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Article

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An empirical study on factors affecting customers' acceptance of internet-only banks in Korea

Cheolho Yoon^{1*} and Dongsup Lim²

Abstract: Internet-only banks have recently emerged in the financial industry because of the rapid development of fintech, which combines information and communication technologies with finance. This study investigated the factors affecting customers' acceptance of internet-only banks in Korea. A research model was developed in which relative advantage, complexity, compatibility, image, trialability, perceived critical mass, personal innovativeness, and computer self-efficacy influence perceived usefulness; image, trialability, perceived critical mass, personal innovativeness, and computer self-efficacy influence perceived enjoyment; and perceived usefulness, perceived enjoyment, and subjective norms influence the intention to use internet-only banks was developed. A total of 305 valid data were collected through questionnaires and analyzed using confirmatory factor analysis and path analysis through structural equation modeling. Results showed that relative advantage, image, perceived critical mass, and personal innovativeness influence perceived usefulness; image, trialability, perceived critical mass, personal innovativeness, and computer self-efficacy influence perceived enjoyment; and perceived usefulness, perceived enjoyment, and subjective norms influence the intention

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Cheolho Yoon is a professor of MIS at Mokpo National University in Korea. He studied computer science at Kwangwoon University in Seoul, Korea, where he also earned his Ph.D in MIS. His research areas of interest are blockchain technology, fintech, IT ethics, and big data. In particular, he is highly interested in fintech, which combines information and communication technology recently. He has published articles in a number of journals such as *Information & Management*, *Journal of Computer Information Systems*, *Journal of Business Ethics*, etc.

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PUBLIC INTEREST STATEMENT

With the development of the fintech industry, internet-only banks are rapidly spreading around the world. Unlike traditional banks that only use internet banking as a tool for financial transactions, internet-only banks refer to banks that operate all of their operations over the internet using personal computers or mobile devices without branches. Recently, internet-only banks have been actively established in the United States, Europe, China, Japan, Korea, Australia, Canada, and other countries around the world. Korea's internet-only banks have been established relatively recently, but are now growing rapidly. This study investigates the customer's acceptance factors for the rapidly growing internet-only banks in Korea and suggests strategic implications to secure their customers to practitioners of internet-only banks around the world. The interesting result of this study is that unlike internet banking, entertainment factors affect customers' acceptance of internet-only banks.

to use internet-only banks. This study suggests practical implications for research on the factors affecting customers' acceptance of internet-only banks in Korea.

Subjects: Management of IT; Customer Relationship Management; CRM; Technology; Behaviour

Keywords: internet-only bank; fintech; innovation diffusion; TAM; Korean bank

1. Introduction

With the rapid development of fintech, which combines information and communication technology, internet-only banks are spreading rapidly around the world. Internet-only banks refer to virtual and non-face-to-face banks that use the internet through a personal computer or a mobile device as their main channel without face-to-face transactions through offline branches. In general, internet-only banks are competitive because they do not need to open separate offline branches, require relatively low operating costs compared with existing banks, and have recently been increasing customer satisfaction by providing a variety of products and services that differentiate them from existing banks.

Since their initial introduction in the United States in the 1990s, internet-only banks have been actively operating in Europe, Japan, China, and the United States, and new internet-only banks continue to be established around the world. In Korea, as internet-only banks (i.e., K-Bank and Kakao Bank) are actively operating and the application for the establishment of Toss Bank, the third internet-only bank, has been approved by the government, the interest in the expected effects and prospects of the introduction, institutional problems and challenges, and customer acceptance and use of internet-only banks is increasing. However, despite the growing weight and interest in internet-only banks in the global financial industry, and the fact that studies on internet banking and mobile banking, which are the previous innovations of internet-only banks, are published frequently every year, little is known about the customer acceptance of internet-only banks, which are the latest fintech. Although recently some studies on customer acceptance of Internet-only banks have been published, these studies focus on specific factors such as trust (Kaabachi et al., 2017; Zhang et al., 2018) and perceived value (Ahn & Lee, 2019). Therefore, it is necessary to identify customers' acceptance factors for internet-only banks from a comprehensive perspective in order to promote research into new areas, internet-only banks.

Internet-only banks use a different way of doing business than traditional banks, but they are rooted in internet banking and mobile banking in their technical aspects. Previous studies on Internet banking and mobile banking have performed empirical analysis on a variety of variables such as technical characteristics variables of the internet and mobile banking, propensity and characteristic variables of customers, and social influence variables based on existing theories such as the Technology Acceptance Model (TAM) (Davis, 1989), the Theory of Reasoned Action (TRA) (Fishbein & Ajzen, 1975) and the Theory of Planned Behavior (TPB) (Ajzen, 1991), the Diffusion of Innovation Theory (Rogers, 2003) and the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003). Therefore, this study aims to investigate the factors influencing the customer acceptance of internet-only banks from a comprehensive perspective in terms of the technological aspect, innovative aspect, individual characteristics, and social influence aspect.

The results of this study are expected to be used as the basis for developing a research model in subsequent studies that analyze the acceptance factors for new fintech technologies. Moreover, they can be used as basic data for the government's policy-making to revitalize the fintech industry and are expected to contribute to the activation of internet-only banks at the forefront of the fintech industry.

2. Internet-only banks

2.1. What are internet-only banks?

Internet-only banks or virtual banks operate most of their business through the internet using a personal computer or a mobile device with a few branches or even without a branch. Internet-

only banks conduct almost all their financial services online, including opening financial accounts, lending funds, issuing credit cards, and transferring money overseas, which are performed by general banks through a self-certification method. Internet-only banks are distinguished from traditional banks in three ways. First, internet-only banks allow customers to open accounts at any time, 24 hours a day for 365 days, and access all financial products through a mobile device. Therefore, customers who have difficulty accessing offline banks due to the nature of the region can get financial services anytime, anywhere. Second, internet-only banks offer better interest rate conditions than general banks by reducing the cost of labor and rent required in branch operations and provide lending services at lower interest rates for low-credit consumers by using big data. Third, internet-only banks provide one-to-one customer service through a big data-based customer management system using non-financial information, such as communication record information, mobile phone payment history, and SNS activities, and a variety of the latest fintech technologies.

The world's first internet-only bank is the Security First Network Bank, which has spread around the world, including Europe and Japan, since it was established in the United States in October 1995. By the end of 2000, more than 40 internet-only banks had been established in the United States alone, and six internet-only banks were included in the top 50 US banks because of their total assets at the end of September 2014. In the case of Japan, after Japan Net Bank, Japan's first internet-only bank, was launched in October 2000, Sony Bank, Seven Bank, and e-Bank were immediately established in April and July 2001. There are currently 10 internet-only banks in Japan. In Europe, the activities of internet-only banks, which are called challenger banks, are leading a new shift in the European banking industry. Typical challenger banks include the United Kingdom's First Direct Atom Bank, Monzo Bank, and Starling Bank and Germany's Fidor Bank. In China, WeBank, China's first internet-only bank, was formally established in December 2014. WeBank has released financial products, such as loans and cash, using Tencent's messenger WeChat and QQ. It is available only through its official app and website and does not have offline branches. As of August 2018, internet-only banks accounted for 8 of the 17 private banks in China, with most internet-related companies being the major shareholders. Indeed, internet-only banks are spreading around the world with the development of fintech technology.

2.2. Difference between internet-only banks and internet banking

Internet-only banks are similar to internet banking, a financial information system in which customers manage their bank affairs in terms of the service content through the internet. Since the advent of internet-only banks, general banks have strengthened their internet banking services, reducing the differentiation factors between internet-only banks and internet banking. However, internet banking is an information system that allows customers to conduct banking on their mobile devices or the internet and is only available when they register in offline branches. In other words, general banks conduct business activities centered on offline branches, which represent face-to-face channels and use non-face-to-face channels, such as internet banking, as a means of supplementary service. Conversely, internet-only banks conduct most of their business through electronic media, such as automatic teller machines (ATMs) and the internet, with no branches or only a few branches. Internet-only banks partially overlap with existing banks, but they conduct all banking operations, such as account opening, deposits, withdrawals, loans, and payments, in a non-face-to-face manner using the internet.

In conclusion, internet-only banks are fundamentally different from internet banking, which uses the internet as an auxiliary means, in that it is entirely based on cyberspace. Table 1 shows the differences between general banks and internet-only banks.

3. Theoretical background and hypothesis development

Little is known about the customer acceptance of internet-only banks. Although internet-only banks are slightly different in concept from internet banking, the research framework of this study was established through a wide literature review of previous studies on internet banking adoption and technology acceptance, as internet-only banks utilize advanced information technology (IT) based on the internet.

Table 1. Differences between general banks and internet-only banks

Internet-only bank	Comparison item	General bank
24 hours, 365 days	Business hours	Weekdays from 9:00 to 16:00
Internet	Main channel	Offline branch
Register by smartphone	Customer registration	Branch visit
Application by smartphone	Loan screening	Branch visit and face-to-face screening
More favorable interest rates	Competitiveness	Expertise through face-to-face service

The theoretical framework adopted in this study is grounded on four core principles: (i) technology acceptance model and intrinsic motivation, (ii) diffusion of innovations theory, (iii) individual characteristics of IT acceptance, and (iv) social factors influencing IT adoption. The logic for this framework is as follows.

3.1. Technology acceptance model and intrinsic motivation

In the literature on internet banking adoption, the most commonly used theory to develop a basic model for predicting the individual use of internet banking is the TAM (Hanafizadeh et al., 2014). TAM, which was proposed by Davis (1989), describes and predicts IT usage based on the TRA of Fishbein and Ajzen (1975). This model includes perceived usefulness and perceived ease of use as the key factors affecting IT acceptance. Perceived usefulness is defined as “the degree to which a person believes that a particular technology would enhance his or her job performance” (Davis, 1989, p. 320). Perceived ease of use is “the degree to which a person believes that the utilization of a particular technology would be free of effort” (Davis, 1989, p. 320). TAM has been widely applied in studies on user acceptance of different types of technologies. Numerous studies have shown that TAM is a powerful and parsimonious model to describe technology use (Y. Lu et al., 2009). TAM has also been used as a theoretical basis in studies on internet banking adoption (see Hanafizadeh et al., 2014). Although perceived usefulness and perceived ease of use are used as the key variables in TAM, in some recent TAM-based studies, perceived ease of use has been reported to have no effect on intention to use (e.g., Hu et al., 2019; Jahangir & Begum, 2008; Kanchanatane et al., 2014). Kanchanatane et al. (2014) presented a research model that combines TAM and diffusion of innovations theory in a study that analyzes the intent of using e-marketing and found that perceived ease of use does not affect the use of e-marketing. Jahangir and Begum (2008) empirically analyzed perceived ease of use and found that it has no effect on the customer acceptance of internet banking. Therefore, we posit the following hypothesis about the theoretical framework for the customer acceptance of internet-only banks based on the TAM.

H1: Perceived usefulness positively affects the intention to use internet-only banks.

Although research on the effect of intrinsic motivation in the internet banking literature is rare, intrinsic motivation is frequently used as the theoretical framework to explain and predict the usage of IT along with extrinsic motivation, such as perceived usefulness. Intrinsic motivation is defined as “the performance of an activity for no apparent reinforcement other than the process of performing the activity per se” (Teo et al., 1999, p. 26). Davis, who proposed TAM, and his colleagues showed that intrinsic motivation has a significant direct effect on the intention to use computers and operationalized intrinsic motivation as perceived enjoyment, which is defined as “the extent to which the activity of using the technology artifact is perceived to be enjoyable in its own right, apart from any performance consequences that may be anticipated” (Davis et al., 1992, p. 1113). Perceived enjoyment has been found to have a significant effect on users’ technology acceptance, especially with regard to hedonic systems (Van der Heijden, 2004). In the context of internet-only banks, perceived enjoyment refers to the belief of internet-only bank users that using them is enjoyable, pleasurable, and fun.

Internet-only banks in Korea not only offer useful services, such as free credit card fees and low loan rates, but also provide entertainment services that allow customers to use deposit interest as points to buy games and music content. In the case of Kakao Bank, it allows the meeting owner to create a bank account under his or her personal name and provide an easy and fun meeting account service in which members collect money together for certain purposes, such as friendship and travel. Therefore, we suggest the hypothesis on perceived enjoyment.

H2: Perceived enjoyment positively affects the intention to use internet-only banks.

3.2. Diffusion of innovation theory

Diffusion of innovation (DOI) theory is commonly used in the literature on internet banking adoption (e.g., Md Nor et al., 2010; Zolait & Sulaiman, 2008) along with TAM because of the innovative nature of internet banking. DOI theory, which was developed by Rogers (2003), explains the process of adopting innovation. Innovation refers to “an idea, practice, or object that is perceived as new by an individual or other unit of adoption” (Rogers, 2003, p. 12). Rogers (2003) proposed five characteristics of innovations that help reduce uncertainty: (1) relative advantage: the degree to which an innovation is perceived as being better than its precursor, (2) complexity: the degree to which an innovation is perceived as being difficult to use, (3) compatibility: the degree to which an innovation is perceived as being consistent with the existing values, needs, and past experience of potential adopters, (4) trialability: the degree to which an innovation can be experimented with before adoption, and (5) observability: the degree to which the results of an innovation are observable to others (Moore & Benbasat, 1991). Rogers argued that “individuals’ perceptions of these characteristics predict the rate of adoption of innovations” (Rogers, 2003, p. 219). Various studies based on the innovation characteristics of DOI theory have empirically verified that diffusion is faster when innovations are perceived to have the aforementioned characteristics and low complexity (Rogers, 2003).

Internet-only banks in Korea offer relatively lower interest rates on loans and higher deposit rates than general banks. In addition, they operate 24 hours a day for 365 days or run cyber branch banks to provide superior services in terms of time and space. The relative advantage of these products and services will increase the perceived usefulness of customers for internet-only banks. The low loan interest and high deposit rates of internet-only banks are based on a self-service concept, in which customers manage all their own banking activities, including opening new accounts, in a rather complicated procedure. In the process of performing these self-service functions, initial customers are expected to be confused, thus negatively affecting the usefulness of internet-only banks. Internet-only banks develop and provide deposits, loans, and various customer services suitable for the lifestyles of customers through big data analysis. Therefore, the relative advantage and compatibility of internet-only banks can improve the perceived usefulness of customers of internet-only banks, whereas complexity can decrease their perceived usefulness. Therefore, we propose the following hypotheses:

H3: Relative advantage positively affects the perceived usefulness of internet-only banks.

H4: Complexity negatively affects the perceived usefulness of internet-only banks.

H5: Compatibility positively affects the perceived usefulness of internet-only banks.

Trialability refers to the usage experience before the adoption of innovation. Previous experience in existing TAM literature is known to have a positive effect on perceived usefulness (Lee et al., 2003). Mutahar et al. (2016) found that trialability affects the perceived usefulness of mobile banking use. Korea’s internet-only banks are increasing their trial use of customers through aggressive promotions that offer discounts on the latest smartphones. Kakao Bank increases its trial use of customers through services, such as account transfer using Kakao messenger. Customers can recognize the usefulness of

internet-only banks through these pilot uses. In addition, Korea's internet-only banks provide a variety of entertainment services, as mentioned previously. If customers experience these entertainment services using internet-only banks on a trial basis, they will be able to enjoy themselves. Therefore, the following hypotheses with respect to trialability are proposed:

H6: Trialability positively affects the perceived usefulness of internet-only banks.

H7: Trialability positively affects the perceived enjoyment of internet-only banks.

Observability, which is the outcome of the observation of the use or innovation of a new technology in a number of people, is similar in concept to perceived critical mass, which is the social factor that this study presents. Therefore, observability is excluded from the hypotheses. In information systems research, Moore and Benbasat (1991) proposed another construct based on Tornatzky and Klein (1982) study extending Rogers' classification, which was considered important in the decision to adopt an innovation. This construct is called image, which is defined as "the degree to which use of an innovation is perceived to enhance one's image or status in one's social system" (Moore & Benbasat, 1991, p. 195). Although Rogers (2003) included image as an aspect of relative advantage, some researchers found the effect of image (social approval) to be different enough from relative advantage to be considered a separate factor (Moore & Benbasat, 1991). Korea's internet-only banks are the latest fintech, and people will feel that they are rewarded qualitatively by their rise in status with others through the use of these advanced technologies. Moreover, raising one's status is expected to have a positive effect on pleasure, similar to what makeup does to women. Therefore, we establish the following hypotheses related to image:

H8: Image positively affects the perceived usefulness of internet-only banks.

H9: Image positively affects the perceived enjoyment of internet-only banks.

3.3. Individual characteristics of IT acceptance

In existing studies, personal innovativeness and computer self-efficacy are mainly used as individual characteristic variables related to the acceptance of innovative technologies. In the theory of innovation diffusion, Rogers (2003) defined innovativeness as "the degree to which an individual is relatively early in adopting a new idea than other members of a social system" (Rogers, 2003, p. 37). Previous studies have verified claims that personal innovativeness affects the adoption of new technologies (Yoon et al., 2015). Agarwal and Prasad (1998) proposed personal innovativeness in IT, which is an influential personal trait variable in relation to technology innovation adoption behaviors and is defined as "the willingness of an individual to try out any new information technology" (Agarwal & Prasad, 1998, p. 206). They described personal innovativeness as a sign of risk taking. J. Lu et al. (2005) argued that it is reasonable to expect individuals to develop more positive intentions toward the adoption of an IT innovation because individuals with higher innovativeness tend to take more risks. They found that personal innovativeness has a significant effect on perceived usefulness. Rouibah and Abbas (2012) found that the more users show signs of innovativeness to use new technologies and like everything new, the more they will enjoy their use. Zhou and Feng (2017) reported that people with a high level of personal innovativeness tend to more easily derive enjoyment and satisfaction from using new technology. Yoon et al. (2015) argued that the innovative nature of individuals has a positive effect on the enjoyment of using a mobile messenger. Therefore, customers with highly innovative characteristics will find using internet-only banks, which are innovative technology, useful and interesting. Therefore, we hypothesize the following:

H10: Personal innovativeness positively affects the perceived usefulness of using internet-only banks.

H11: Personal innovativeness positively affects the perceived enjoyment of using internet-only banks.

Self-efficacy, which is an individual characteristic, is defined as a person's belief in his or her capability to perform a given task (Bandura, 1977). Bandura (1994) argued that high self-efficacy leads to high performance regardless of the type of task. Compeau and Higgins (1995) proposed computer self-efficacy, which is an individual's ability to apply his or her computer skills to a wider range of computer-related tasks, and explained that people with high levels of computer self-efficacy feel less afraid of computers, are more likable and confident, and use more useful tools for their jobs and everyday life. Researchers have empirically analyzed computer self-efficacy to have a positive effect on perceived usefulness (Karsten et al., 2012). In the existing literature, the relationship between computer self-efficacy and perceived enjoyment is not well known. However, prior IT research has found a negative relationship between computer self-efficacy and computer anxiety (Karsten et al., 2012). As computer self-efficacy can perform a task with less fear, it is expected to increase enjoyment in performing the task. Such personal characteristics are also expected to be applied to the use of internet-only banks based on IT. Therefore, the following hypotheses are presented:

H12: Computer self-efficacy positively affects the perceived usefulness of using internet-only banks.

H13: Computer self-efficacy positively affects the perceived enjoyment of using internet-only banks.

3.4. Social factors influencing IT adoption

Although the original TAM excludes social influence from its formulation, recent internet banking studies based on TAM have considered the importance of social influence in the adoption of internet banking. We focused on two specific social influence factors that are likely to influence individuals' internet-only bank usage, namely subjective norms and perceived critical mass, because they are frequently used in internet banking and instant messenger studies as the influencing factors in forming intentions.

In the IT acceptance literature, the subjective norms of the TRA proposed by Fishbein and Ajzen (1975) are manipulated as social influence variables. Subjective norms refer to "the person's perception that most people who are important to him think he should or should not perform the behavior in question" (Fishbein & Ajzen, 1975, p. 302). It has been found to be more important prior to or in the early stages of innovation implementation when users have limited direct experience from which to develop attitudes (Tan & Teo, 2000). In the TAM literature, Venkatesh and Davis (2000) suggested that subjective norms could directly affect behavioral intention. Many researchers have demonstrated subjective norms to have a direct effect on customers' acceptance of internet banking (e.g., Marakarkandy et al., 2017; Safeena et al., 2013; Yaghoubi & Bahmani, 2010). Therefore, we posit the following:

H14: Subject norms positively affect the behavioral intention to use internet-only banks.

Although perceived critical mass has not been used in internet banking adoption studies, it has been known to play an important role in the proliferation of technologies based on communication technology. Therefore, perceived critical mass can also affect the spread of internet-only banks based on the internet. Perceived critical mass is defined as "the degree to which a person believes that most of his or her peers are using the system" (Lou et al., 2000, p. 95). Markus (1987) first applied critical mass theory to the diffusion of technologies. Perceived critical mass, which is the perception of the number of users of a technology, may be considered evidence of the objective reality of the diffusion of a technology (Yoon et al., 2015). Along this line of reasoning, if an individual perceives that many people use internet-only banks, he or she may accept it as objective evidence of the usefulness of internet-only banks. As empirical evidence, many studies have found that perceived critical mass has a positive effect on perceived usefulness (e.g., Li et al., 2005, 2010; Lou et al., 2000). Although the relationship between perceived critical mass and perception of enjoyment has not yet been fully explored (Yoon et al., 2015), some studies on technology adoption have found that a positive relationship exists (e.g., Li et al., 2005, 2010). Korea's Internet-only banks can be regarded as a technology that includes hedonistic characteristics

because they not only provide useful services but also a variety of services, including entertainment. In general, people believe that if many people watch a particular movie, then it must be fun. Similarly, people will think that using Internet-only banks that include hedonic features is fun if many people use them. Therefore, we hypothesize the following:

H15: Perceived critical mass positively affects the perceived usefulness of internet-only banks.

H16: Perceived critical mass positively affects the perceived enjoyment of using internet-only banks.

3.5. Research model

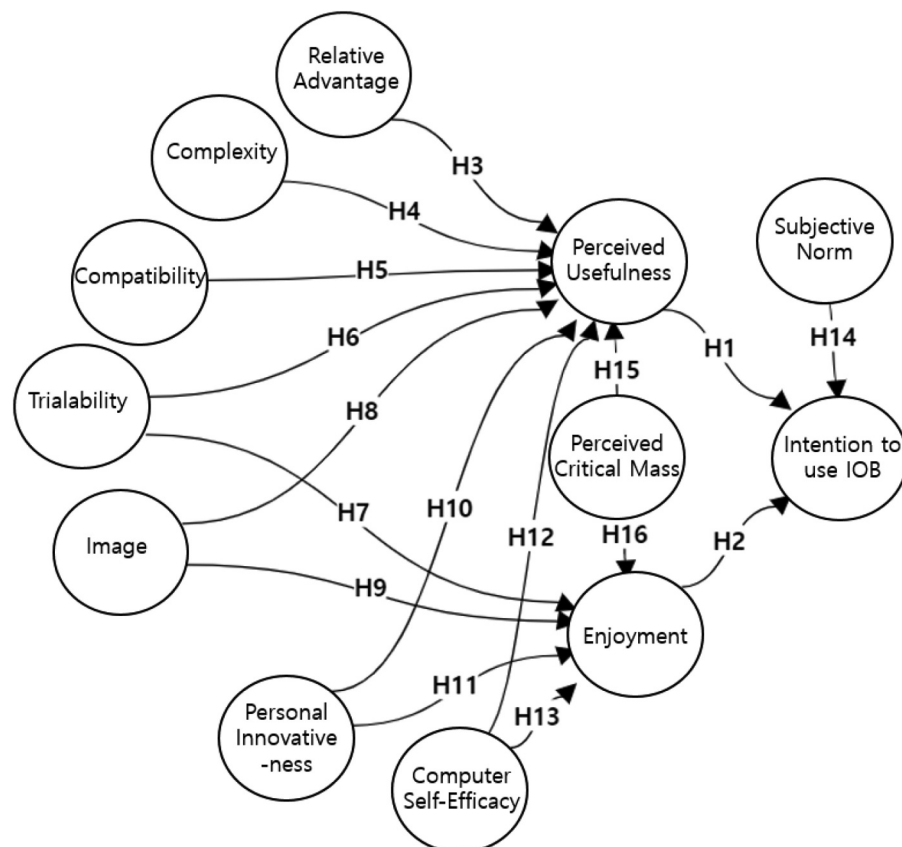
The research model posits that relative advantage, complexity, compatibility, image, trialability, perceived critical mass, personal innovativeness, and computer self-efficacy influence perceived usefulness; image, trialability, perceived critical mass, personal innovativeness, and computer self-efficacy influence perceived enjoyment; and perceived usefulness, perceived enjoyment, and subjective norms influence the intention to use internet-only banks. Figure 1 illustrates this research model.

4. Research methodology

4.1. Data collection

The data collection of this study was conducted through online survey using the web and mobile-linked QR codes provided by the cloud-based social science research automation site (ssra.or.kr). The respondents were randomly chosen from university campuses and the streets. A total of 305 usable questionnaires were collected and used in the analysis. The respondents comprised 119 males and

Figure 1. Research model.



186 females. Among the respondents, 46% were over 40 years of age, and 20% were company workers. The detailed descriptive statistics of the respondents are shown in Table 2.

4.2. Measurement development

To measure the constructs in the research model, we developed measurements based on the items used in previous studies that established reliability and validity. The measurements for the relative advantage, complexity, compatibility, and trialability constructs of the DOI theory variables were adapted from Tan and Teo (2000). The measurements for image were adapted from Moore and Benbasat (1991). The measurements for personal innovativeness and computer self-efficacy of the individual characteristic variables were adapted from J. Lu et al. (2005) and Thatcher (2008), respectively. The measurements for subjective norms and perceived critical mass of the social influence variables were adapted from Taylor and Todd (1995) and Li et al. (2005), respectively. The measurements for perceived usefulness and perceived enjoyment were adapted from Yoon et al. (2015). All items were measured using a seven-point Likert scale, with responses ranging from “strongly disagree” to “strongly agree.” The measurements used in this study are shown in the Appendix A.

5. Results

The structural equation modeling (SEM) approach was used to validate the research model. For the SEM, the partial least squares (PLS) method was employed. PLS is advantageous for conducting exploratory studies (Chin, 1998) and analyzing complex models. It can also estimate parameters

Table 2. Descriptive statistics of the respondents' characteristics

Measure	Value	Frequency	Percentage
Gender	Male	119	39.0
	Female	186	61.0
	-	305	100.0
Age	20–24	91	29.8
	25–29	24	7.9
	30–34	11	3.6
	35–39	13	4.3
	40–44	26	8.5
	45–49	54	17.7
	Older than 50	86	28.2
	-	305	100.0
Education	High school or below	3	1.0
	High school	34	11.1
	University student	100	32.8
	Bachelor's degree	96	31.5
	Master's degree or over	72	23.6
	-	305	100.0
Job	None	6	2.0
	Students	103	33.8
	Company worker	62	20.3
	Housewife	28	9.2
	Specialized job	62	20.3
	Others	26	8.5
	Small business owner	18	5.9
	-	305	100.0

efficiently and generally has a high statistical power (Hair et al., 2013). For the PLS technique, we used the plspm package of the open-source software R (Sanchez et al., 2013).

5.1. Reliability and validity of the measurement items

In this study, the reliability of the measurements was assessed based on the Cronbach's alpha coefficient and the composite reliability value for the constructs. As shown in Table 3, the Cronbach's alpha coefficient of all the constructs exceeded the 0.70 level. The composite reliability also showed values much higher than the recommended level of 0.70 (Bagozzi & Yi, 1988). Therefore, the results demonstrated a reasonable reliability level for the measurement items.

To assess the validity of the constructs of the research model, convergent and discriminant validity tests were conducted based on confirmatory factor analysis (CFA) using PLS. In the CFA by PLS, convergent validity is assured when each measurement item loads significantly, with the p-value of its t-value well within the 0.05 level, on its assigned construct (Gefen & Straub, 2005) and when the average variance extracted (AVE) of the constructs is higher than 0.50 (Fornell & Larcker, 1981). As shown in Table 4, all the t-values of the measurements were above 1.96, and the AVE values of all constructs in Table 3 were over 0.5. These results indicate the convergent validity of all the measurement items for the constructs.

Discriminant validity is assured when measurement items load more strongly on their assigned construct than on the other constructs in the CFA (Chin, 1998) and when the square root of the AVE of each construct is larger than its correlations with the other constructs (Fornell & Larcker, 1981). As shown in Table 4, all the measurement items loaded considerably stronger on their respective factors than on the other constructs. Table 5 shows that all correlations between two constructs are less than the square root of the AVE of both constructs. Therefore, the results demonstrate the discriminant validity of all constructs.

Although the Fornell and Larcker (1981) criterion and the method of Chin (1998) are the dominant approaches for evaluating discriminant validity, these approaches do not reliably detect the lack of discriminant validity in common research situations (Henseler et al., 2015). Therefore, we employed

Table 3. Reliability

Construct	Item no.	C. Alpha*	CCR**	AVE***
Relative Advantage	3	0.89	0.932	0.82
Complexity	3	0.864	0.917	0.786
Compatibility	2	0.883	0.945	0.895
Image	3	0.86	0.915	0.78
Trialability	2	0.83	0.922	0.854
Perceived Critical Mass	3	0.933	0.957	0.882
Personal Innovativeness	3	0.894	0.934	0.825
Computer Self-efficacy	3	0.95	0.968	0.909
Perceived usefulness	2	0.923	0.963	0.929
Perceived enjoyment	3	0.961	0.975	0.928
Subjective norms	3	0.874	0.923	0.796
Intention to use internet-only banks	2	0.936	0.969	0.94

*Cronbach's alpha, **Composite construct reliability, ***AVE: Average variance extracted.

Table 4. Results of the CFA

Items	RA	CMP	FIT	IMG	TRA	CM	PIIT	CSE	PU	PE	SN	INT	t-value
α1	0.874	-0.39	0.74	0.68	0.70	0.58	0.41	0.62	0.71	0.63	0.53	0.64	53.17
α2	0.926	-0.23	0.65	0.61	0.62	0.52	0.40	0.58	0.66	0.59	0.58	0.63	85.85
α3	0.915	-0.25	0.73	0.68	0.65	0.55	0.47	0.57	0.71	0.65	0.60	0.70	74.75
α4	-0.269	0.87	-0.34	-0.24	-0.37	-0.27	-0.15	-0.41	-0.28	-0.27	-0.21	-0.22	29.97
α5	-0.301	0.86	-0.21	-0.14	-0.25	-0.27	-0.05	-0.37	-0.29	-0.21	-0.20	-0.29	38.68
α6	-0.285	0.93	-0.36	-0.18	-0.37	-0.29	-0.08	-0.38	-0.28	-0.27	-0.18	-0.26	68.87
α8	0.708	-0.29	0.93	0.67	0.69	0.57	0.43	0.55	0.67	0.64	0.54	0.56	73.63
α9	0.727	-0.28	0.92	0.75	0.73	0.57	0.57	0.62	0.72	0.68	0.63	0.64	71.31
α10	0.792	-0.34	0.78	0.87	0.73	0.61	0.53	0.62	0.77	0.71	0.61	0.70	52.35
α11	0.606	-0.15	0.61	0.92	0.67	0.55	0.54	0.55	0.69	0.69	0.67	0.62	87.37
α12	0.507	-0.02	0.62	0.86	0.58	0.45	0.54	0.42	0.55	0.62	0.66	0.48	43.28
α13	0.672	-0.34	0.75	0.67	0.92	0.73	0.45	0.64	0.70	0.68	0.59	0.60	58.73
α14	0.67	-0.35	0.71	0.72	0.93	0.65	0.52	0.69	0.73	0.71	0.67	0.67	72.92
α24	0.589	-0.29	0.62	0.59	0.70	0.94	0.33	0.55	0.69	0.61	0.61	0.55	96.8
α25	0.546	-0.27	0.59	0.57	0.69	0.94	0.36	0.51	0.69	0.59	0.58	0.51	78.24
α26	0.587	-0.31	0.62	0.57	0.72	0.94	0.35	0.56	0.72	0.62	0.56	0.53	87.86
α15	0.49	-0.17	0.53	0.60	0.53	0.36	0.90	0.57	0.56	0.55	0.51	0.50	68.7
α16	0.346	-0.02	0.43	0.53	0.43	0.28	0.91	0.51	0.44	0.47	0.51	0.43	56.55
α17	0.433	-0.09	0.47	0.51	0.46	0.35	0.92	0.57	0.49	0.51	0.53	0.41	95.48
α18	0.591	-0.43	0.60	0.56	0.69	0.55	0.59	0.95	0.63	0.62	0.61	0.55	102.82
α19	0.64	-0.43	0.64	0.59	0.68	0.55	0.60	0.96	0.64	0.63	0.65	0.58	149.12
α20	0.643	-0.39	0.61	0.59	0.69	0.55	0.56	0.95	0.65	0.60	0.66	0.59	114.62
α27	0.732	-0.29	0.70	0.72	0.74	0.73	0.52	0.63	0.96	0.74	0.67	0.75	124.49
α28	0.75	-0.33	0.76	0.75	0.75	0.71	0.54	0.67	0.96	0.77	0.69	0.76	129.96
α29	0.688	-0.28	0.73	0.75	0.73	0.64	0.54	0.63	0.79	0.96	0.68	0.70	102.54

(Continued)

Table 4. (Continued)

Items	RA	CMP	FIT	IMG	TRA	CM	PIIT	CSE	PU	PE	SN	INT	t-value
a30	0.649	-0.27	0.68	0.73	0.72	0.62	0.56	0.63	0.75	0.97	0.68	0.72	143.11
a31	0.652	-0.27	0.70	0.73	0.73	0.60	0.54	0.62	0.73	0.97	0.69	0.75	142.77
a21	0.494	-0.18	0.54	0.58	0.54	0.46	0.57	0.62	0.55	0.57	0.89	0.50	39.12
a22	0.513	-0.12	0.54	0.59	0.54	0.49	0.48	0.51	0.57	0.60	0.92	0.55	60.6
a23	0.647	-0.28	0.60	0.74	0.70	0.67	0.49	0.65	0.73	0.70	0.88	0.69	68.52
a32	0.71	-0.30	0.68	0.65	0.68	0.55	0.48	0.62	0.77	0.72	0.65	0.97	108.82
a33	0.696	-0.26	0.65	0.68	0.66	0.54	0.48	0.54	0.75	0.74	0.64	0.97	129.29

∞: Maximum Value.

RA: Relative advantage, CMP: Complexity, FIT: Compatibility, IMG: Image, TRA: Trialability, PIIT: Personal Innovativeness, CSE: Computer Self-efficacy, SN: Subjective norm, CM: Perceived critical mass, PU: Perceived usefulness, PE: Perceived enjoyment, INT: Intention to use internet-only banks

Table 5. AVE and the correlation matrix

Construct	RA	CMP	FIT	IMG	TRA	CM	PIIT	CSE	PU	PE	SN	INT
RA	(0.91)											
CMP	-0.32	(0.89)										
FIT	0.76	-0.3	(0.95)									
IMG	0.73	-0.21	0.76	(0.88)								
TRA	0.73	-0.37	0.75	0.76	(0.92)							
CM	0.61	-0.31	0.61	0.61	0.75	(0.94)						
PIIT	0.47	-0.11	0.53	0.6	0.52	0.37	(0.91)					
CSE	0.66	-0.44	0.62	0.61	0.72	0.58	0.61	(0.95)				
PU	0.77	-0.32	0.73	0.76	0.77	0.75	0.55	0.67	(0.96)			
PE	0.69	-0.28	0.7	0.76	0.75	0.64	0.57	0.65	0.79	(0.96)		
SN	0.63	-0.22	0.62	0.73	0.68	0.62	0.57	0.67	0.7	0.71	(0.89)	
INT	0.73	-0.29	0.63	0.69	0.69	0.56	0.5	0.6	0.79	0.75	0.66	(0.97)
Mean	5.06	3.15	4.66	4.71	4.92	4.22	5.05	4.47	4.87	5.04	4.64	4.92
SD	1.48	1.65	1.55	1.33	1.51	1.41	1.55	1.4	1.48	1.46	1.48	1.52

(). Square root of AVE

the heterotrait-monotrait ratio of the correlations (HTMT) criterion proposed by Henseler et al. (2015) additionally. For discriminant validity assessment of the HTMT criterion, we computed the HTMT values for each pair of constructs on the basis of the item correlations. As shown in Table 6, all HTMT values for each pair of constructs were below .90, which is the threshold of the HTMT criterion. Therefore, the results demonstrate the discriminant validity of all constructs.

5.2. Hypothesis testing

By evaluating the structural model, we examined the coefficients of the causal relationships between the constructs and their significance, which would test the hypotheses. Figure 2 illustrates the path coefficients and their significance on the structural model. The path coefficients, their t-value and p-value on the structural model, and the coefficients of determination (R^2) for each dependent construct are shown in Table 7.

We performed hypothesis testing based on the structural model. As indicated in Table 7, the results show that perceived usefulness and perceived enjoyment significantly affect intention to use internet-only banks ($\alpha = 0.01$) and that subjective norms significantly affect intention to use internet-only banks ($\alpha = 0.05$). Therefore, H1, H2, and H14 are supported. Relative advantage, image, and perceived critical mass significantly affect perceived usefulness ($\alpha = 0.01$), and personal innovativeness significantly affects perceived usefulness ($\alpha = 0.05$). Therefore, H3, H8, H10, and H15 are supported. Trialability and image significantly affect perceived enjoyment ($\alpha = 0.01$), and personal innovativeness, computer self-efficacy, and perceived critical mass significantly affect perceived enjoyment ($\alpha = 0.05$). Therefore, H7, H9, H11, H13, and H16 are supported. Conversely, complexity, compatibility, trialability, and computer self-efficacy do not affect perceived usefulness. Therefore, H4, H5, H6, and H10 are rejected.

In addition, 77% of the variance in perceived usefulness ($R^2 = 0.769$) is explained by relative advantage, complexity, compatibility, trialability, image, personal innovativeness, computer self-efficacy, and perceived critical mass; 68% of the variance in perceived enjoyment ($R^2 = 0.679$) is explained by trialability, image, personal innovativeness, computer self-efficacy, and perceived critical mass; and 67% of the variance in intention to use internet-only banks ($R^2 = 0.668$) is explained by perceived usefulness, perceived enjoyment, and subjective norms.

6. Conclusion

The result of the hypothesis testing shows that relative advantage, image, perceived critical mass, and personal innovativeness affect perceived usefulness and that image, trialability, perceived critical mass, personal innovativeness, and computer self-efficacy affect perceived enjoyment. Moreover, perceived usefulness, perceived enjoyment, and subjective norms affect intention to use internet-only banks. Conversely, complexity, compatibility, trialability, and computer self-efficacy do not affect perceived usefulness, and thus the hypotheses related to them were rejected.

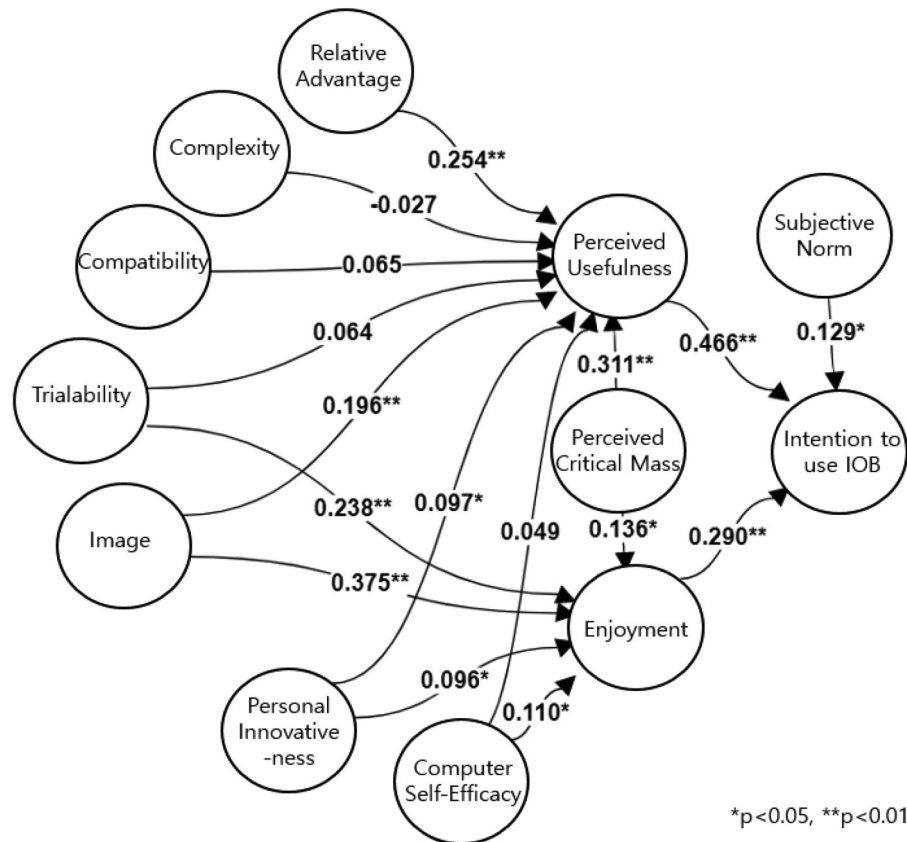
The discussion points on the results are as follows. First, perceived enjoyment has a direct effect on the adoption of internet-only banks. In previous internet banking adoption studies, perceived enjoyment was not used as a key factor in internet banking adoption. In general, as internet banks have been regarded as a utilitarian information system, variables reflecting hedonistic characteristics, such as perceived enjoyment, have been excluded from studies on internet bank adoption (see Hanafizadeh et al., 2014). Recently, however, internet-only banks, which are a fintech, have begun to offer useful services, such as free credit card fees and low loan rates as well as a variety of entertainment services. Therefore, perceived enjoyment, which is a hedonistic factor, seems to be a key factor that directly affects the adoption of internet-only banks along with perceived usefulness.

Second, the relative advantage of innovation diffusion theory has been shown to strongly affect perceived usefulness in the adoption of internet-only banks. However, complexity and

Table 6. HTMT values

Construct	RA	CMP	FIT	IMG	TRA	CM	PIIT	CSE	PU	PE	SN
CMP	-0.45										
FIT	0.85	-0.35									
IMG	0.58	-0.31	0.38								
TRA	0.84	-0.44	0.53	0.89							
CM	0.51	-0.44	0.31	0.51	0.35						
PIIT	0.41	-0.13	0.29	0.51	0.28	0.34					
CSE	0.54	-0.73	0.30	0.50	0.34	0.48	0.50				
PU	0.85	-0.36	0.50	0.85	0.52	0.80	0.60	0.72			
PE	0.55	-0.39	0.33	0.59	0.34	0.52	0.47	0.52	0.36		
SN	0.55	-0.28	0.33	0.62	0.35	0.54	0.50	0.56	0.36	0.60	
INT	0.61	-0.42	0.34	0.60	0.36	0.51	0.46	0.53	0.39	0.65	0.57

Figure 2. Path diagram of the research model.



compatibility have no effect on perceived usefulness. In previous studies, relative advantage has been generally analyzed to play the most important role among the variables of innovation diffusion theory. Therefore, relative advantage seems to have a significant effect on perceived usefulness in adopting internet-only banks. However, complexity does not affect perceived usefulness. These results are generally reported when the new technology to be adopted is easy to use. In other words, internet-only banks are based on internet banks in terms of how to use them, and thus customers already have experience in using them. Therefore, complexity does not seem to be significant in adopting internet-only banks. Compatibility has a significant effect on the adoption of innovation (technology), which generally requires large changes. Although internet-only banks are innovative technologies, they do not require any significant behavioral or environmental changes in the person who uses them when adopting them. Therefore, compatibility also appears to have no effect on perceived usefulness.

Third, image, which was added in this study as an innovation diffusion theory variable, has a positive effect on both perceived usefulness and perceived enjoyment. In innovation diffusion theory, image is regarded as an attribute of relative advantage (Rogers, 2003). Therefore, in this study, image, similar to relative advantage, seems to affect perceived usefulness. The use of internet-only banks, which are the latest fintech technology, is thought of as an act of raising one's status with others, such as using the latest expensive smartphone or cosmetics. Therefore, people seem to enjoy using internet-only banks. As a result, image in this study affects perceived enjoyment.

Fourth, as expected, personal innovativeness and computer self-efficacy, which are individual characteristics, have a positive effect on the adoption of internet-only banks. Although personal innovativeness significantly affects perceived usefulness and perceived enjoyment, its effect is only

Table 7. Hypothesis testing results

Hypothesis	Sign	Path coefficient	t-value	p-value
H1. Perceived usefulness -> Intention to use internet-only banks	(+)	0.466	5.150	0.000
H2. Perceived enjoyment -> Intention to use internet-only banks	(+)	0.290	3.437	0.000
H3. Relative advantage -> Perceived usefulness	(+)	0.254	4.631	0.000
H4. Complexity -> Perceived usefulness	(-)	-0.027	-0.900	0.184
H5. Compatibility -> Perceived usefulness	(+)	0.065	0.994	0.161
H6. Trialability -> Perceived usefulness	(+)	0.064	0.717	0.237
H7. Trialability -> Perceived enjoyment	(+)	0.238	2.606	0.005
H8. Image -> Perceived usefulness	(+)	0.196	3.119	0.001
H9. Image -> Perceived enjoyment	(+)	0.375	5.611	0.000
H10. Personal innovativeness -> Perceived usefulness	(+)	0.097	2.117	0.018
H11. Personal innovativeness -> Perceived enjoyment	(+)	0.096	1.920	0.028
H12. Computer self-efficacy -> Perceived usefulness	(+)	0.049	0.735	0.231
H13. Computer self-efficacy -> Perceived enjoyment	(+)	0.110	1.810	0.036
H14. Subjective Norms -> Intention to use internet-only banks	(+)	0.129	1.785	0.038
H15. Perceived critical mass -> Perceived usefulness	(+)	0.311	5.089	0.000
H16. Perceived critical mass -> Perceived enjoyment	(+)	0.136	2.173	0.015

Perceived usefulness R²: 0.769.

Perceived enjoyment R²: 0.679.

Intention to use internet-only banks R²: 0.668.

slight (path coefficient: 0.098 and 0.096, respectively). According to Yi et al. (2006), personal innovativeness has a significant effect on trying a new technology with risk taking. Although perceived risk has been suggested as an important factor in adoption in previous internet banking studies, the advances in security technology today make internet-only banks considered less risky. Therefore, personal innovativeness in the use of internet-only banks does not seem to have a strong effect on perceived usefulness and perceived enjoyment. Computer self-efficiency has no effect on perceived usefulness but has an effect on perceived enjoyment. Computer self-efficiency generally works well when the skill is difficult to use. However, internet-only banks do not seem to be a difficult technology for customers to use, as complexity has no effect on perceived usefulness. Therefore, computer efficiency does not affect perceived usefulness.

Finally, this study suggests that social influence factors play an important role in the adoption of internet-only banks. In previous internet banking adoption studies, many researchers have demonstrated that subjective norms directly affect customers' adoption of internet banking (e.g., Marakarkandy et al., 2017; Safeena et al., 2013; Yaghoubi & Bahmani, 2010). Subjective norms have a direct effect on customers' adoption of internet-only banks because these banks are based on Internet banking technology. Moreover, if many people use internet-only banks, others will also find it useful and fun. Therefore, perceived critical mass has a positive effect on perceived usefulness and perceived enjoyment.

6.1. Contributions and implications

This study has important implications for research and practice. First, it contributes to the research on internet-only banks. Internet banking is a popular topic, and although many studies have been conducted on it, little is known about the latest fintech technology of internet-only banks. As an early work on internet-only banks, this study inspires follow-up studies. Second, previous internet banking studies have suggested and analyzed a research model only from the perspective of internet banking as a utilitarian information system. Conversely, in this study, internet-only banks are set up as a technology that not only has utilitarian characteristics but also hedonistic characteristics, and perceived enjoyment is presented as the underlying variable of the research model and verified empirically. Therefore, subsequent studies are expected to conduct more extensive research on internet-only banks based on the theoretical basis of this study. Third, this study analyzed comprehensive and diverse variables, including the variables of innovation diffusion theory, personal characteristics, and social impact variables, to analyze customers' adoption of internet-only banks. The variables used in this study and their results are expected to be used as empirical data for hypothesis setting or as comparative data for the results of subsequent studies.

Aside from these obvious implications for researchers, the results also have implications for practitioners. First, this study reveals that perceived enjoyment has a direct effect on customers' adoption of internet-only banks along with perceived usefulness. In other words, people not only use internet-only banks because they are useful but also because of the entertainment services provided by these banks. Therefore, managers of internet-only banks need to develop services that customers can enjoy more to promote internet-only banks. Second, this study shows that image plays an important role in customers' adoption of internet-only banks. It not only has a positive effect on perceived usefulness but also has a strong effect on perceived enjoyment. Therefore, managers of internet-only banks need to implement a strategy to enhance the image of customers using internet-only banks. This strategy can involve making public advertisements for internet-only banks using popular models or by creating an internet-only bank brand community to enhance members' sense of belonging. Third, the individual characteristic variables play an important role in customers' adoption of internet-only banks. Personal innovativeness and computer self-efficiency have a positive effect on perceived usefulness and perceived enjoyment, which are the mediators of customers' adoption of internet banks. Therefore, managers of internet-only bank managers should conduct intensive marketing on customers with high personal innovation and computer self-efficiency for a more effective

customer acquisition. Finally, trialability has a positive effect on perceived enjoyment. Managers of internet-only banks need to offer their customers the opportunity to increase their use of Internet-only banks.

6.2. Limitations and recommendations for future research

Although the results of this study suggest meaningful implications for researchers and practitioners, the study has the following limitations. First, this study focuses on intention instead of actual behavior. Although most theories regard the intention to use behavior as the most influential factor of actual behavior, actual behavior can be changed by situational factors. Therefore, future studies should include actual behavior in their research models. Second, the study was conducted in only one country, that is, Korea, which has a high level of IT and has a national culture with high collectivism. Therefore, the empirical results of this research model in other countries may show different results. Future research must be conducted in various countries to verify and generalize the results of this study. Finally, other factors may also contribute to predicting customers' adoption of internet-only banks. If so, these factors should be incorporated into the proposed model of customers' adoption of internet-only banks. The variables that may be examined include trust, perceived risk, and government support.

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Relative advantage: Likert scale ranging from strongly disagree to strongly agree

- a1. The internet-only bank makes my financial transactions easier.
- a2. The internet-only bank helps me manage my finances more effectively.
- a3. I think the internet-only bank is more useful than a general bank for managing my financial resources.

Complexity: Likert scale ranging from strongly disagree to strongly agree

- a4. Using the internet-only bank is difficult.
- a5. Using the internet-only bank is sometimes frustrating.
- a6. Using the internet-only bank is too complicated.

Compatibility: Likert scale ranging from strongly disagree to strongly agree

- q7. *The internet-only bank is compatible with my lifestyle (dropped).*
- a8. Using the internet-only bank fits well with how I like to manage my finances.
- a9. The internet-only bank fits my financial business style perfectly.

Image: Likert scale ranging from strongly disagree to strongly agree

- a10. Using an internet-only bank gives me a good image.
- a11. Most people who use the internet-only bank have a good image.
- a12. If people use the internet-only bank, their image will seem to improve.

Trialability: Likert scale ranging from strongly disagree to strongly agree

- a13. I have many opportunities to use the internet-only bank.
- a14. Internet-only banks are readily available on a trial basis.

Personal innovativeness: Likert scale ranging from strongly disagree to strongly agree

- a15. If I hear about new information technology, I will look for ways to experiment with it.
- a16. Among my peers, I am usually the first to try out new information technologies.
- a17. I like experimenting with new information technologies.

Computer self-efficacy: Likert scale ranging from strongly disagree to strongly agree

- a18. I can complete my task in the internet-only bank, even if no one is around to help me.
- a19. I can complete my task in the internet-only bank without any previous experience.
- a20. I can complete my task in the internet-only bank just by looking at manuals on the web.

Subjective norms: Likert scale ranging from strongly disagree to strongly agree

- a21. People who influence my behavior think I should use the internet-only bank.
- a22. People who are important to me think that I should use the internet-only bank.
- a23. People around me say it is good to use an internet-only bank.

Perceived critical mass: Likert scale ranging from strongly disagree to strongly agree

- a24. Many of my friends use the internet-only bank.
- a25. Many of the people I deal with use the internet-only bank.
- a26. I can easily see people using an internet-only bank around me.

Perceived usefulness: Likert scale ranging from strongly disagree to strongly agree

- a27. Using an internet-only bank is effective for financial transactions.
- a28. Using an internet-only bank is useful for my financial business.

Perceived enjoyment: Likert scale ranging from strongly disagree to strongly agree

- a29. Using an internet-only bank is enjoyable.
- a30. Using an internet-only bank is pleasurable.
- a31. I have fun using an internet-only bank.

Intention to use internet-only banks: Likert scale ranging from strongly disagree to strongly agree

- a32. I plan to use the internet-only bank in the future.
- a33. I try to use the internet-only bank as much as possible.



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