

The Evaluation of M-Commerce Interface on Smart Phone in Thailand

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Abstract— In this research, text-based E-money application interface and graphic-based application interface on a the smart phone were evaluated. The goal is to study the effect of application interfaces on ease of use, intention to use and perceived risk. The questionnaire survey was conducted to ask university students and middle age people. Both groups have been using or have an expertise in using a smart phone. However, they do not have experience on using E-money services. They were asked to evaluate by randomly selecting the tasks of applications. In the experiment, a reliability analysis, factor analysis and regression analysis were conducted. The result shows that ease of use and perceived risk are affected by a text-based. Ease of use and intention to use are affected by a graphic-based E-money application affects but not perceived risk. This research discusses about the smart phone users toward the E-money application interface which will be useful for E-money business.

Keywords— E-Money, M-Commerce, Usefulness, User Interface, Perceived risk

I. INTRODUCTION

Today, the mobile phone has become one of the most important devices in communication. Moreover, the mobile technology also has been developing very fast. As we can see, we have used the mobile phone not only as a phone but also as a compact computer which we can take around everywhere with us, especially when we can connect internet from the mobile. Research in [1] studied on a review for mobile commerce research and applications showed that the mobile phone has added tremendous value to the business industry.

With high-ended technology, the mobile is getting smaller but the speed is getting faster including more spaces to compile data. However, the mobile's monitor itself still needs to keep redesign to serve the business structure better. The business structure today is very adaptable. It has to have least steps to work on for the consumer. Therefore, the consumer will feel rather comfortable to do the business on it. Next, timing is another issue. The consumer would like to be able to shop anywhere and anytime. The popular one at this moment is E-commerce because it response to this structure very well.

A study in [2] focused on the model for E-commerce Customer Satisfaction Evaluation and the result shows that the consumer satisfaction measurement for using E-commerce is very important and rather to do it. There are numerous factors that we have to keep in mind for example consumer's concern, web design, safety of website, information accuracy and reliability. The business that accentuates on customer satisfactory and wants to increase the business channel has applied this mobile technology with the E-commerce. It has transformed to be the new business structure "Mobile Commerce" (M-commerce) or E-commerce on the mobile phone. It has such a big impact on the business today. A research in [3] studied on an evaluation framework for viable business models for M-Commerce in the information technology sector and the result shows that the study will be merited in the future if conditions are hold true; M-Commerce will be used strategically by different value chain partners in many creative manners. Telecommunication and mobile technology will continue to evolve, with added on features and improved services, to support more demand in the market. The need to accessing the Internet on anywhere and anytime basis by using mobile devices will grow and continue to increase tremendously. The more advanced devices, with more computing power and better displays, will flood the market in the future. As a result, it will enhance the business capabilities and applications to the mobile phones. The study in [4] has pointed out that mobile technology continues to grow with endless possibilities. It provides an effective and efficient ways to conduct business in variety of sectors, such as in financial transactions. In developed countries, the advance mobile phones help improve and increase the payment applications and lead to the development of new P2P services. We can see the examples from many pilot programs partnered by the financial institutions and wireless service providers. One important factor for this technology is user interface (UI). The study in [5] focused on generating user interface for mobile phone devices using template-based approach and generic software framework and the conclusion confirms that the design of the UI has become even more crucial in the market today. Besides, providing the ease of

usage to general consumers, the well designed UI can give consumers the impression of the brand/device which is often used to judge their purchasing decision. In addition, its design plays an important part during the development of software.

For Thailand, E-money service has been introduced into the business. The distinguish E-Money in Thailand is mPay from Advanced Info Service (AIS) [6] and True Money from True Corporation (TRUE) [7]. Both mPay and True Money are the services that could be done through the mobile phone by using the applicable application, for example paying for telephone bills, booking for movie ticket, and paying bills. These two telecom service provider, AIS and TRUE, have a different unique selling point. AIS is well known for excellent services but TRUE is remarkable on serving right to the consumer's need or TRUE CONVERGENCE. However, this service is not yet well established in Thailand. Therefore in research, the user interface of E-money application on both providers and the effect of user interface on other aspects which are usefulness, intention to use and perceived risk are further studied. This study will be immense beneficially to the consumer and the E-money service provider both in and out of Thailand.

In the following section, methodology, data collection, measurement development, reliability analysis, factor analysis, and the result from the regression are described respectively. The result from descriptive statistics is described in the fourth section. Finally, our conclusion and discussion are described in the fifth section.

II. METHODOLOGY

A. Data Collection

In this research, 120 participants are asked to fill out questionnaires. Participants are equally divided into two groups. They are asked to perform one of three tasks on either mPay or True Money. Three common tasks between mPay and True Money are (1) depositing money into a pre-paid phone, (2) transferring money to other the phone that use the same E-money service and (3) buying products using E-money such as an international calling card or a cash card). After that, they are asked to fill out the questionnaire after finishing the task. However, two of questionnaires were invalid. Therefore, only 118 questionnaires will be analysed. The demographic data of respondents are show in TABLE 1. More than 70% of participants are female. Around 50% of participants are university students whose ages are 18-22 years old. More than 70% of participants use internet on computer every day. And more than 50% have experience on using internet on mobile phone.

B. Measure

Questionnaire is divided into three sections. The first section is demographic characteristics of participants, the second section is the technology background of the participant and the third is participants' attitude toward E-money application. In the third section, there are four parts: (1) To measure the usefulness of application, (2) the intention of

using the application, (3) the suitable interface of application and (4) the risk of using the application. Each part contains ten questions each which are 40 questions in total. All questions are applied from the research in [8] - [14]. The participants are requested to evaluate the level of their agreement with each scale item on a four points likert scale from (1) Disagree, (2) Somewhat Disagree, (3) Somewhat Agree, (4) Agree.

TABLE 1. DEMOGRAPHIC DATA OF RESPONDENTS (N = 118).

Category	Percentage (%)
Gender:	
Male	33.1%
Female	66.9%
Age:	
18-22	51.7%
23-30	18.6%
31-45	29.7%
Frequency of using internet on computer:	
Never	5.9%
Less than once a week	3.4%
2-3 times a week	7.6%
More than 3 times a week	11.9%
Everyday	71.2%
Frequency of using internet on mobile phone:	
Never	41.5%
Less than once a week	11.0%
2-3 times a week	10.2%
More than 3 times a week	8.5%
Everyday	28.8%

C. Reliability Analysis

Reliability Analysis is used to measure how decisive of each question by limiting the questions that when that item is removed, Cronbach's Alpha will be increased. Questions from part one, two, and four in a questionnaire are separately performed with reliability analysis until the total Cronbach's Alpha is higher than Cronbach's Alpha on each questions itself or the Cronbach's Alpha on each item is higher than 0.7 leaving out only the benefit items.

D. Factor Analysis

Benefit items from reliability analysis step are further used in this step. Questionnaire from True Money contains 26 benefit items and questionnaire from mPay contains 23 benefit items. Factor Analysis was applied to the benefit by using the principle components extractions method and varimax rotation. The criteria used in this analysis are outlined as follows:

- 1) Factors with given values or latent roots of all components should be greater than 1.0.
- 2) Communalities of all times should be more than 0.5.
- 3) The factor loadings of ± 0.50 or greater are considered necessary for practical significant, and
- 4) Cronbach's alpha values of each factor extracted and overall measure should be greater than 0.7.

Extraction the item is divided into two rounds by separating mPay and True Money. The factor analysis extracted items into four factors for both of them. For mPay, there are six items for user interface, nine items for usefulness aspect, eight items for intention to use aspect and three items for perceived risk aspect. For True Money, there are seven items for user interface, four items for usefulness aspect, ten items for intention to use aspect and nine items for perceived risk aspect. These factors provide a reliable and consistent measure of intended dimensions and no further elimination of items appears necessary.

III.RESULT OF REGRESSION ANALYSIS

Regression analysis is used to measure how much the user interface (presenting the E-money service) has an effect on usefulness, intention to use and the perceived risk aspects. In this experiment, the collected data of mPay and True Money are separately analysed. Two factors are paired and performed with regression analysis result in Figure.1. This figure is user interface versus usefulness, user interface versus intention to use, and user interface versus perceived risk. This figure shows the bar graph of beta values of each factor for mPay and True Money.

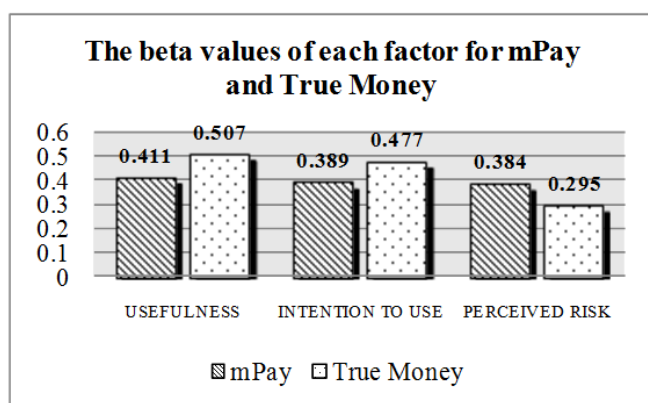


Figure 1. RESULTS OF REGRESSION ANALYSIS (BETA VALUE).

All aspects are statistically significant at the .01 level for mPay application. Figure 1 shows the values of each aspect. The highest coefficients is from usefulness aspect (Beta = 0.411, $p < 0.01$). The second one is from intention to use aspect (Beta = 0.389, $p < 0.01$). And the last one is from perceived risk aspect (Beta = 0.384, $p < 0.01$) respectively. Therefore, the user interface has positive and statistically significant impact on the usefulness, intention to use and perceived of risk aspects.

For True Money, the usefulness and perceived of risk aspects are statistically significant at the .01 level and the intention to use aspect is statistically significant at the .05 level. The highest coefficients is from perceived risk aspect (Beta = 0.507, $p < 0.01$). The second one is from usefulness aspect (Beta = 0.477, $p < 0.01$). The last one is from intention to use aspect (Beta = 0.295, $p < 0.05$) respectively. Therefore,

the user interface has positive and statistically significant impact on the usefulness, intention to use and perceived of risk aspects.

For mPay application, the user interface has an effect on the usefulness aspect. Many participants complained about the difficult of how to perform a given task. The main reasons are from the unclear steps and unclear descriptions. They also were pleased by these graphics but some of them were confused by the icons because some icons do not communicate clear enough. They thought the application will be more useful if the icons are good representatives and easy to understand.

Moreover, the user interface has a subsequence effect on the intention to use aspect for mPay application. Because mPay application's interface is a graphic based. It has graphic icons to represent each service as shown in the Figure 2.

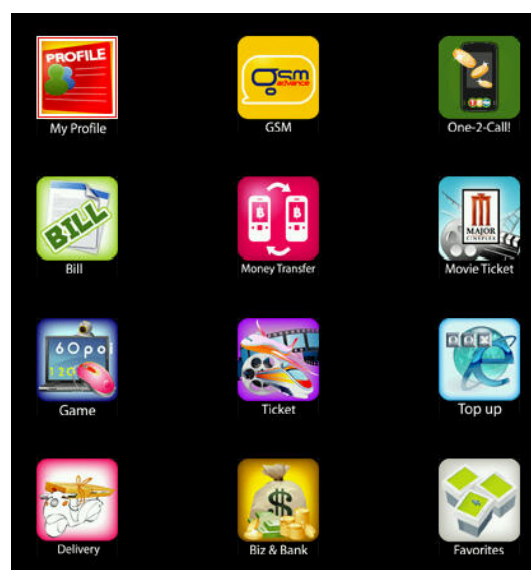


Figure 2. mPay application's interface

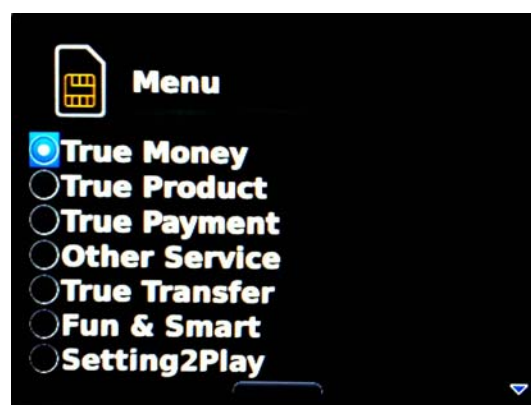


Figure 3. True Money application's interfaces

We can observe that the coefficient values of the usefulness and the intention to use are not much different. Therefore, we can conclude that the user interface has the

same effect on the usefulness and the intention to use. Moreover, the user interface has less impact on the perceived risk factor than other aspects. And also, the coefficient value of the perceived risk from Figure 1 (mPay) is less than from the coefficient value of the perceived risk from Figure 1 (True Money). It is likely that users feel less risk while using the graphic-based E-money application.

For True Money application, the results show that the perceived risk aspect is highly influenced by the user interface. There are many users thought that perceived risk aspect is very important to them. Because the True Money application is text-based, that uses concise words, brief messages, and abbreviations for each menu as shown in Figure 3. From the experiment, some participants felt comfortable on using the application and also felt that the system has been thoroughly checked for errors and security issues since it is being released to the public. On the other hand, a portion of the participants felt that some words were ambiguous and the abbreviations were unclear. This group of participants did not feel comfortable using the application because they were afraid that they will have to pay for the services that they mistakenly chose because of the unclear menus. Additionally, the unprofessional descriptions give the participants the impression that the application is not safe and unsecure. It can be implied that participants feel risky while using the text-based E-money application with unclear descriptions.

User interface also affects usefulness aspect. Most participants think that this application is easy to use and that features and functions such as money transfer, weather forecast, news, or movie times, music store, and utilities payment fulfill their needs; it makes their daily life more convenient and easier. And since user interface is the text-based, the application can run on any mobile phone. Even though this makes the system very robust, some participants think that menu descriptions are unclear. As a result, they have to carefully access each function. Some participants feel that user interface design is not efficient, making it harder to perform tasks. In addition, there are many different ways that can help participants operate the tasks easier without accessing to the applications. In other words, participants think that this application is not applicable as it could be useful.

For intention to use aspect, many participants felt that this application is easy to use because of the text-based interface. Moreover, this application is interesting and useful in making their daily life more comfortable. So they wanted to learn and intend to use the application more. But some participants feel that user interface design is too plain and that the font sizes are too small. The description of text on the screen is also not clear. These confused some participants. In addition, most participants are accustomed to use what they used to rather than using this new application. It can be implied that participants is not interested in the application.

IV. RESULTS OF DESCRIPTIVE STATISTICS

When we counted frequency of the participants answered 'agree' or 'disagree' on each question; from the most to the least respectively, the top four questions from both mPay and True Money are shown in TABLE 2 and TABLE 3. These tables compose of list of the questions, the frequency and the percentage.

From the TABLE 2, we could see (from the 59 participants who used mPay), the question that got majority 'agree' is "Using the application improves the quality of the work", and the same from True Money is "I think the e-money application provides an easy exit for the user". From the table, we could see that the similarity of these four questions from these two networks are US_01, US_03, UI_07, UI_10 and asking about the advantages and suitable for the user interface. Therefore it shows that majority had agreed upon on how the application has been helping them manage their tasks easier and faster. They were also adding if there were some mistakes, the system should warn them about it.

TABLE 2. TOP FOUR QUESTIONS THAT HAVE THE HIGHEST FREQUENCY OF "AGREE".

mPay			True Money		
Question	Freq.	Percent	Question	Freq.	Percent
(US_01) Using the application improves the quality of the work I do.	28	47.5	(UI_09) I think the E-money application provides an easy exit for the user.	23	39.0
(UI_10) I think the E-money applications provide error messages that indicate the error.	27	45.8	(UI_07) I think the E-Money application supports undo and redo. (UI_08) I think the E-money application should have a button for back to the previous screen easily. (UI_10) I think the E-money applications provide error messages that indicate the error.	22	37.3
(UI_07) I think the E-Money application supports undo and redo.	26	44.1	(US_03) The application enables me to accomplish tasks more quickly.	20	33.9
(US_03) The application enables me to accomplish tasks more quickly.	23	39.0	(US_01) Using the application improves the quality of the work I do.	18	30.5

TABLE 3. TOP FOUR QUESTIONS THAT HAVE THE HIGHEST FREQUENCY OF “DISAGREE”.

mPay			True Money		
Question	Freq.	Percent	Question	Freq.	Percent
(RI_01) I find it necessary to be cautious with E-money.	22	37.3	(RI_01) I find it necessary to be cautious with E-money.	37	62.7
(RI_10) Another's person steals consumer's information to assume the consumer's identity.	16	27.1	(RI_08) Unauthorized access to payment system to steal consumer's data. (RI_09) Stealing credit cards information, or billing more than consumer authorized. (RI_10) Another's person steals consumer's information to assume the consumer's identity.	33	55.9
(IN_07) If this application is not installed, I intend to install this program for using E-Money services.	13	22	(IN_07) If this application is not installed, I intend to install this program for using E-Money services.	28	47.5
(RI_08) Unauthorized access to payment system to steal consumer's data. (IN_06) I intend to be a heavy user of the application whenever they are available.	12	20.3	(UI_01) I think the interface application is interesting and attractive.	27	45.8

TABLE 3 shows the top four questions that received the highest frequency ‘disagree’. The question received the highest frequency of ‘disagree’ for both mPay and True Money is “I find it necessary to be cautious with E-money.” That mean they did not think that they have to be cautious or careful when using this application. The top four questions that received highest frequency on ‘disagree’ were the question that involved the risks and the intention to use. But for True Money would also have question of the usable of the interface (UI_01) included. The participants who selected ‘disagree’ to True money on the appeal of its user interface because it is text based not the graphic based: unlike mPay, (for mPay, there were eight participants who selected ‘disagree’ on UI_01 or 13.6%). From the table, the common questions from both networks are RI_01, RI_08, RI_10, and

IN_07. It was telling us that participants disagree on being careful or cautious when using E-money because their information might be stolen. However, it might be because we only let the participants tried on the prepaid phone card or transferring some money that did not cost more than 50 Baht (approximately 1.7 US Dollar). Therefore, they might think that they did not have to be careful about the safety. Moreover, the majority of participants would disagree on adding on the application that had E-money.

After the participants answered the surveys, most of them thought the application was useful but might not use it because it was not necessary to their life. But if they were already downloaded on their phone, they might be interested, if not, they did not need it either. There are other ways for doing tasks such as paying bills at the convenient store. And many participants still rely on the traditional way besides using E-money. Moreover, some E-money services have fee. So they think that they can use the other ways and did not have to pay for the fee.

V. CONCLUSIONS

In this research, the Evaluation of E-money application interface on the smart phone in Thailand is studied. This is one of the first research that has been done on what aspect that application interface on the smart phone has an effect on the use of consumer. Participants including university students and mature participants were asked to use E-money application. These two applications, which are mPay and True Money, are delivered by two large telecom service providers in Thailand. These two applications share common tasks but their design approaches are different. Regression Analysis method was used for analysing data. The result from experiment shows that although the designs are different, both application interfaces have an effect on usefulness, intention to use, and perceived risk to the customers.

If a company wants to develop the E-money application on mobile phones, the important factors include the language, and layout/icon design. There should be some explanation under the menus or icons that explain the functionality. They should choose suitable size of font or icon that is comfortable for users to read. Classifying tasks by using color will make users feel good and confident when using the application.

There are still many interesting factors that can be further studied, such as age factor, literacy factor and trust factor. Such research would be useful for any companies who tend to provide or improve E-money business on the mobile phone.

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