

# Digital Inequality in the Use of Mobile Business Supporting Features

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## Abstract

Today, Internet has become an essential part of peoples' daily lives. As the advancement of Internet technology, the phenomenon of digital inequality has received substantial attention. This study extended research on digital inequality to the field of mobile business. The paper aimed to investigate the impact of digital inequality in the use of mobile business supporting features in China. To address this, an empirical study with 258 subjects was carried out. The results indicated that perceived ease of use had a significant positive effect on the use of mobile business supporting features, while perceived risk had a significant negative effect on the use of mobile business supporting features. Furthermore, this study also revealed that socio-economically disadvantaged individuals were more likely to be influenced by perceived risks, while socio-economically advantaged individuals were more likely to be influenced by the utilitarian motivations.

**Keywords:** Digital inequality, mobile business, TAM

## 1. Introduction

Today, Internet has become an essential part of many peoples' life. Internet is able to bring many potential values to the society, such as creating new value, increasing social wealth and enhance social happiness. However, many scholars have noticed the impact of digital inequality on the various applications on the Internet [18]. The research on digital inequality in the use of E-business applications has received increasing attention. For instance, Buhtz et al. have studied the second-order digital inequality in the use of E-business in the US [3]. They presented a conceptualized research framework for digital inequality study in the context of E-business.

Advanced mobile technologies offer opportunities to support mobile business work processes in real-time irrespective of time and location of users. However, to our knowledge, the research on the impact of digital inequality in the use of mobile business supporting features is relatively absence. According to the 2014 annual report from China Internet Network Information Center (CNNIC) [6], the scale of China's Internet users has reached 649 million at the end of 2014 and the percentage of those using mobile phones to access the web has jumped from 81% in 2013 to 86% at the end of 2014. The mobile business is booming rapidly in China. China, as a fast-growing developing country, has the largest number of mobile phone users all over the world. Mobile business is booming in China. It is interesting to examine how mobile business supporting features are used by different users in China. Therefore, we aimed to investigate the impact of digital inequality in the use of mobile business supporting features in China in this study.

By using mobile business supporting features like group purchasing, price comparison sites or taxi booking, consumer can easily search products and services and compare their price on mobile devices. This is different from the traditional market, in which product availability, position and pricing are highly associated with the place of residence. For instance, mobile coupons are means by which individuals can shop cheaper on their mobile devices than in the traditional market. But not everyone is able to receive economic gains from the use of mobile business supporting features. People with different Internet skills, level of education and socio-economic status may behave differently when using mobile business supporting features. Digital inequality always existed among users of mobile business supporting features. Concerning the theme of mobile business, first-order digital inequality refers to the inequality of mobile business applications access, while the second-order digital inequality refers to different manners of using mobile business applications. The objective of this research is to explore the influence of an individual socio-economic status on the use of mobile business supporting features.

The remainder of this paper is organized as follows: the theoretical background is provided in Section 2. Section 3 proposes the research model and hypothesis. This is followed by the presentation of the research method and research results in Section 4. The findings of this research are discussed in Section 5. Section 6 presents the implications of this research. Section 7 concludes this research.

## **2. Theoretical Background**

### **2.1. Digital Inequality**

The term digital inequality often referred to the gaps in access to a computer and Internet access. DiMaggio et al. defined digital inequality as the difference between individuals regarding their access to, and ability to use, information and communication technology [9]. Previous research has focused on the first-order digital inequality [8], which meant the access to information communication technology and its sociological implications, such as, the lack of online education opportunities [29]. Recent research have paid attention to the second-order digital inequality [25]: rather than exploring whether individuals use ICT or not, the study focuses on examining differences in how people use ICT to create opportunities for themselves. The second-order digital inequality tends to focus on the different ways how people use ICT depending on their socio-economic status.

Previous research also paid increasing attention to the phenomenon of digital inequality in various themes (e.g., e-business, e-government). Mossberger et al. [31] have proposed three kinds of performance of digital inequality: firstly, the differences in access and operation of information technology among people, secondly, the differences in economic opportunities resulting from people's inability to participate in Internet-based education, training and lack of hiring opportunities, thirdly, the difference in democracy caused by inability to participate in e-government. Furthermore, scholars have researched variations in Internet skill among different people [26] and digital inequality in the use of electronic government [23]. Last but not least, Buhtz et al. [3] explored second-order digital inequality within the context of e-commerce in the US.

### **2.2. Socio-economic Status**

Digital inequality has been studied in different dimensions including gender, race and age [4] [35]. Furthermore, income and the level of education have been identified as another two key dimensions to reflect the socio-economic difference between individuals [28]. For example, Van Deursen and van Dijk [37] studied the Internet skill of the Dutch and revealed that lower education would lead to lower Internet skills. In the recent study, Buhtz et al. [3] investigated the relationship between socio-economic status and the use of E-business supporting features

and found that the socio-economically advantaged individuals use e-business more effectively than the socio-economically disadvantaged individuals with respect to e-business supporting features.

### **2.3. Technology diffusion theory**

The Technology Acceptance Model (TAM) was the most influential model to investigate the acceptance of information [7]. Perceived ease of use and perceived usefulness were two factors in the original TAM model [7]. The main notion in TAM is that peoples' attitudes toward a technology are shaped by their beliefs about the attributes of this technology, which in turn influence peoples' intentions to adopt this technology. However, perceived ease of use and perceived usefulness may not fully reflect the motivation of users of mobile business applications. Depending on the specific technology context, additional explanatory variables may be needed beyond perceived ease of use and perceived usefulness. Researchers have extended TAM with some additional constructs into the context of e-business and mobile business [14][15][38]. For example, perceived risk has proved to be an important factor to impact the adoption of E-business [34]. Gao and Krogstie [12] and Gao, Zang and Krogstie [19] argued that there were also other non-technical factors that impact users' adoption of mobile services. For entertainment-oriented services, both utilitarian and hedonic aspects are important [13][21].

### **2.4. The Use of Mobile Business Supporting Features**

It is believed that people who get fully use of mobile business supporting features have opportunities to get economic gains offered by mobile business. Therefore, it is important for users to take advantage of the supporting features offered by mobile business applications. The supporting features can be associated with buyers' buying decision-making model. Buying decision-making model has divided the purchasing process into the following five steps [10]: problems cognitive, information search, alternative evaluation, purchase decision and post purchase behavior. Among the five steps, the information search and purchase decision were thought to be the most important steps [20]. Mobile business supporting features is of help for users to make a right buying decision. The objective of this study is to investigate the use of mobile business supporting features with individual with different socio-economic status in China. Compared to E-business applications, mobile business applications have potential to provide more advanced supporting features (e.g., location based services [16]). For example, users can use taxi-hailing application to locate and hail the closet taxi. Concerning the stages involved in buying decision-making model, we focus on studying the use of mobile business supporting features in the information search stage of the purchasing process.

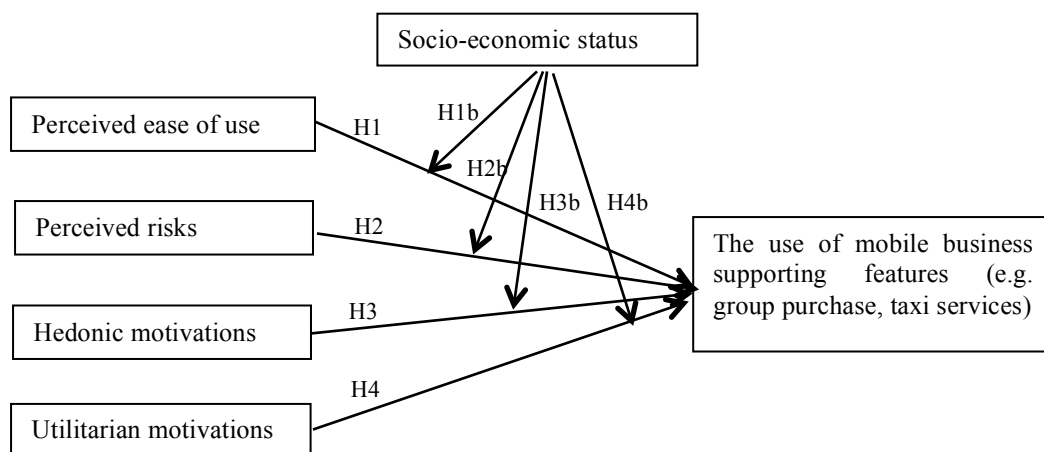
## **3. Research Model and Hypotheses**

### **3.1. Research Model**

To address the research objective, we built a model to explain how and to what extent socio-economic status influence the use of mobile business supporting features. On the one hand, we applied an expanded TAM model to fit the context of the use of mobile business supporting features. The utilitarian motivations were used to replace perceived usefulness in TAM. Furthermore, the perceived risk and hedonic motivations were added to the original TAM model. The four dependent variables in this research are perceived ease of use, perceived risk, hedonic motivations and utilitarian motivations. The definitions of these four variables are illustrated in Table 1. One the other hand, the socio-economic status was included to the research model as a moderator variable. The research model is presented in Fig.1.

**Table 1.** Construct definitions and Sources

Construct	Definition	Sources that inform construct
<b>Perceived ease of use</b>	The degree to which an individual believes that using mobile business supporting features would be free of effort.	[7]
<b>Perceived risk</b>	The user's subjective expectation of suffering a loss in pursuit of the desired outcome of using mobile business supporting features.	[34] [38]
<b>Hedonic motivations</b>	The pleasure and inherent satisfaction derived from using mobile business supporting features.	[5] [24]
<b>Utilitarian motivations</b>	The extent to which using mobile business supporting features enhances the effectiveness of personal related activity.	[5] [24]

**Fig. 1.** The research model

### 3.2. Research Hypotheses

Borrowed from TAM [7], perceived ease of use reflects how difficult it will be to use a new technology or system. This belief is associated with an individual's assessment of the mental effort involved in using a new technology or system. Mobile services are provided on mobile devices. The limitations of mobile devices may have the potential to affect users' perceptions of ease of use of mobile services. Previous studies (e.g., [15][17]) have demonstrated that Perceived Ease of Use has a direct positive impact on intention to use mobile services.

Due to the complexity of mobile business supporting features, socio-economically disadvantaged individuals are different to socio-economically advantaged individuals in their perceived ease of use. Socio-economically disadvantaged individuals usually less effectively than socio-economically advantaged individuals to cope with issues in the process of using mobile technologies. Consequently, the perceived ease of use may have a more intense influence on the use of mobile business supporting features for socio-economically disadvantaged individuals. Therefore, we proposed the hypotheses as follows:

*H1: Perceived ease of use have positive effect on the use of mobile business supporting features.*

*H1b: Socio-economic status will moderate the positive relationship between perceived ease of use and the use of mobile business supporting features such that the relationship is stronger for the socio-economically disadvantaged individuals than the socio-economically advantaged individuals.*

Perceived risk (PR) is commonly thought of as felt uncertainty regarding possible negative consequences of using a product or service [11]. It is believed that perceived risk would have a negative influence on the use of mobile business supporting features. People with higher income were more likely to take risks [36], while people with lower income were more likely to have an intensive emotional vulnerability with respect to financial losses [32]. Consequently, the socio-economically disadvantaged individuals tend to be more likely to be influenced by perceived risks than the socio-economically advantaged individuals. Therefore, we proposed the hypotheses as follows:

*H2: Perceived risks have a negative effect on the use of mobile business supporting features*

*H2b: Socio-economic status will moderate the positive relationship between perceived risks and the use of mobile business supporting features such that the relationship is stronger for the socio-economically disadvantaged individuals than the socio-economically advantaged individuals.*

Hedonic and utilitarian motivations have been proved to have effect on consumer behavior of online shopping [5]. For example, Gao, Yang and Krogstie [18] found that utilitarian benefits and perceived enjoyment had a significant positive impact on older adults' intention to use smartphones in China. It is believed that both hedonic motivations and utilitarian motivations would have a positive impact on the use of mobile business supporting features.

Pervious research also revealed that getting utilitarian benefits were more important to the socio-economically advantaged individuals than the socio-economically disadvantaged individuals. For example, Norris [33] suggested that socio-economically advantaged individuals have better opportunities to access and use information technology than socio-economically disadvantaged individuals because of their better level of education. Furthermore, hedonic benefits offered by mobile business applications are more important for the socio-economically disadvantaged individuals than the socio-economically advantaged individuals. The socio-economically disadvantaged individuals were more likely to burden pressures [1]. Using mobile business supporting features is more likely to be seen as a way of stress relief, which is a kind of hedonic motivational drivers, for the socio-economically disadvantaged individuals. Therefore, we proposed the following hypotheses:

*H3: Hedonic motivations have a positive effect on the use of mobile business supporting features.*

*H3b: Socio-economic status will moderate the positive relationship between hedonic motivations and the use of mobile business supporting features such that the relationship is stronger for the socio-economically disadvantaged individuals than the socio-economically advantaged individuals.*

*H4: Utilitarian motivations have a positive effect on the use of mobile business supporting features.*

*H4b: Socio-economic status will moderate the positive relationship between utilitarian motivations and the use of mobile business supporting features such that the relationship is stronger for the socio-economically advantaged individuals than the socio-economically disadvantaged individuals.*

## **4. An Empirical Study**

### **4.1. Instrument Development**

Validated instrument measures from previous studies were used as the foundation to create the instrument for this study. In order to ensure that the instrument better fit the context of

mobile business supporting features, some minor changes in wording were made to ensure easy interpretation and comprehension of the questions. As a result, 15 measurement items (see Appendix 1) were included in the instrument. A 7-point Likert scale, with 1 being the negative end of the scale (strongly disagree) and 7 being the positive end of the scale (strongly agree), was used to examine participants' responses to all items in this part. In addition, data were analyzed using structural equation modeling (SEM). As for the dependent variable, the participants were required to answer the following question: how many times did you use the mobile business supporting features (e.g., price comparisons site) for mobile shopping in the past year? The participants can choose among six categories (0 time, 1-5 times, 6-10 times, 11-15 times, 16-20 times and above 20 times).

#### 4.2. Samples

The survey was conducted in China. We distributed the survey in term of Internet-based questionnaires individually from March 15 to April 22 2015. We used the paid service from a Chinese research institutions' website to collect the data. A total of 300 responses were collected, while 258 of them were valid. The survey had a response rate of 86 percent. The demographic information of the respondents is summarized in Table 2.

**Table 2.** Demographic information of the respondents

		<b>Number</b>	<b>Percent (%)</b>
<b>Gender</b>	Male	122	47.29
	Female	136	52.71
<b>Age</b>	Under 18	3	1.16
	18-25	104	40.31
	26-30	77	29.84
	31-40	57	22.09
	Above 40	17	6.59
<b>Educated level</b>	Lower-Secondary School	7	2.71
	Upper-Secondary School	13	5.04
	Undergraduate Students	188	72.87
	Master Students	35	13.57
	Doctoral Students	2	0.78
	Vocational School students	13	5.04
<b>Monthly disposable income</b>	Under 1000 RMB	30	11.63
	1000-1999 RMB	38	14.73
	2000-2999 RMB	53	20.54
	3000-5999 RMB	89	34.50
	6000-10000 RMB	37	14.34
	More than 10000 RMB	11	4.26
<b>Familiarity mobile phone</b>	Very familiar	108	41.86
	Familiar	122	47.29
	Normal	28	10.85
	Not familiar	0	0.00

#### 4.3. Descriptive Results

The means and standard deviations for each of the items in the survey are presented in the Appendix 2. Some interesting findings are summarized here. Firstly, we noticed that the first item of perceived ease of use "My interaction with the mobile business supporting features is

clear and understandable” has the lowest mean value but the highest standard deviation. This implies that the mobile business supporting features needs to be better designed to fit users’ needs. Furthermore, the results indicated that the mean value of the hedonic motivation and utilitarian motivations were relatively high (all above 5.1). This means that people have obvious hedonic motivations and utilitarian motivations when they are using the mobile business supporting features. However, this does not necessarily mean that the hedonic motivations and utilitarian motivations have significant positive influence on the use of mobile business supporting features. Further tests on this were presented in the following sections.

#### 4.4. Data Analysis

To test the reliability of each construct in the research model, the Internal Consistency of Reliability (ICR) of each construct was tested with Cronbach’s Alpha coefficient. As a result, the Cronbach’s Alpha values range from 0.883 to 0.904 (see Table 3). A score of 0.7 is marked as an acceptable reliability coefficient for Cronbach’s Alpha [30]. All the constructs were above 0.70. Therefore, the reliability of the scales was quite good.

All measurement items were from the validated items previous research in this study. Furthermore, we used principal component analysis to extract factors. The factor with characteristic root larger than 1 was extracted and the accumulated variance contribution rate was 69.021%. The standardized loadings were all above 0.5. Therefore, the validity of the scales was good.

The fitness of the hypothesised model can be assessed using six commonly used fit indices [27]: Chi-square, Chi-square/df, Normed Fit Index (NFI), Comparative Fit Index (CFI), Root Mean Square Residual (RMR) and Root Mean Square Error of Approximation (RMSEA). CFI was the primary fit-statistic of the six for the purposes of this study, as recommended by [2]. A CFI above 0.90 is indicative of a well-fitting model. According to our result, CFI is above 0.90 in this study. This means that the resulting measurement model has good model-to-data fit.

**Table 3.** Reliability statistics

Scale	Cronbach's Alpha	N of Items
Perceived ease of use	.890	4
Hedonic motivations	.883	3
Utilitarian motivations	.904	4
Perceived risks	.896	4

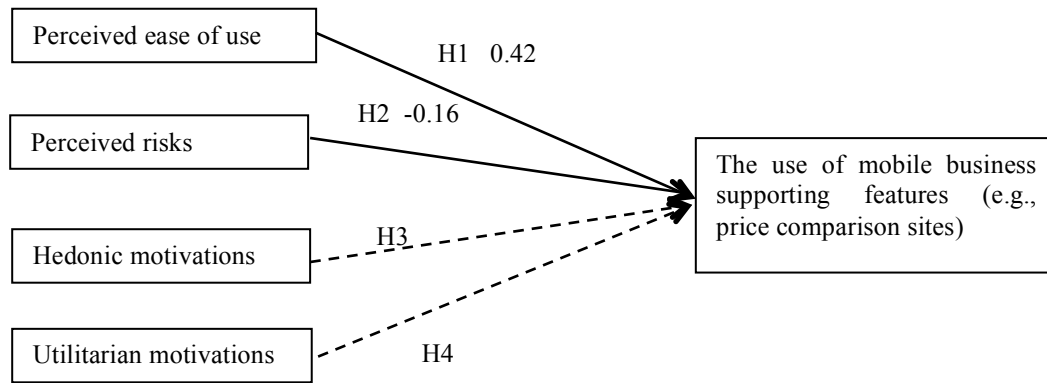
#### 4.5. Hypotheses Testing Results

##### 4.5.1 The test of main effect

The Table 4 showed regression weights. And the results of the structural model main effect were showed in Fig. 2. Perceived ease of use has been proved to have significant positive effect on the use of mobile business supporting features ( $P < 0.01$ ), with a path coefficient of 0.42. Perceived risks have significant negative effect on the use of mobile business supporting features ( $P < 0.05$ ), with a path coefficient of -0.16. Hedonic motivations and Utilitarian motivations have not been found to have a significant positive influence on the use of mobile business supporting features. Thus, H1 and H2 were supported, while H3 and H4 were not supported (showed as dotted lines in Fig. 2) in this study.

**Table 4.** Regression Weights: (Default model)

	Estimate	S.E.	C.R.	P
Use <--- Perceived ease of use	.662	.222	2.986	.003
Use <--- Hedonic motivations	-.073	.234	-.310	.757
Use <--- Utilitarian motivations	.159	.283	.562	.547
Use <--- Perceived risks	-.256	.118	-2.170	.030

**Fig. 2.** Results of structural modeling main effect

#### 4.5.2 The test of moderate effect of socio-economic status

Multiple-group analysis in Amos was used to test the moderate effect of socio-economic status. A default model and a limited model have been set up. In the limited model, regression coefficients of perceived ease of use to use of mobile business supporting features between the two groups was set up as equal. The default model was assumed to be correct. The change of chi square value has not been significant at the level  $P > 0.05$ . Therefore, the results indicated that the socio-economic status did not have a moderate effect on the relationship between perceived ease of use and the use of mobile business supporting features. H1b was not supported. By following the similar approach, we tested the H2b, H3b and H4b. As a result, H2b and H4b were supported, while H3b was not supported. This means that socio-economic status would moderate the relationship between utilitarian motivations and the use of mobile business supporting features such that the relationship is stronger for the socio-economically advantaged individuals than the socio-economically disadvantaged individuals. Furthermore, the results also revealed that socio-economic status would moderate the positive relationship between perceived risks and the use of mobile business supporting features such that the relationship is stronger for the socio-economically disadvantaged individuals than the socio-economically advantaged individuals.

## 5. Discussion

According to the test results, four of eight research hypotheses were supported. Contrary to our expectations, both hedonic motivations and utilitarian motivations did not have significant positive effects on the use of mobile business supporting features. For the hedonic motivations, the possible explanation might be that the mobile business supporting features were not seen as a way to have fun by Chinese consumers. Concerning the utilitarian motivations, some users might not know the possible value of the mobile business supporting features. Moreover, perceived risks had a significant negative effect on the use of mobile business supporting features. This is in consistent with the finding from the previous study that perceived risks was one of the important factors to negatively affect the use of e-business applications [34].



Concerning the moderate effect of socio-economic status, the finding indicated that the relationship between utilitarian motivations and the use of mobile business supporting features was stronger for the socio-economically advantaged individuals than the socio-economically disadvantaged individuals. In the other words, the socio-economically advantaged individuals were more likely to be influenced by the utilitarian motivations. On the other hand, socio-economic status also moderated the relationship between perceived risks and the use of mobile business supporting features. The socio-economically disadvantage individuals were more likely to be influenced by the perceived risks, which confirmed the previous research findings [32].

## **6. Implications**

### **6.1 Theoretical Implications**

As for the theoretical implications, this study extended the research on digital inequality from the context of E-business to the context of mobile business. This research contributes to the current literature on the use of mobile business supporting features from the perspective of second-order digital inequality. Moreover, the socio-economic status was included into the research model as a moderator. The findings revealed that the socio-economically disadvantage individuals were more likely to be influenced by the perceived risks. However, the socio-economically advantage individuals were more likely to be influenced by the utilitarian motivations.

The mobile devices provided a new channel for users to access Internet and various applications. Mobile business applications are able to offer potential benefits to consumers. However, these benefits are not equal to all the users. This research also provided some managerial implications to the governmental sector and service providers. For the governmental sector, the results indicated that second-order digital inequality has become a social issue. They need to pay more attention to how mobile business supporting features are used by users. We found that some Internet literacy trainings were needed for the socio-economically disadvantaged individuals to decrease the perceived risks when using mobile business supporting features. Mobile services providers can attempt to attract more users by allowing users to use a trial version of the mobile services without registering their profiles. Having a reliable third party mobile payment service provider can reduce users' perceived risks of mobile business supporting features.

## **7. Conclusion**

This study examined the issue of digital inequality in the use of mobile business supporting features in China. A research model with eight research hypotheses was proposed. An empirical study with 258 users was carried out in China. Four research hypotheses were positively significant supported in this research. The results indicated that perceived ease of use had a significant positive effect on the use of mobile business supporting features, while perceived risk had a significant negative effect on the use of mobile business supporting features. Furthermore, this study revealed that socio-economically disadvantaged individuals were more likely to be influenced by perceived risks, while socio-economically advantaged individuals were more likely to be influenced by the utilitarian motivations.

There were also some limitations in this research. First, income and the level of education are just two basic dimensions to define users' socio-economic status. Additional dimension may include in the future research on digital inequality. Second, besides the factors in our structural model, there may have other factors affecting peoples' use of mobile business supporting features. Last but not least, the sample size is quite small in this study. The sample may not represent the entire population in China.

**Appendix 1**

Factor	Item	Literature
Perceived ease of use	(1) My interaction with the mobile business supporting features is clear and understandable. (2) Interacting with the mobile business supporting features do not require a lot of my mental effort. (3) I find the mobile business supporting features easy to use. (4) I find it easy to get the mobile business supporting features to do what I want it to do.	[24]
Hedonic motivations	(1) Using the mobile business supporting features is enjoyable. (2) Using the mobile business supporting features is pleasant. (3) Using the mobile business supporting features is fun.	[24]
Utilitarian motivations	(1) Using the mobile business supporting features improves my performance for information search in the consumption process. (2) Using the mobile business supporting features improves my productivity for information search in the consumption process. (3) Using the mobile business supporting features enhances my effectiveness for information search in the consumption process. (4) Using the mobile business supporting features is useful for my information search in the consumption process.	[24]
Perceived risk	(1) I think using mobile business supporting features in monetary transactions has potential risk (2) I think using mobile business supporting features in product purchase has potential risk (3) I think using mobile business supporting features in merchandise services has potential risk (4) I think using mobile business supporting features puts my privacy at risk.	[38]

**Appendix 2**

Item	N	Minimum	Maximum	Mean	Std. Deviation
PEOU_Item1	258	1	7	4.98	1.425
PEOU_Item2	258	1	7	5.14	1.413
PEOU_Item3	258	1	7	5.40	1.256
PEOU_Item4	258	1	7	5.32	1.216
HM_Item1	258	1	7	5.18	1.242
HM_Item2	258	1	7	5.34	1.174
HM_Item3	258	1	7	5.41	1.161
UM_Item1	258	1	7	5.45	1.225
UM_Item2	258	1	7	5.39	1.253
UM_Item3	258	1	7	5.47	1.147
UM_Item4	258	1	7	5.44	1.160
PR_Item1	258	1	7	5.20	1.250
PR_Item2	258	1	7	5.20	1.258
PR_Item3	258	1	7	5.27	1.246
PR_Item4	258	1	7	5.45	1.186

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