the size of the functions and roles of software, which is the subject of maintenance, is also increasing due to various user requirements and environmental changes. In addition, as business processing methods and application methods become more complex and diverse, maintenance is becoming more and more difficult. For this reason, maintenance costs are increased (Cheng Mingxi, Li Ji and Nazarian, 2019).

In the software maintenance process, according to changes in the environment and work, if design and function implementation are standardized to facilitate software change, so that other organizations can distribute and apply the same to their affairs, each institution requires different functions, and it can be seen that maintenance is easier than distributing and applying each software reflecting the request (Guo Zhiling and Dan, 2018). Ease of maintenance can be seen as a positive factor for the switch to cloud computing, and ease of maintenance can be expected to have a positive effect on value, so it is determined that it should be included in among pull factors.

As seen in previous studies on pull factors, cost reduction and ease of maintenance can be expected to affect the intention to switch to innovative technology, so it was decided that it should be included among pull factors, and the following hypotheses were established.

H2: Pull factors will have a positive effect on the intention to switch to cloud-based digital trade.

***H2-a*:** Low costs will have a positive effect on the intention to switch to cloud-based digital trade.

H2-b: Ease of maintenance will have a positive effect on the intention to switch to cloud-based digital trade.

2.3.3. Mooring Factors

In the PPM model, it is explained that push factors and pull factors alone cannot sufficiently explain the switching behavior of consumers (Bansal, Taylor and James, 2005). This is because even though push factors and pull factors have a strong influence, they may vary depending on the user's situation or circumstances. These are referred to as mooring factors, which generally vary from person to person, but in most cases they act similarly. Variables corresponding to the concept of the mooring effect include switching costs, subjective norms or social influences, consumer attitudes toward switching, past behaviors, and tendency to seek diversity (Hsieh et al., 2012).

Information security is to prevent service availability violations or data leakage that may occur when using cloud services as well as information systems, and to increase service availability and stability (Handarkho and Harjoseputro, 2020). Mathew (2012) has studied immatured services and security and privacy-related concerns as obstacles to cloud service introduction. Data leakage, service availability and stability, compatibility with existing systems, stable service provision, cost, and legal regulations are some of the essential issues discussed in terms of information security (Yang Huihui, Cui Ruifu and Chong Weiying, 2020). The risk to information security is one of the technical risks perceived by users. This refers to the possibility of not meeting or failing to meet security requirements such as confidentiality, completeness, user authentication, and non-repudiation during or after a transaction (Ratnasingham and Kumar, 2000). Studies have argued that user trust and privacy are also important items in terms of information security of cloud computing, and that strengthening and maintaining the level of data and privacy protection is an important task in cloud computing (Siani and Benameur, 2010). Schniederjans and Yadav (2013) adopted security concerns as a technology factor in the study of the integrated model for successful ERP introduction. Studies have found that when a big data system is introduced (Mahmoud, Hegazy and Khafagy, 2018), if the security risk is large, it negatively affects the introduction and the security factor also affects the propagation of the information sharing service (Singh et al., 2015).

Based on these prior studies, when a medical institution switches an existing information system to a cloud computing system, since all information is integrated and operated within the system, there is a high possibility that a single incident will raise security issues such as a large personal information breach.

Meanwhile, when a company promotes the introduction of cloud computing, the sunk cost of the existing business processing method can be a huge barrier to switching, and there may also be concerns that duplicate investment may occur if the existing method is maintained for various reasons after the establishment of the cloud computing environment (Chang Yuwei, 2020). Since information systems are usually introduced throughout the organization to increase operational efficiency in institutions, this is essential for work.

In other words, in order to use the information system, it is necessary to learn how to use the system and to get accustomed to it. The cost of such time and effort becomes a sunk cost if the system is not utilized or the system is terminated. The higher these sunk costs are, the more likely a company will avoid switching to the new system because they or their employees will be reluctant to spend the time and money.

In this study, as seen in previous studies on mooring factors, it can be expected that the innovation of users and sunk costs influence intention to switch to innovative technology. It was determined that such should be included among mooring factors, and the following hypotheses were established.

H3: Mooring factors will have a negative effect on the intention to switch to cloud-based digital trade.
H3-a: Security concerns will have a negative effect on the intention to switch to cloud-based digital trade.
H3-b: Sunk costs will have a positive effect on the intention to switch to cloud-based digital trade.

2.4. Innovation Resistance

As information and communication technology develops rapidly, many studies have focused on how innovative technology users can adapt and utilize new systems (Rivard and Lapointe, 2012). However, in order to accommodate new innovative products or services, user resistance to the product or service must be overcome in advance, and this overcoming is a process leading to the consumer's intention to accept the product or service (Kim Hee-Woong and Kankanhalli, 2009). In other words, consumers begin to accept a new product or service only after resistance to it is first overcome. This means that in this process, resistance and acceptance coexist (Rivard and Lapointe, 2012). Resistance is defined as the consumer's refusal to change from the current state or the unwillingness to accept innovation (Maier et al., 2015). Research on such resistance is being widely studied not only in psychology and marketing, but also in the field of information systems. In psychology, resistance to change was defined as an individual's tendency to avoid change, and in business administration, it was conceptualized as an action pursued to maintain the status quo or to maintain continuous avoidance of change. In the field of information systems, it is defined as the adverse effects or objections of users to the proposed change from the results of information system implementation (Kim Hee-Woong and Kankanhalli, 2009). According to Lapointe and Rivard (2005), users of information systems perceive risks through their environment or mutual relationships, form resistance attitudes, and lead to resistance behaviors. In this regard, this study intends to establish the following hypotheses, as it is determined that the new functions provided by cloud-based digital trade are likely to increase user resistance and induce switching intention.

H4: Pull factors will have a negative effect on innovation resistance.
H4-a: Low cost will have a negative impact on innovation resistance.
H4-b: Ease of maintenance will have a negative effect on innovation resistance.

H5: Innovation resistance will have a positive effect on switching intention.

2.5. Moderating Effect of Mooring Factors

In studies using the PPM model, it has been reported that mooring factors play a role in adjusting the relationship between push factors and pull factors and actual migration behavior (Bansal, Taylor and James, 2005). If we expand this to switching behavior, even if

push factors or pull factors are strong, there is a high probability that users will not switch to the current service in a situation where the mooring factors that keep them in the existing trade business are strong.

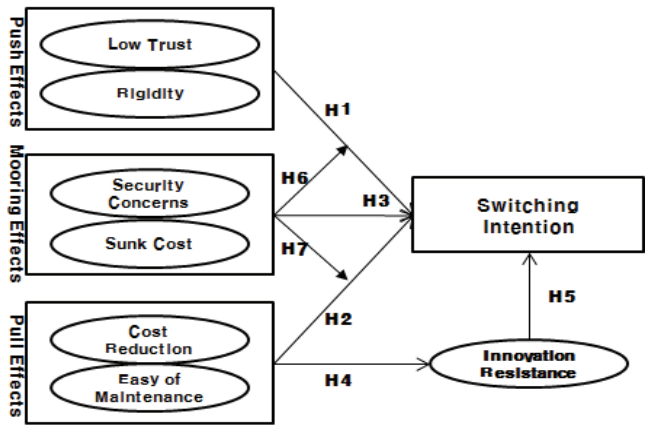
The purpose of this study is to empirically analyze the factors that influence switching from conventional trade business methods to cloud-based trade. Therefore, in this study, a research model was constructed and hypotheses were established by focusing on the factors related to switching to the cloud computing information system. However, in the PPM model of the migration theory used as the fundamental theory of this research model, it is theorized that mooring factors have a moderating effect on the relationship between the push factors and switching intention, and also has a moderating effect on the relationship between pull factors and switching intention (Fu, 2011; Hsieh et al., 2012). Therefore, this study also intends to further verify whether mooring, the anchoring factor, has an effect on the relationship between dissatisfaction and switching intention, push factors, and whether mooring affects the relationship between the push factors, value, and switching intention.

In other words, concerns about security and sunk costs are expected to play a moderating role in the influence of push and pull factors on switching intention, so the following hypotheses were established. Also, based on the previous studies and hypotheses discussed above, the research model in Fig. 3 is presented.

H6: Mooring factors will play a moderating role in the relationship between push factors and switching intention.

H7: Mooring factors will play a moderating role in the relationship between pull factors and switching intention.

Fig. 3. Research Model and Hypothesis



3. Methodology

3.1. Sampling

In this study, a preliminary questionnaire was prepared prior to conducting the questionnaire survey. Thirty copies of the prepared preliminary questionnaire were retrieved and the

composition of the measurement items was reconstructed. The survey was conducted after correcting some of the measurement analyses. The sample targeted companies engaged in trading among companies in incubation centers of key universities across the country that are preparing to switch their existing trading methods to cloud-based digital trade. The survey period was conducted for about 15 days from November 22nd to December 6th, 2021, and the survey was conducted after the respondents were provided with an explanation of the concept of digital trade using cloud services before answering. In this study, a total of 296 valid questionnaires were used for empirical analysis through the above process and demographic characteristics of the sample are shown in Table 1.

Table 1. Demographic characteristics of sample

Item		Frequency	%	Item		Frequency	%
Age of Company	Blow 1	39	13.2%	Employee	Below 5	22	7.4%
	1~5	121	40.9%		5~10	85	28.7%
	5~10	95	32.1%		10~20	118	39.9%
	Over10	41	13.9%		Over 20	71	24.0%
	Total	296	100%		Total	296	100%
Main Item	Food	52	17.6%	Target Market	China	75	25.3%
	Chemistry	50	16.9%		America	64	21.6%
	Textile	31	10.5%		EU	52	17.6%
	Electric	45	15.2%		Asia	44	14.9%
	Automobile	44	14.9%		M.East	24	8.1%
	Precision	53	17.9%		Africa	20	6.8%
	Others	21	7.1%		Other	17	5.7%
	Total	296	100%		Total	296	100%

3.2. Measurement Items

In order to measure the variable factors presented in the research model according to each concept, the measurement items of each variable were set based on previous studies, and are shown in Table 2.

Table 2. Measurement Item

Item	Concept	Measures	Reference
Low Trust	The extent to which one perceives that the results of the existing format are not satisfactory	Work results are contradictory and inconsistent	Colgate et al. (2007)
		Work results are not outstanding	
		Work results are not sufficient	
Rigidity	Extent to which one perceives that the existing format cannot reflect the demands of new conditions	Can't be modified flexibly to meet the new conditions	Schniederjans and Yadav (2013)
		Modification of functions in accordance with the demands for changes is slow	
		Can't adapt to new conditions sufficiently	

Table 2. (Continued)

Item	Concept	Measures	Reference
Security Concern	Extent to which one believes that personal information or data is not being protected	Can't transmit important information	Mathew (2012)
		Information transmission through the internet is not safe	
		Security of the cloud system is not high.	
Sunk Costs	Extent of costs or effort expended to implement the existing format	A lot of energy is invested	Schniederjans and Yadav (2013)
		A lot of time and efforts are invested	
		A lot of money is invested	
Cost Reduction	Extent of cost for initial establishment and operation	The price for the introduction is reasonable and valid	Benlian and Hess (2011)
		The initial establishment costs are low	
		The operating and maintenance costs are reasonable.	
Ease of Maintenance	Extent of the ease of function modification and maintenance	Ease of maintenance	Maier et al. (2015)
		Function modification and processes are well managed	
		Data back up and restoration is quick and easy	
Switching Intention	Factors inducing motivation for transition to Cloud Service	Plan to undergo transition to Cloud Service	Lai and Wang (2015)
		Transition to Cloud Service is possible	
		Recommended transition to Cloud Service to others in the surrounding.	
Innovation Resistance	Extent of objecting the transition to Cloud Service	Dissatisfied with the transition to Cloud Service	Maier et al. (2015)
		Transition to Cloud Service is not good.	
		Oppose the use of Cloud Service	

4. Findings

4.1. Correlation between Variables

The results of correlation analysis between major conceptual variables are shown in Table 3 below. Examining the relationship between switching intention and push factors, mooring factors, and pull factors, it was found that there was generally a high level of correlation. Ease of maintenance showed the highest correlation with .37**, followed by cost reduction with .35**, confirming a high level of correlation. The relationship between pull factors and

the user resistance level was found to have a significant correlation with the ease of maintenance at a level of .31**, and switching intention and user resistance also showed a high correlation at -.45**.

Table 3. Correlation between Variables

Construct	①	②	③	④	⑤	⑥	⑦	⑧
①	**.93**							
②	.22**	**.90**						
③	-.12	-.16*	**.91**					
④	-.17*	.11	.27**	**.92**				
⑤	-.15*	-.21**	.10	.19**	**.89**			
⑥	-.27**	-.23**	.12	.17*	.21**	**.86**		
⑦	.30**	.26**	.11	.26**	.35**	.37**	**.85**	
⑧	.29**	.20**	-.15*	-.14	-.11	-.31**	-.45**	**.92**
Mean	3.03	2.98	3.15	3.22	3.29	3.33	3.18	3.34
Std	.72	.61	.64	.83	.74	.82	.56	.79

Note: 1. **p<01, *p<05, diagonal values are the square root of AVE.

2. ①Low trust ②Rigidity ③Security Concern ④Sunk Cost ⑤Cost Reduction ⑥ Ease of Maintenance ⑦ Switching Intention ⑧Innovation Resistance

4.2. Reliability and Validity of Measurement Items

In this study, confirmatory factor analysis was conducted to examine the reliability and validity of the measurement items. As shown in the table below, the t-value for explaining each conceptual variable was found to be 8.91 or higher (p<.01), indicating that the validity of concentration was secured. Also, when the concept reliability was .7 or more, the average variance extracted (AVE) was judged to be reliable when it was .5 or more. Both the conceptual reliability and AVE presented in Table 4 were found to be in the good category. In order to understand discriminant validity, this study looked at the correlation coefficient between the square root of the AVE and the variables. As shown in Table. 3, the square root value of AVE was larger than the correlation coefficient value of the adjacent horizontal and vertical axes, confirming that discriminant validity was not an issue for the measurement items used in this study. Specifically, it was confirmed that the maximum value of the square of the correlation coefficient was smaller than the minimum value of the AVE, indicating that the discriminant validity of the measured items was good.

Table 4. Results of Confirmatory Factor Analysis

Construct	Item	Factor loading	Standard error	t-value	Cronbach's α	CR	AVE
Low Trust	LT1	.843	-	-	.91	.86	.83
	LT2	.871	.05	18.75			
	LT3	.903	.04	18.58			
Rigidity	RI1	.899	-	-	.88	.85	.80
	RI2	.948	.06	11.18			
	RI3	.887	.07	16.56			

Table 4. (Continued)

Construct	Item	Factor loading	Standard error	t-value	Cronbach's α	CR	AVE
Security	SC1	.892	-	-	.90	.89	.80
Concern	SC2	.889	.07	14.46			
	SC3	.852	.06	17.37			
Sunk Cost	SU1	.895	-	-	.93	.88	.82
	SU2	.942	.05	23.53			
	SU3	.908	.04	22.17			
Cost	CR1	.882	-	-	.87	.83	.77
Reduction	CR2	.927	.07	11.77			
	CR3	.937	.08	12.55			
Ease of	EM1	.913	-	-	.89	.89	.72
Maintenance	EM2	.927	.08	12.84			
	EM3	.928	.08	13.73			
Switching	SI1	.902	-	-	.84	.84	.71
Intention	SI2	.927	.06	9.28			
	SI3	.902	.05	8.91			
Innovation	IR1	.801	-	-	.91	.88	.81
Resistance	IR2	.819	.05	15.29			
	IR3	.872	.05	12.81			

4.3. Results of Empirical Test

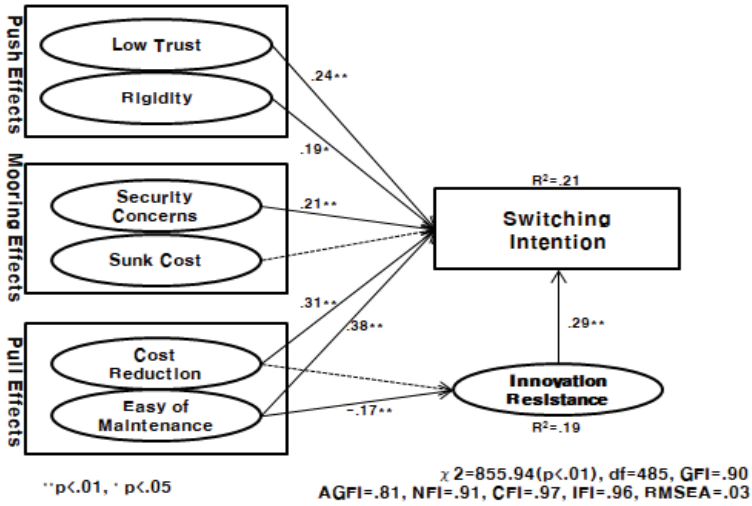
In this study, structural equation model (SEM) analysis was performed to identify the causal relationship between each variable, and the AMOS 21.0 program was used for analysis. Prior to verifying the structural equation model, this study judged the suitability of the model. The suitability of the model was found to be the model fit was $\chi 2$=855.94($p<.01$), df=485, GFI=.90 AGFI=.81, NFI=.91, CFI=.97, IFI=.96, RMSEA=.03, etc. As a result of analysis, the structural model did not show that the GFI value was higher than the reference value, but other indicators were generally good, so it is considered a model suitable for acceptance.

The test results of the research hypothesis are shown in Fig. 4. Firstly, among the push factors affecting the intention to switch to the innovative technology of cloud-based digital trade, the low reliability factor was .24**($p<.01$), which showed a high influence, and rigidity was .19*($p<.05$), so Hypotheses 1-1 and 1-2 between push factors and switching intention were both accepted. Next, in the relationship between pull factors and switching intention, ease of maintenance was .38**($p<.01$), which showed a high level of influence, and cost reduction was found to have an influence of .31** ($p<.01$), so both Hypotheses 2-1 and 2-2 between the pull factors and the switching intention were adopted. Meanwhile, as for mooring factors, security concern was .21** ($p<.01$), which showed a significant relationship with the level of resistance to innovative technologies, so Hypothesis 3-1 was accepted and Hypothesis 3-2 was rejected. Through this, with regards to the factors affecting the level of resistance to innovative technology, it was confirmed that pull factors had a relatively strong

effect. These results suggest that positive stimulus regarding standard innovative technology can be a major factor in bringing about changes in users' attitudes.

In the relationship between pull factors and innovation resistance, cost reduction was found to have no statistically significant effect; however, ease of maintenance was found to have an influence of -.17** (p<.01), so only Hypothesis 4-2 was adopted. In addition, user innovation resistance was found to have an influence of .29**(p<.01) on switching intention, confirming that Hypothesis 5 was accepted. Through this, pull factors were presented as positive stimuli regarding innovative technologies in this study, and t was confirmed that it can act as a burden for users to adapt to a new environment.

Fig. 4. SEM Results



4.4. Results of the Moderating Effect of the Mooring Factor

In this study, multi-group analysis was used to examine the path difference between push factors and pull factors according to mooring factors. For a total of 296 samples, the average value of each conceptual variable was obtained according to the method suggested by Aiken, West and Reno (1991), and the average value was classified into a high group and a low group and applied to the analysis. First, the verification of the path difference according to the level of security concerns is shown in Table. 5. Among users with a high level of security concerns, the effect of pull factors showed a relatively high influence on switching intention compared to users with a low level of security concerns. Statistically, it was confirmed that there was a significant difference at a 95% confidence level. Meanwhile, with regards to the effect of push factors on switching intention, the statistical significance of differences was not secured in both paths. This result is because users with high security concerns have a relatively low level of rejection of innovative technologies, and this is interpreted as a favorable evaluation of innovative technologies. Next, the results of the difference test according to the sunk cost level are presented in Table. 6. Users with a high perception of sunk costs were expected to have a higher level of adherence to the existing work method than those who did not; however, as a

result of verification, the difference between the two groups was not statistically supported. Based on these results, it can be seen that although the sunk cost of switching an existing work system to an innovative technology is meaningful from the point of view of a company as a user, it is distinguished independently from switching to innovative technology.

Table 5. Multi-group Analysis Results by Security Concern Level

path	Std. Coef.				Δχ2	Result
	High		Low			
LT→SI	.24	**	.14	**	1.66	Reject
RI→SI	.23	**	.12		1.89	-
CR→SI	.40	**	.18	**	4.07	Accept
EM→SI	.43	**	.21	**	4.23	Accept

Table 6. Multi-group Analysis Results by Sunk Cost Level

path	Std. Coef.				Δχ2	Result
	High		Low			
LT→SI	.18	**	.26	**	1.02	Reject
RI→SI	.13	**	.19	**	.85	Reject
CR→SI	.29	**	.24	**	.49	Reject
EM→SI	.35	**	.19	**	3.92	Accept

5. Conclusion and Implications

Digital trade has been used for about 20 years as the term for electronic trade (Borchert et al., 2021), and the usage of the digital trade is increasing sharply in line with the recent COVID-19 pandemic situation. However, there are not many prior studies related to cloud based digital trade, and they are focused on macro issues such as the establishment of a digital economy order (Azmeh, Foster and Echavarri, 2020). In this study, as innovative technologies, cloud service and digital trade were studied using the PPM model of migration theory from the user's point of view, and factors influencing the intention to switch to innovative technologies were demonstrated.

This study has important academic and practical implications as follows.

First, the point of this study is that the PPM model was applied to analyze the intention of users to switch to innovative technologies. Many studies have applied various theories to understand the adoption of innovative technologies, including the TAM model, and switching from existing work systems; however, in measuring the changing psychology of users, the studies have been somewhat incomplete. Accordingly, this study comprehensively considered the push factors of existing business systems, the pull factors of cloud-based digital trade, and the mooring factors, which are the users of innovative technologies, by using the PPM model, thereby verifying the relative influence on switching intention and innovation resistance. As a result of verification, it could be concluded that pull factors have a relatively high influence on switching intention compared to push factors, and in particular, it was confirmed that ease of maintenance is a factor that encourages switching and can also induce innovation resistance at the same time.

Second, resistance, the negative attitude of organizational members, is one of the biggest problems that hinder the introduction of new systems of cloud based digital trade in companies. However, not all members of the organization always resist, but in some cases, they accept it, so efforts should be made to reduce negative attitudes toward change by thoroughly understanding the reasons for resistance. Also, in the case of most system changes, the workload is inevitably increased due to education and training on the new system, and at this time, resistance to change and inertia to continue using the existing system may emerge. In order to reduce this resistance or inertia, work changes due to system changes should be sufficiently recognized in advance and it should be made known that the increase in work load is a temporary phenomenon, so it can be said that prior education in terms of change management is necessary to make it clear that a new system is essential for organizational development.

Third, service providers of cloud service-based digital trade seem to need a way to reduce user resistance when launching new services to the market. In general, PaaS, which is operated based on self-maintenance such as in the case of Amazon, has significantly reduced the inconvenience of conventional trade processing systems, so it is easy for users to think that resistance will decrease. However, as can be seen from the results of this study, users may feel burdened about adapting to changes in their existing work methods. Since such innovation resistance can have a negative effect on the switch to innovative technology of cloud based digital trade, companies need to make gradual improvements that minimize resistance when upgrading with new functions.

Fourth, as a result of verifying the difference between routes by classifying groups according to the mooring factor, it was confirmed that the higher the level of security concern, the more favorable the attitude toward cloud-based digital trade. This means that companies attach great importance to the security of transaction information, and when using cloud-based digital trade, information and data cannot be viewed by other users, and it is important that personal information is safely protected.

Although this study has several implications for researchers and practitioners, it has some limitations. First, the sample size for the empirical analysis in this study is rather small, considering the size of overall trade firms in Korea. Hence, it is important to identify more diverse datasets and ensure that the data represent a diverse trade firms across different industries. Second, there is a need for a comparative study in many competitive countries on the intentions of small and medium-sized trading companies to switch to innovative technologies. In the case of Korea, where ICT technology is advanced, trade business processing using information system technology is relatively large, but it is difficult to apply it to small and medium-sized trading companies around the world. Of course, in the current trade environment, some information and communication technologies are grafted because some companies may not be able to utilize them due to institutional problems. Third, it seems necessary to classify user resistance into more specific attributes to understand the causal relationship. In order to clearly present the test results of the hypotheses, this study looked at user resistance in terms of the perceived rejection and burden of users in accepting new technologies. However, there are various attributes that affect the switching intention of users of recent innovative technologies.

In spite of the above limitations, it is expected that this study will be helpful for the propagation of cloud based digital trade in which it is still necessary for follow-up studies to conduct more systematic research design and in-depth analysis, and to present clear implications for the cloud based digital trade.

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