

Comparison of Determinants in Internet and Mobile Commerce Adoption

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Abstract

Understanding user acceptance of the Internet, especially the intentions to use Internet commerce and mobile commerce, is important in explaining the fact that these commerce have been growing at an exponential rate in recent years. This paper studies factors of new technology to better understand and manage the electronic commerce activities. The theoretical model proposed in this paper is intended to clarify the factors as they are related to the Technology Acceptance Model. More specifically, the relationship among trust and other factors are hypothesized. Using the Technology Acceptance Model, this research reveals the importance of the hedonic factor. The result of this research implies that the ways of stimulating and facilitating customers' participation in mobile commerce should be differentiated from those in Internet commerce.

1. Introduction

The Internet has been growing at an exponential rate in recent years. For many years computer users have used the Internet to share data, collaborate on their work, and exchange messages. Recently, millions of computer users worldwide have begun to explore the Internet and engage in commercial online activities [16, 26, 47]. A variety of people have joined one or more of the Internet and mobile commerce that have grown to serve consumer needs for communication, information, and entertainment. A core Stream of IS research is identifying the determinants of individual users' adoption and usage of Information Technology [26, 42, 43]. Understanding users' decision-making processes in IT adoption and usage has generated much interest in IS research.

The success of Internet commerce and mobile commerce hinges on consumer willingness to adopt new technology and engage in activities using systems and devices different from what they have used in the past. The rapid development of modern wireless and wire communication technology is promoting Internet commerce and mobile commerce as an important application for consumers. Nevertheless, insufficient user acceptance has long been an obstacle to the successful adoption of new IT. Internet and mobile applications are rapidly and widely developed for consumers. It is crucial to understand the consumer perception and adoption of Internet and mobile technology.

The Internet enables millions of people worldwide to exchange information and conduct business. Keeney [22] suggested that Internet commerce is a function of the customer's perception of the benefits and costs of both a product and the processes of finding, ordering, and receiving it. Measured by this momentum, it is clear that mobile commerce will also gain greater importance in the future [46]. In a turbulent Internet and mobile commerce environment, service providers need to understand how to satisfy customers to sustain their growth and market share. This is because customer satisfaction is critical for establishing long-term customer relationships [33]. The companies could maintain customer relationships through understanding the customer and finding out the crucial factors for user acceptance of new IT.

The advantages of Internet commerce are efficiency, convenience, broader selections, lower cost and the large amount of information. In comparison, mobile commerce is useful especially for the user's urgent demands. But mobile commerce is harder to use in comparison with Internet commerce because of small devices. Insight into the factors affecting acceptance of mobile commerce related technology in consumer

contexts may be gained by examining the applicability of the Technology Acceptance Model (TAM) [9, 10] to such contexts. Based on the Theory of Reasoned Action, TAM is a parsimonious model, asserting that all influences of external variables such as system design features on behavior are mediated by Usefulness and Ease of Use. TAM was originally developed to explain individuals' adoption of technology in a workplace setting. Various versions of the model have been proposed over time in the workplace and consumer context. The key difference between workplace and consumer contexts with respects to TAM is that in the latter, a hedonic factor may be an important addition to the model [5]. Our model aims to examine Internet commerce and mobile commerce adoption from the technology user perspective and customer perspective. This study is one of the first attempts to compare the acceptance of Internet and mobile commerce. The finding of this study will provide validation of the factors involved in the customer decision making processes.

Also, another purpose of this study is to identify the relationship between trust and other factors: To propose a theoretical explanation of the varying effects of trust on IT adoption by differentiating between Internet commerce and mobile commerce.

2. Theoretical Background

2.1. Mobile commerce

With the rapid growth of mobile technology, expectations of mobile commerce are increasing. While capabilities of mobile technology have been continuously expanded, the nexus between business strategies and the value of mobile technology is not yet fully understood.

Mobile commerce refers to the emerging arena within which commercial transactions are made possible using handheld mobile devices that are connected through wireless networks. Most scholars consider mobile commerce as a subset of electronic commerce [23, 27, 32, 40]. Vrechopoulos [45] says that mobile commerce is providing service and product through mobile network and device, which is an extended concept of electronic commerce based on Internet Technology.

Nonetheless, in this research, it is necessary to distinguish mobile commerce from traditional electronic commerce so that Internet commerce only refers to electronic commerce performed using computer devices connected through wired network.

Based on the above definitions, it could be said that mobile commerce is extended from electronic commerce and inherits all the characteristics of Internet commerce and traditional electronic commerce. Therefore, for companies already using Internet commerce for their business, adding mobile dimension to their Internet commerce is not likely to require drastic changes in their existing information systems.

However, it is important to notice that mobile commerce includes not only Internet commerce applications running over mobile devices and wireless networks, but also many new applications that became possible due to unique capabilities of wireless network and user mobility.

Distinct features of mobile commerce are mobility and broad reach [23, 32, 39]. Mobility implies portability. In other words, users can conduct business on real time bases in mobile commerce environment. Customers as well as vendors can be reached at any time via a mobile device. Ubiquity, convenience, localization, and personalization are characteristics of mobile commerce [31].

Even though mobile commerce is able to provide abundant flexibility regarding time and place to individuals, customers have been reluctant to adopt it in real world. The difficulties due to the limitations of mobile devices reduce the potential benefits of mobile commerce. The customers of mobile commerce receive limited and insufficient information owing to the constraints of mobile terminals [47].

Although there are differences between mobile commerce and Internet commerce, mobile commerce is regarded as an extended view of electronic commerce, and both of them are adapted in similar way. Therefore, we can apply prior Internet commerce research model [15] to mobile commerce research. Using the same approach to internet commerce and mobile commerce, this research tries to analyze the differences between the users' acceptance of mobile commerce and that of Internet commerce.

2.2. Trust

Lots of research has been done about trust in diverse fields such as anthropology, economics, organizational behavior, psychology, and sociology. Despite disciplinary differences, researchers have tried to identify the shared understanding of trust.

In an integrated view, Mayer [28] defined trust as "the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to control that

other party.” Based on cross-disciplinary collection of scholarly writings, Rousseau [36] defined trust as “a psychological state comprising the intention to accept vulnerability based upon positive expectations of the intentions or behavior of another.” An important attribute of trust is vulnerability [29, 34] because trust always exists in uncertain environments. Trust allows people to take part in risky activities that they cannot monitor and yet where they may be disappointed by the actions of others [20].

Trust is crucial in such situations as transactional buyer-seller relationships, especially those containing an element of risk, including interaction with an e-vendor. Even though various disciplines are dealing with trust, trust in Internet commerce and mobile commerce should be redefined especially based on the Internet environment. In this regard, Donny and Cannon [12] defined trust as “buyer-seller relationships as the perception by a prospective buyer of credibility and benevolence in the target of trust” from the business view point. In electronic commerce environment, Jarvenpaa and Tractinsky [20] redefined trust as “a consumer’s willingness to rely on the seller in an online environment and take action in circumstances where such action makes the consumer vulnerable to the seller.”

There are several factors causing risks when people build up trust. Relationships of different form entail distinctly different risks [38] because risk varies distinctly as the form of a relationship varies. In addition, risky factors are caused in environments and matters situated by people [35]. However, as trust is based on the expectation that others will behave as expected, people are willing to be vulnerable in spite of these risky environments. So other parts in the defining of trust emphasize the trustee’s belief [21, 30, 35]. The focus is how this belief can be obtained. Some antecedents of trust are regarded to be able to create this belief. Different streams of research on trust have identified a number of trust antecedents: Knowledge-based trust, institution-based trust, calculative-based trust, cognition-based trust, and personality-based trust [15, 30]. Since the case of initial relationships has no interaction history, knowledge-based trust does not apply [29].

The difference between the amount of information possessed buyers and sellers is referred to as information asymmetry [3]. This may give rise to opportunistic behavior such as misrepresentation of product quality, which could lead to mistrust or even market failure. In Internet commerce and mobile commerce, lacking the ability to inspect the product physically and relying exclusively on electronic

information is a big problem. In the context of information asymmetry, a customer can be expected to trust an e-vendor more when the customer believes that the e-vendor has more to lose than to gain by cheating or has nothing to gain by breaking customer trust. Calculative trust is deterrence-based in that individuals will not engage in opportunistic behavior out of fear of facing the adverse consequences of being untrustworthy [18].

H1a: Calculative-based beliefs will positively affect trust in Internet commerce.

H1b: Calculative-based beliefs will positively affect trust in mobile commerce.

Cookies, click-stream data trails, and the ease of conducting online surveys have permitted unprecedented tracking of what consumers search for, click on, and ultimately buy [11]. These risks make customers hesitate in giving their personal information or buying products. If these risks are removed, customers will engage in Internet commerce and mobile commerce freely [37]. Therefore, institution-based structural assurances are more important in Internet and mobile commerce.

H2a: Perceptions of structural assurances built into a Web site will positively affect trust in Internet commerce.

H2b: Perceptions of structural assurances built into a mobile site will positively affect trust in mobile commerce.

Situational normality is an assessment that the transaction will be a success, based on how normal or customary the situation appears to be [25]. People tend to extend greater trust when the nature of the interaction is in accordance with what they consider to be typical and anticipated. In the context of Internet commerce and mobile commerce, the site represents what customers expect based on their experience and knowledge of other similar sites, and for this reason, they will be more inclined to trust the e-vendor [15].

H3a: Perceptions of situational normality will positively affect trust in Internet commerce.

H3b: Perceptions of situational normality will positively affect trust in mobile commerce.

Except in auctions, most Internet commerce and mobile commerce does not end with one transaction. It is a continued process which is based on familiarity. Knowledge-based trust regards familiarity as an important factor [30], but in the case of one-time transaction process, familiarity is not important factor for building trust. In this case, cognition-based trust is needed [15, 30]. Familiarity with a trustworthy e-vendor can increase consumer trust because familiarity increases as the amount of knowledge about the e-

vendor based on a consumer's previous successful transactions through the Internet and mobile site accumulates.

H4a: Familiarity with a trustworthy e-vendor will positively affect trust in Internet commerce.

H4b: familiarity with a trustworthy e-vendor will positively affect trust in mobile commerce.

In the context of Internet commerce and mobile commerce, without physical examination and inspection of the product, consumers will perceive potential risks. Thus, these environments have fatal consumer privacy weaknesses and issues involving monetary transactions, product purchase, and merchandise services. Trust helps reduce the social complexity a consumer faces in Internet and mobile commerce by allowing the consumer to subjectively rule out undesirable yet possible behaviors of the e-vendor.

H5a: Trust in the e-vendor will positively affect the intended use of Internet commerce.

H5b: Trust in the e-vendor will positively affect the intended use of mobile commerce.

2.3. Technology Acceptance Model

The function of trust in Internet and mobile commerce is more complex than that in general commerce, because the trust relationships exist among three parts: the customer, the vendor, and the Internet site. As the customer and vendor cannot meet each other face-to-face, they only meet through an Internet or mobile site. Well-designed sites can give good recognition about the vendor. Thus, the success of mobile commerce hinges on consumer willingness to adopt new technology and engage in activities using systems and devices different from what they have used in the past [4]. So it needs to consider not only trust but also TAM (Technology Acceptance Model) because of its characteristic Internet and mobile commerce.

According to TAM [8], fundamental determinants of user acceptance are two variables; PU (perceived usefulness) and PEOU (perceived ease of use). People tend to decide to use or not to use an application based on whether or not it will help them perform their job better. PU is defined as "the degree to which a person believes that using a particular system would enhance his or her job performance." [8] However, even if potential users believe that a given application is useful, they might believe that the system is too hard to use. PEOU, in contrast, refers to "the degree to which a person believes that using a particular system would be free of effort." [8] As a result, PU had a significantly greater correlation with usage behavior than PEOU.

PEOU is the antecedent to PU and direct determinant of system usage.

Although the theory is applicable and has been successfully applied to diverse non-organizational settings, including Internet [1, 15], a number of exceptions have been reported in the literature [2, 4, 44]. While Davis' TAM theory asserts that PU-usage relationship is stronger than PEOU-usage relationship, some researches have found that PEOU is a strong predictor of user acceptance in hedonic context [4, 17]. Heijden's research [17] studies the differences in user acceptance models for productivity-oriented and pleasure-oriented information systems, and asserts that PU loses its dominant value in favor of PEOU in the hedonic information system. Hedonic systems aim to provide self-fulfilling value to the user, in contrast to utilitarian systems, which aim to provide instrumental value to the user. If consumers seek self-fulfilling value or hedonic-oriented product, PEOU would have more important value affecting the intended use than PU.

H6a: PU will positively affect the intended use of Internet commerce.

H6b: PU will positively affect the intended use of mobile commerce.

H7a: PEOU will positively affect the intended use of Internet sites.

H7b: PEOU will positively affect the intended use of mobile commerce.

H8a: PEOU will positively affect PU of Internet commerce.

H8b: PEOU will positively affect PU of mobile commerce.

As mobile commerce is similar to Internet commerce, using Gefen's integrating model of TAM and trust in e-commerce context, we suggest the following hypotheses which extend the scope of commerce environment.

The user will be able to successfully complete tasks in Internet and mobile commerce with a service provider who can be trusted. Trust establishes the credibility of the service provider in providing what has been promised [14]. Trust in service providers builds PU by giving customers subjective assurance that the vendor providing services in Internet commerce or in mobile commerce is capable of generating better performance in transactions [15].

H9a: Trust will positively affect PU in Internet commerce.

H9b: Trust will positively affect PU in mobile commerce.

Processes explained well and easy to understand can create trust in business transactions [24]. PEOU also

increases trust through perception to use Internet and mobile sites easily.

H10a: PEOU will positively affect trust in Internet commerce.

H10b: PEOU will positively affect trust in mobile commerce.

In some cases, with existing well-established cognitive patterns, the user may perceive the Internet and mobile sites are easy to use and require less cognitive learning effort. Situational normality can increase PEOU since consumers' prior knowledge of how to use the site will be directly applicable to the task purchasing from the present site [15].

H11a: Situational normality will positively affect PEOU in Internet commerce.

H11b: Situational normality will positively affect PEOU in mobile commerce.

The more familiar consumers are with a site from prior visits, the more they perceive the site to be easy to use. Familiarity, an acquired cognitive map of the procedures involved, provides the user with additional tools to solve the problem quicker, with greater ease, and with fewer errors [15, 41].

H12a: Familiarity with the e-vendor will positively affect PEOU in Internet commerce.

H12b: Familiarity with the e-vendor will positively affect PEOU in mobile commerce.

Figure 1 shows the research model summarizing these hypotheses in Internet commerce and mobile commerce.

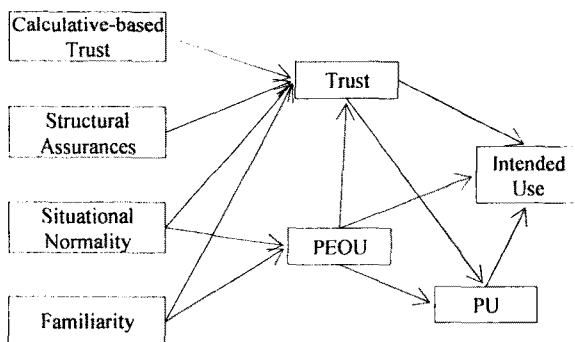


Figure 1. Research model

3. Method

Data were collected from undergraduate students who has experiences of Internet and mobile commerce asking them to assess the ringback tone service vendors from whom they made a purchase.

There are some reasons for choosing ringback tone services. First, we have to employ the same products available to both Internet commerce and mobile

commerce since our research aims to compare different behavior intentions of customers in Internet and mobile commerce. Second, ringback tone services are low touch items. Low touch products are the kind of products that typically require little examination before purchase and, therefore, require less trust in the vendor than other products. Finally, by using hedonic-oriented products, we can investigate whether PEOU is a much stronger factor affecting the intended use than PU or not.

We borrowed Gefen's [15] research questionnaire and applied to extend mobile commerce. The same questionnaire was used to compare Internet commerce with mobile commerce for efficiency. Five-point Likert scale (1 being "strongly disagree" to 5 being "strongly agree") was used.

TAM scales of PU and PEOU adapted from Davis' scales [8]. The intended use relating to specific outcome behaviors is consistent with the way that Crosby et al. [7]. Trust items were composed to reflect specific beliefs of consumers in the mobile commerce vendor's integrity, benevolence, ability, and predictability as in the previous empirical research on buyer-seller relationships [7]. Calculative-based trust-building items represent the calculation made by the consumer that the mobile commerce vendor has nothing to gain by being dishonest, uncaring, or unknowledgeable. The familiarity items deal with customer familiarity with an e-vendor. Situational normality items deal with the assessment that the interaction is typical of that type of mobile commerce vendor. Structural assurance items capture some of the typical steps taken by many Internet sites to reassure their customers that the interaction is safe [15].

The questionnaire was administered to users who have experience of purchasing ringback tones through Internet or mobile commerce. Because the pilot test shows elder respondents tend to use Internet commerce heavily, we obtained survey data with younger age. The respondents were undergraduate students in Korea.

Questionnaires from respondents who have not previously purchased ringback tone services or did not answer to that question were discarded. Questionnaires with some other missing values are also discarded. Final dataset contains 204 responses in Internet commerce and 207 responses in mobile commerce. Most Internet commerce respondents were in their early 20's (20: 53%, 21: 17%, other: 30%). Men are 142 (60%) and women are 82 (40%). Mobile commerce respondents were also in their early 20s (20: 50%, 21: 16%, other: 34%). Men are 119 (57%) and women are 90 (43%). Most respondents prefer Internet commerce (respondents with Internet commerce

experience: 96%, respondents with mobile commerce experience: 72%) to mobile commerce (respondents with Internet commerce experience: 5%, respondents with mobile commerce experience: 28%)

4. Analysis and Results

We chose the partial least squares (PLS) structural equation analysis to test the hypotheses. PLS employs a component-based approach for estimation purposes and can readily handle formative factors [6]. PLS also places minimal restrictions on the sample size and residual distributions [6]. Chin's study has provided the efficiency and effectiveness of a PLS approach, and it is better suited for explaining complex relationships than the other methods [34]. Two-stage analytical procedures were conducted. Confirmatory factor analysis was first conducted to assess the measurement model, and then the structural relationships.

To validate the measurement model, convergent validity was evaluated by examining composite reliability and average variance extracted from the measures. Values for composite reliability are recommended to exceed 0.70 [6] and AVE values should be greater than the generally recognized cut-off value of 0.50 [13].

All composite reliability and AVE values meet the

recommended threshold values. Table 1 and 2 summarize the results.

Discriminant validity indicates the extent to which a given construct is different from other constructs. To evaluate discriminant validity, the AVE may be compared with the square of the correlations among the latent variables [13]. Table 1 and Table 2 show that all AVEs are greater than the off-diagonal elements in the corresponding rows and columns, demonstrating discriminant validity.

Hypotheses 2, 5, 8, 10, 11, and 12 are supported for both Internet commerce and mobile commerce. However, hypotheses 4 and 6 are not supported by either Internet commerce or mobile commerce. Hypotheses 1, 3, 7 and 9 are supported in Internet commerce but not supported in mobile commerce, so these results imply the need of different strategy according to each context of commerce.

The results of the proposed theoretical model and hypothesis tested with PLS are summarized in figure 2 and 3.

Table 1. Composite reliability, AVE, and correlation of constructs values in Internet commerce

		Composite Reliability	AVE	1	2	3	4	5	6	7	8
1	Calculative-base trust	0.782	0.557	0.746							
2	Structural assurance	0.856	0.600	0.098	0.775						
3	Situational normality	0.827	0.617	0.186	0.238	0.785					
4	Familiarity	0.861	0.756	0.045	0.311	0.287	0.869				
5	Trust	0.825	0.611	0.270	0.563	0.403	0.349	0.782			
6	PEOU	0.861	0.554	0.212	0.192	0.445	0.498	0.455	0.744		
7	PU	0.878	0.590	0.242	0.230	0.469	0.369	0.519	0.656	0.768	
8	Intended use	0.846	0.733	0.085	0.096	0.212	0.420	0.207	0.305	0.251	0.856

(Square root of the AVE are the bolded diagonal values)

Table 2. Composite reliability, AVE, and correlation of constructs values in mobile commerce

		Composite Reliability	AVE	1	2	3	4	5	6	7	8
1	Calculative-base trust	0.748	0.520	0.721							
2	Structural assurance	0.856	0.599	0.069	0.774						
3	Situational normality	0.826	0.615	0.097	0.149	0.784					
4	Familiarity	0.853	0.743	-0.055	0.299	0.224	0.862				
5	Trust	0.820	0.604	0.254	0.611	0.344	0.281	0.777			
6	PEOU	0.854	0.540	0.199	0.229	0.463	0.496	0.394	0.735		
7	PU	0.884	0.606	0.186	0.246	0.483	0.301	0.466	0.655	0.778	
8	Intended use	0.827	0.706	0.009	0.186	0.222	0.489	0.273	0.399	0.272	0.840

(Square root of the AVE are the bolded diagonal values)

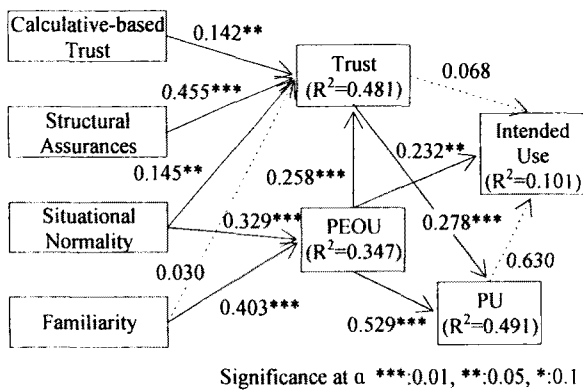


Figure 2. Path coefficients in Internet commerce

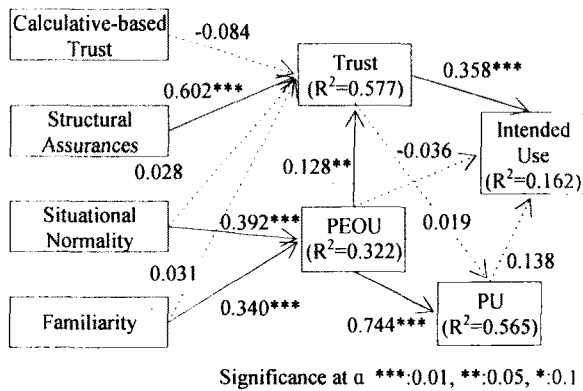


Figure 3. Path coefficients in mobile commerce

4.1. The factors affecting the intended use

Noticeable results have been found in Internet commerce and mobile commerce regarding the factors affecting the intended use such as trust, PU, and PEOU.

First of all, it turned out that trust is the important factor influencing the intended use in mobile commerce but not in Internet commerce. Since the ringback tone services chosen for the test have relatively low risks when purchased compared to other merchandise, the effects of trust are not so strong. That explains why the assumption in Internet commerce is not supported. In addition, the Internet related technology and the Internet market is so mature that trust in one particular service provider site has no strong influence on the intended use of that particular site.

In the mobile commerce environment, the wireless Internet access fee up to the point of selecting the product the customer wants varies according to the type of Internet service subscribed. Usually it takes much time for users to connect the ringback tone service site and download ringback tone. In the mean while, the information provided is very limited due to the characteristics of mobile communication. It increases the possibilities to select unsatisfactory ringback tone

due to the lack of information about the service provider, or results in increased mobile communication cost the user might not have expected.

Trust makes the user take action in circumstances with risks and uncertainty [19], and accordingly the assumption that trust affects the intended use was adopted in mobile commerce at its beginning stage since when it is at the initial stage, the recognition of risks of the service provider and market environment has major effects compared to when it is at its mature stage. In other words, it seems that because mobile commerce is still recognized as a more dangerous environment comparing to Internet commerce, the importance of trust is being regarded relatively high.

Another interesting point is the assumption that PU affects the intended use has been dismissed by both Internet commerce and mobile commerce. Many researches across diverse areas and under various research settings have confirmed that PU is the strongest predictor of user acceptance. However, our result with ringback tone services, hedonic-oriented products, reveals that PU is not a stronger determinant of the intended use than PEOU is. Since determinants affecting the intended use depend on the utilitarian or the hedonic nature of the products [17], the test result using hedonic-oriented product supports the hypothesis that PEOU will affect the intended use. The respondents of the test are mostly in their early 20's and tend to be more hedonic. Heijden [17] suggests that hedonic value can play a pivotal role in increasing acceptance of otherwise utilitarian information systems so that the hedonic nature of an information system can become an important boundary condition to the validity of the TAM model.

Although our finding shows that PEOU has significant effect on the intended use in Internet commerce, this hypothesis wasn't supported in mobile commerce. Prior researches verified that PEOU is an important factor affecting the intended use in hedonic context, especially since this result implicates that the mobile commerce setting is somewhat more difficult to use than the Internet commerce setting. If several difficulties are solved, the use of mobile commerce will be increasing.

4.2. Antecedents of trust

It turned out that the calculative-based antecedent factors of trust affect trust formation in Internet commerce but not in mobile commerce. Calculative-based antecedent factors of trust mean that customers form trust in service providers, expecting that service providers would not do any harmful acts to the

customers causing them disadvantage rather than advantage [15].

While in the Internet environment, there are so many ringback tone service providers competing with one another so that subscribing and canceling of the service is flexible. But in mobile commerce, since very few ringback tone service providers exist and each of them is strategically allied to one of the mobile communication companies, once subscribed, canceling of the service is not easy. Another words, once a customer chose a mobile communication company, there is no choice but to take a particular ringback tone service provider that is allied to that mobile communication company. Because the ringback tone service provider is not same as the mobile communication companies, ringback tone service providers are not very sensitive to customers' behavior. Therefore, there is a possibility that these providers could take harmful actions such as providing low quality service against customers.

The assumption that the awareness of structural assurances presented at a site has positive effects on trust formation of the service provider turned out to be supported for both mobile commerce and Internet commerce alike. Based on the path-coefficients from the results, it was revealed that structural assurances have great influence on trust formation. Therefore, institution-based structural assurances both in Internet commerce and mobile commerce are proved to be crucial factors.

The assumption that institution-based situational normality affects trust formation is well established in Internet commerce, while this is not so in mobile commerce. Since there are various types of ringback tone service sites on the Internet, enough comparison among sites and the acquisition of information about service providers make providers' behaviors predictable. So, when facing institution-based situational normality, trust in the service provider could be formed in Internet commerce. In contrast, in mobile commerce environment, differences among service providers are not of importance, comparison is not easy, and acquisition of information is quite limited as well. Behaviors of service providers may not be predictable based only on institution-based situational normality, which causes difficulties in forming trust in service providers.

The assumption that knowledge-based familiarity to the service provider has positive effects was not survived in either Internet commerce or mobile commerce. Although consumers are well aware of service providers, if they learned negative aspects

about them rather than positive ones, it cannot have positive effects on trust formation.

4.3. Antecedents of PEOU

It was revealed that institution-based situational normality and knowledge-based familiarity, which are regarded as the antecedent factors of PEOU, support the assumption of both Internet commerce and mobile commerce. Institution-based situational normality and knowledge-based familiarity provide knowledge by means of existing experiences. In the process of transactions, the users would feel ease of use when the transaction is facilitated with the help of existing knowledge rather than having to learn new knowledge.

Because PEOU is the most important factor that affects the intended use in Internet commerce, institution-based situational normality and knowledge-based familiarity needs to get more attention in order to encourage the intended use considering they have indirect effects on the intended use via PEOU.

4.4. Antecedents of PU

As presented in the TAM theory, it turned out that the effect of PEOU as an antecedent factor of PU is great in any condition of Internet commerce and mobile commerce.

Combining trust and the TAM theory, the new assumption that trust would affect PU is supported only in the Internet commerce environment not in mobile commerce environment. As seen in the characteristics of the respondents of the survey, the majority of people who have experience of mobile commerce prefer to Internet commerce. In other words, in Internet commerce, once trust in the service provider is formed as a result of successive transactions, it could be a factor of increasing availability of the site in the long run. But in mobile commerce, even though the majority of clients form trust in the service provider, they might move to Internet ringback tone service sites due to their convenience and availability. Another word, in mobile environment almost no customer have relationship with a service provider site long enough to form trust, which seems to be the reason why the assumption is not established.

Although PEOU is the antecedent factor of PU, it also appears to be the antecedent factor of trust as trust and TAM are combined. The assumption that PEOU would have positive effects on trust formation is supported for both mobile commerce environment and Internet environment. In the mobile commerce

environment, PEOU appears to have no direct effects on the intended use, but since it has indirect effects on it through trust formation, it could be regarded as a crucial factor in both commerce environments.

5. Conclusion

The study has attempted to analyze the adoption of Internet and mobile commerce. From the point of view that mobile commerce is a subset of traditional electronic commerce, this research applies the same approach developed in Internet commerce to mobile commerce. By comparing the two types of commerce, the following factors are found.

Trust is an important factor affecting the intended use in mobile commerce but not in Internet commerce. In Internet environment, the Internet related technology and the Internet market is so mature that trust in a particular service provider site has no strong influence on the intended use of that particular site. In contrast, mobile commerce is still at its initial stage, and trust in a particular site could have significant influence on the intended use of that site. Therefore, it is needed to concentrate on building trust in mobile sites with structural assurance.

Although PU, rather than PEOU, is a prominent predictor of user acceptance according to prior researches, due to the characteristics of hedonic-oriented products and customers involved in this research, the result suggests that PEOU is the strongest predictor of user acceptance in Internet commerce. It means that different strategies are needed in Internet and mobile commerce with views of consumer perception and the adoption of Internet and mobile technology.

Limitations of mobile devices cause hesitation towards adopting mobile commerce. It suggests that the progress of user acceptance in mobile commerce could be made by focusing on easy-to-use interface design. With distinct features, mobility, and broad reach, mobile technology should keep developing user-oriented easy-to-use interface.

In this paper, there are some limitations. First, samples were gathered from the early 20's who are regarded as more hedonic-oriented. Thus it would be interesting to perform similar research with people in various ages. Second, we used ringback tone services for testing the research model. Since mobile commerce is still in the beginning stage of development, the choice of products is limited. Bias may have crept into the research design as utilitarian-oriented products were not included in the test. The research should be continued in the future, using more various products

available in mobile and Internet commerce. Third, this study measures behavioral intention instead of actual consumer behavior. Finally, in order to achieve more in-depth analysis about consumer perception and adoption of Internet and mobile technology, the TAM model needs to be modified like C-TAM [4] and TAM2 [44].

Our study on internet commerce and mobile commerce adoption is an initial step toward comparing Internet and mobile commerce acceptance. Such findings would encourage further research and more in-depth and extensive analyses on consumer perception, and the adoption of Internet and mobile technology.

6. References