An Analysis on Technology Acceptance of Ubiquitous Banking Service

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Abstract

The objective of this paper is to identify factors influencing intention to use ubiquitous banking service focusing on potential users using a regression model. Through this, providers of ubiquitous banking services can get an idea of future development, including marketing strategy through the results of this analysis. This paper proposes that perceived usefulness is the most important factor influencing the uptake of ubiquitous service. Also in addition, ANOVA test shows that higher education level of the user can lead to the higher intention to use an ubiquitous banking service. In this study, we set up a model by using the most basic factor among influential factors presented in previous studies as an independent variable. However, other research variables which affect acceptance of ubiquitous service should be considered by thinking more diversely.

1. Introduction

The therm 'Ubiquitous' was used by Mark Wiser describing the idea of 'Ubiquitous Computing'[15]. It rooted from 'Ubique' in Latin, which mean 'existent everywhere at the same time'. Nowadays it is used to describe the accessing of computers everywhere, anyplace without any barriers. Ubiquitous technology has developed mobility, probability and embedded, pervasive features, which has sought to connect each and integrated technology. (at anytime and anyplace through internet and mobile devices (mobile phone, PDA etc) for creating new business)

It has been analysed that in the view of profits the best business model should be done through a Ubiquitous company using low embedded but high mobile area. In this way, Ubiquitous banking which may expand upon present mobile banking is required to analyse its own business model for the future.

Since mobile internet has influenced people's lives very much, it is necessary that Mobile Banking should be analysed and that they should be developed further. Rapid internet development have resulted in use of mobile phones, PDA and smart phones. These development allow for many different kinds of business model to attract customers by giving them high levels of satisfaction. Such a widespread diffusion of internet and mobile telecommunications use has triggered fast changes in diverse social group and industry domains. Forecasts of convergence between IT and communication technologies explain a future environment of new mobile devices, content services, business opportunities and usages[3]. This trend is observed within mobile banking and it is quite natural to make use of features of M-banking which enables people to use banks without barriers of time and place.

The recent statistics shows that mobile banking transactions using mobile phones and smart phones exceed 100 trillions Korean won for the first time. The sudden rapid increase of amounts in banking industry by using mobile phone have many advantages. For example, the location-awareness services which provides users with where they are guides people to the closest banking branch in real time and they are able to get cash from the bank as long as the mobile has a GPS device. This location-awareness service leads to the creation of new business and develops new mobile service and users. And now the service appears to be replacing the existent internet banking. However, since fast development of IT and wireless technologies make banking services avaliable to people in Ubiquitous environment, U-banking services should be studied as a replacement service of internet and mobile banking service to promote Ubiquitous banking services. In particular Korea has had the fastest superhighway internet speed infrastructure and, fast evolution of mobile technology has shifted it into one of the strongest IT utility countries, which provides Korea with the foundation of quickly building an Ubiquitous network environment(www.patentmap.og.kr).

With this background, this study is to carry out users' technology acceptance of emerging new Ubiquitous banking services in the beginning of Ubiquitous society.

2. Research Contents and Research Methods

2.1 Research Contents

Mobile businesses have been greatly developed in wide ares such as books, music, ticketing, reservation, news, advertisement, stock

information, mobile telecommunication, banks etc[14]. In the banking industry, internet or mobile banking services are very important because of cash and money deals. While internet and Ubiquitous services may have been widespread and familiar with people, Ubiquitous banking services have just been introduced recently, Ubiquitous banking services can be argued that similar principles and cases can be used in Ubiquitous banking services. But since there exist fundamental differences between them, it is not easy to apply them into Ubiquitous banking services.

First of all, if concepts of Ubiquitous banking services are related with existing banking services, Ubiquitous banking services can be classified as integrated banking services including internet banking, mobile banking and T-banking. However, since so far there have been enough research works regarding Ubiquitous banking services, it is almost impossible to compare former Ubiquitous banking services studies. Therefore in this study, we would like to define that Ubiquitous banking service is the new integrated banking services connecting existing internet banking, mobile banking, T-banking services when we consider various bank services and related works.

Therefore it is required to access more directly and correctively to find features of users' characteristics and their needs because in Ubiquitous banking which has had great possibility of growth and development, the business should take advanced actions and gain a competitive advantage

In particular recent Ubiquitous banking has been leading new banking industry by using multi terminals, which should be regarded as new paradigm in the banking industry and revolution of new technology. That is, though Ubiquitous banking a new financing and telecommunication environment can be achievable in technology, but we have no idea how efficiently the users will

accept Ubiquitous banking services.

2.2 Research Method

It will be natural to admit that Ubiquitous banking in new technology will be possible in the banking industry. Therefore it is required to study how users would accept Ubiquitous banking service and what factors would satisfy users as a new innovation. For this purpose, we intend to research what factors influenced users to make their decisions of using Ubiquitous banking services.

Growing information and communication technology(ICT) environment has helped various businesses models in the internet, mobile and Ubiquitous sectors[12]. Although there are some models that explain the adoption of Interactive Communication Technologies and Mobile Devices[20], there are still many gaps with regard to the adoption of mobile Internet services[3] and especially ubiquitous services in existing literature. Theoretically information and technology adoption research is continuously reviewed on trust perspectives between barriers to adoption of new technologies and the perceived benefits or added value of new technologies. In information systems literature, Bouwman et al.[3] reviewed that the diffusion research theory, the theory of reasoned action and planned behaviour[2] provides a deeper understanding of customer acceptance of emerging mobile and ubiquitous technologies and services and the diffusion of innovation [19], the Technology Acceptance Model (TAM), the extended Technology Acceptance Model, and the Unified Theory of Acceptance and Use of Technology (UTAUT)[6] are used to explain possible adoption and acceptance patterns of new technologies among consumers. Davis[5] suggested that concepts like relative advantage, compatibility, complexity, triability and observability, as well as

perceived risk, perceived usefulness and perceived ease of use play a key role in these approaches. Gefen, et al.[8] argues that the customers are keeping their trust in the e-vendor [18] and that trust is at the heart of relationships of all kinds[16][17].

Perceived Usefulness (PU) and Perceived Ease of Use (PEU) play a key role in using new systems according to TPB's hypothesis. Also in reality systems acceptances are decided by users' behaviour intentions which are influenced by user's attitude[1]. In the last, he hypothized that attitude is directly affected by a system consisted of PU and PEU. Venkalesh etc[21] set up a theory that social influencing process and perceived tool process are important to extended TAM. Lederer etc[13] suggested that required information and elements of information quality influence usefulness. Relative usefulness and complexibility in innovation theory are opposite concepts against usefulness and ease of use in TAM [10][19]. Since then, extended TAM was often introduced[7][11][16][22].

However, there are a few problems regarding using Ubiquitous banking in it's present form. First most of current models lack applying Ubiquitous's features to their owns. Therefore we should admit that Ubiquitous banking has immediate access/ connection feature which can not be found in any existent systems or services. While Ubiquitous banking has some problems of systems instability and relative difficulty in input and output data, it causes consumers to pay high cost.

This study focuses on how consumers perceive and adopt Ubiquitous banking as a new concept of service as an initial stage of research. Through this result the industry is able to provide consumers with their desired services by searching for more agreed adoptable elements.

3. Analysis and results

3.1 Measurements and data collection

In this study, the following concept was deduced through meetings with specialists of bank-related matters based on the content provided in www.patentmap.or.kr and presented in the questionnaire.

"Ubiquitous banking is a new way of banking created by integrating Internet banking, mobile banking and phone banking which independently existed into one using ubiquitous technology. Bank transactions can be done not only using a mobile phone or a DMB phone or through Internet without necessity to separately purchase a special terminal but also anywhere, anytime using a TV set, cable TV or satellite TV while in transit, at home or in the office."

In this section, responses to all items were measured on a 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). A total of 265 questionnaires were randomly collected at Jeju international airport of South Korea. Among the 265 respondents, 133 respondents(50.2%) were males, and 132 respondents(49.8%) were females. Approximately 71.3% of the respondents was in the age group 20-39, followed by the age groups 40 - 49 (14.7%). And, in the family total income, the highest 31.7% of the respondents were in the length group '2,500 - 3,500 (thousand Korean won)' and in education level, the 49.1% of the respondents were in the group 'the graduated over university'.

3.2 Research model and hypothesis

In this study, as an initial exploratory study, we intend to carry out analysis focusing on usefulness, ease of use and social influence, most basic factors, which affect acceptance intention.

The hypothesis of the research is as follows and the research model can be seen in [Figure 1].

Research hypothesis 1 (H1): Perceived usefulness influences intention to use with positive (+) direction.

Research hypothesis 2 (H2): Social influence influences intention to use with positive (+) direction.

Research hypothesis 3 (H3): Perceived ease of use influences intention to use with positive (+) direction.

Research hypothesis 4 (H4): Intention to use has a significant difference by demographic variables.

In addition, this study finds whether there are differences on intention to use by demographic variables (gender, age, income, and education level). So, the following hypothesis can be proposed as another hypothesis.
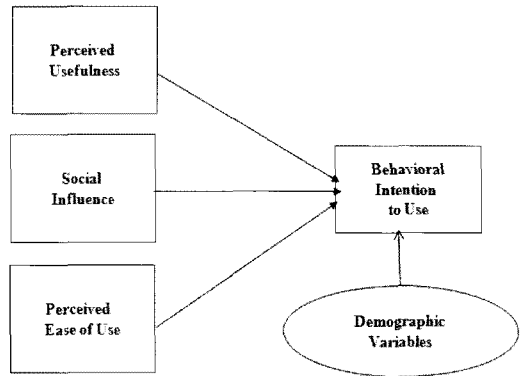
[Figure 1] Research Model

<Table 1> Factor analysis

Variables \ Factor Name	perceived usefulness	social influence	perceived ease of use	Cronbach's alpha
It seems that, through ubiquitous banking, bank service can be used regardless of time and place.	0.893			0.851
Ubiquitous banking seems to be a better service than existing services (Internet banking, mobile banking or phone banking).	0.864			
It seems that I can more easily use the bank service I want through ubiquitous banking.	0.857			
If a person who has an influence on my behavior recommends me to use ubiquitous banking, I will seriously consider using ubiquitous banking.	0.540			
I am under an environment which allows easy use of ubiquitous banking.		0.877		0.768
If a person whom I consider important recommends me to use ubiquitous banking, I will seriously consider using ubiquitous banking.		0.865		
The organization (company, home, etc.) I belong to has an atmosphere of recommending use of new technology (such as ubiquitous banking).		0.570		
I think I am in possession of experience and knowledge required for use of ubiquitous banking.			0.858	0.716
I have someone who will help me when a problem occurs while I use ubiquitous banking.			0.838	
Eigen value	2.770	2.062	1.795	
Accumulated rate	30.773	53.681	73.628	
KMO			0.802	
Bartlett's Test of Sphericity	Appro. Chi-square		1184.840	
	Sig		0.000	

3.3 Exploratory factor analysis for hypothesis test

The first step is to examine the dimensionality of the independent variables scale by means of an exploratory factor analysis. Factor analysis for independent variables was conducted on 9 question items. The factor analysis was based on the inherent value, i.e., Eigen value greater than 1 and enhancement of discrimination power using varimax rotation method.

As a result, three factors are identified and the result was revealed in <Table 1>. <Table 1> indicates that the overall variance rate predicated by the total four factors was 73.63%. In <Table 1>, the original variables are grouped into three major factors: perceived usefulness (F1), social influence (F2), perceived ease of use (F3). And reliability of extracted factors was identified using Cronbach's alpha coefficient to verify the reliability of the questions constituted by the manipulated definition as <Table 1>.

In turn, the factor and reliability analysis of behavioral intention to use (two variables) as dependent factor show the good fitting of factor analysis: two variables and high Cronbach's alpha (0.891).

3.4 Regression analysis for research hypothesis test 1, 2, & 3

To test whether the regression analysis for verifying the independent factors has an influence on intention to use is statistically significant, F -value results were examined.

Regression analysis is conducted with intention to use as a dependent factor and perceived usefulness, social influence, and perceived ease of use as the independent factors in order to examine the hypothesis 1, 2, 3 and to find the most significant factor on the intention to use. <Table 2> shows that the regression equation realizing research hypothesis 1, 2, & 3 was partially significant at the significance level of 0.01%.

As shown in <Table 2>, each regression equation shows that F-value has a significant level (p=0.000). Also, the determinant coefficient, R^2, of 0.430 means that the independent factors have an effect on intention to use with explanation of each 40.0%. Also, perceived usefulness factor in independent factors shows the highest significance level (0.000).

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3.5 ANOVA test for research hypothesis test 4

The ANOVA method was utilized to test hypotheses 4. The following <Table 3> shows the summary for one-way ANOVA of the Hypothesis 3.

<Table 4> shows that F Prob. (i.e., the p-value: 0.051) has no significance at 0.1% level except for education level. So, as a result of the hypothesis 4 test, the ANOVA test shows that the higher education level can lead to the higher intention to use an ubiquitous banking service.

<Table 2> Regression Analysis on Hypothesis 1, 2 & 3

Model	Non-standardized coefficients		Standardized coefficients	t-value	Significant probability
	B	Standard error	Beta		
Constant	-1.34E-16	.047	–	.000	1.000
Perceived usefulness	.502	.047	.502	10.739	.000
Social Influence	.288	.047	.288	6.168	.000
Perceived ease of use	.308	.047	.308	6.600	.000
R=.656, R2=.430, Adjusted R2=.423, F=65.641, Sig=.000***					

*Note: * p<0.1, ** p<0.05, *** p<0.01*

<Table 3> The Summary for One-Way ANOVA of Hypothesis 4 Test

Gender	Sum of Squares	D. F.	Mean Squares	F Ratio	F Prob.
Between Groups	2.656	1	2.656	2.672	.103
Within Groups	261.344	263	0.994		
Total	264.000	264			
Age	Sum of Squares	D. F.	Mean Squares	F Ratio	F Prob.
Between Groups	6.482	4	1.710	1.729	.144
Within Groups	257.158	260	0.989		
Total	264.000	264			
Income	Sum of Squares	D. F.	Mean Squares	F Ratio	F Prob.
Between Groups	4.847	4	1.212	1.216	.305
Within Groups	259.153	260	0.997		
Total	264.000	264			
Education	Sum of Squares	D. F.	Mean Squares	F Ratio	F Prob.
Between Groups	7.850	3	2.617	2.666	.048
Within Groups	256.150	261	0.981		
Total	264.000	264			

4. Conclusions

In this study, as an initial exploratory study, we intended to explore how users perceive and accept the service under a new concept called ubiquitous banking. As a result of the analysis, the following implications could be deduced:

First, the more useful the user thinks the service is, the higher the intention to use is. That is to say, if it is perceived to be better or can be more easily used than the existing Internet banking and mobile banking, the acceptance level will be the highest.

Second, the point is that, though it is not statistically significant, acceptance intention of the male is higher than that of the female, and, at 10% statistically significant level, the higher the education level is, the higher the ubiquitous banking acceptance intention becomes.

In future study, there is a possibility for the impact of additional factors to be researched by using this study which can be based as initial study on ubiquitous banking service. In this study, we set up a model using the most basic factor among influential factors presented in previous studies as an independent variable. However, other research variables which affect acceptance of ubiquitous service should be identified and analyzed through more diverse considerations.

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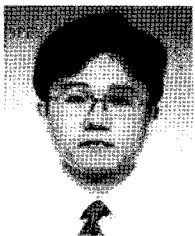1994 University of Wales Swansea (UK), MIS(Ph.D)
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