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The Important of Enjoyment and Mobility for Continuance with Mobile Data Services*

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Abstract: This paper investigates the factors impacting users continuance intentions on using mobile data services. Specifically, a second-stage continuance model is revised and tested with a focus on both hedonic and utilitarian needs. The constructs of enjoyment and mobility are used to derive a set of hypotheses. An instrument is developed to collect data from 607 subjects. Statistical analyses such as structural equation modeling are conducted on collected data for hypotheses testing. The findings show that both utilitarian mobility and enjoyment constructs help to predict continuance intention toward mobile data services through smart phones. The salience of disconfirmation and beliefs in mobility and enjoyment drives satisfaction and attitude changes toward continuance intentions. Moreover, perceived mobility, enjoyment and satisfaction constructs jointly explained almost 80 percent of the variance in post-usage attitude. Theoretical and practical implications are also presented and discussed.

Key words: E-commerce; M-commerce; enjoyment research

1. INTRODUCTION

With rapid proliferation of 4G wireless broadband networks and mobile devices such as smart phones and tablet computers, mobile Internet data services are enjoying the level of popularity which was never experienced by any previous mobile computing technologies. A mobile device, by common understanding, refers to a small, hand-held computing device, typically having a display screen with touch input or a mini keyboard and weighing less than two pounds. Smart phones, Tablet computers and wearable phones are some examples. Those devices support various mobile data services over a wide geographic area to enable exchange of messages, photos, voices, and e-mail, booking plane tickets, and playing web games while on the road. Since the turn of this century, a good number of research studies have been done to predict and explain user adoption of wireless mobile data services^[1]. With mobile phones more data-focused, more users are predicted to connect to the Internet with wireless devices than desktop PC's within five years^[2]. It is the high time to examine the perceptions, satisfaction and continuance intentions of mobile Internet data service users. Researchers have attempted to identify which antecedents are most critical to continued use and how continued use can change attitudes that have been found to be important predictors of adoption intention^[3]. Our preliminary literature review reveals very few user continuance studies in mobile context; and those published recently are all conducted in other countries^[4]. Very few continuance studies use Chinese mobile Internet users so far. Thus, there is some evident lack of understanding of user continuance intentions with mobile Internet services in China. which has the highest penetration rate worldwide for mobile devices; lack of understanding of the factors influencing their continuance intentions.

The aim of this research is two-folded: to reveal if actual usage experience impacts user perceptions toward mobile data services; to explore if the utilitarian and hedonic determinants are both important in the decision

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process on continuance usage of mobile data services. As a theory guide, a process model will be developed to study mobile Internet data service user continuance intentions. To achieve the research purpose, we first discuss the relevant literature and propose our research model with hypothesized relationships. We then propose our research methodology and data analysis plan to test our research model. After reporting the test results, the implications for research and practice are also discussed, prior to research limitations and future research directions.

2. THEORY BACKGROUND

Users' post-adoption behaviors have emerged as a key topic in IS research in recent years. Prior studies proposed several theoretical models, including the ECT (expectation-confirmation theory), TAM (technology acceptance model), UTAUT (unified theory of acceptance and use of technology), and the latest integration of UTAUT and ECT in the expanded two-stage model of IS continuance. These theories have one thing in common - to explain how the determinants are related to each other and causally influence IT usage. These models help to lay the nomological network of our research model. On the other hand, with recent breakthroughs in broadband infrastructure, interactive software and wireless mobile technologies, the scope and application of IS have expanded beyond its original utilitarian objective to also encompass non-utilitarian objectives. Understanding of the hedonic system acceptance also contributes to inclusion of important constructs in the current model.

2.1 ECT and TAM

Based on the ECT, Bhattacharjee proposed a two-stage model of IS continuance^[5], a process model, to study the change in cognitive beliefs (i.e. perceived usefulness and disconfirmation) and affects (i.e. satisfaction and attitude) during the course of IS usage. This two-stage model links usage-related beliefs and attitudes in the pre-usage stage with those in the usage stage and posits disconfirmation (equivalent to confirmation in essence) and satisfaction as emergent constructs affecting post-usage beliefs and attitudes that, in turn, influence continuance intention. This model makes it possible to capture how users' perceptions changed in the pre- and post-acceptance stages. However, perceived usefulness was incorporated as the only usage-related belief.

The TAM (Technology Acceptance Model) is one of the most influential and robust in explaining IT/IS adoption behavior. The key purpose of TAM was to provide a basis for discovering the impact of external variables on internal beliefs, attitudes, and intentions. TAM assumes that beliefs about usefulness and ease of use are always the primary determinants of information technologies adoption in organizations. Perceived usefulness is defined as the extent to which a person believes that using a system would enhance his or her job performance. TAM was originally created to examine IT/IS adoption in business organizations. This model, for its widely recognized value, has served as a theory root in other models including ECT and UTAUT. TAM is also frequently used for predicting general individual acceptance, especially in mobile data services.

2.2 Hedonic System Acceptance Model

Many new generations of systems have since emerged aimed at enhancing users' hedonic outcomes like entertainment rather than utilitarian outcomes such as productivity. In technology acceptance and use, the concept of hedonic value reflects users' potential entertainment and emotional worth. A satisfied consumption activity not only comes from an extrinsic reward of purchasing mobile data services but also gains a more intrinsic, personal, and emotional pleasure from accepting and using the mobile data services. Given motivational differences behind using different types of systems, prior models of utilitarian system usage provide a limited understanding of one's usage of hedonic systems. Bhattacharjee^[6] extended current models to tailor to the unique configuration of interactive hedonic systems.

Drawing on attitude theories in psychology literature and the work of vander Heijden^[7], this postulated model replaced perceived usefulness and perceived ease of use with perceived enjoyment and social image as the core cognitive drivers of usage, and further traced those beliefs back to the system attributes of technical

quality and interaction quality. In IS usage literature, this model is one of the earliest to focus on hedonic systems and is well validated in an empirical study of Chinese college students. In comparison with other studies incorporating perceived enjoyment, the model by Lin^[8] seems to have stronger theoretical power. Nevertheless, this model only aims at usage intention and may not be explanatory for continuance intention. Although UTAUT2 also studied hedonic motivation and used mobile Internet context, different research approach renders our study valuable.

2.3 Model and Hypotheses Development

To enhance our understanding of the post-adoption phenomenon related to mobile Internet data service usage, we have created a second-stage continuance model (see Figure 1). Our argument is that mobile data services are both utilitarian and hedonic. They are designed to fulfill users' hedonic needs such as entertainment, enjoyment and excitement, in addition to utilitarian needs to access information and to communicate with people anywhere the users go. Thus, mobility and enjoyment emerge as the two most important drivers for Internet mobile data service uses. To explore whether the expected enjoyment and mobility are confirmed or disconfirmed, is important to comprehend whether their hedonic and utilitarian needs are satisfied, to understand the formation of their post usage perceptions and attitude, which ultimately influence intentions to continue with such services. The rest of the section focuses on discussion of the constructs and hypothesized relationships in this model.

The value and usefulness of Internet services via mobile devices is mostly shown in mobility. Mobility, a most significant feature of wireless Internet services via mobile devices, is commonly defined as the degree of internet service availability on the move. Ghose and Han believe that mobility can be classified geographically into local, regional, national, and international mobility^[9]. The extent of geographical mobility of users is identified having a positive effect on their mobile Internet activities. The value of mobility – ubiquity and instant connectivity - is enabled by portability. The portability of the mobile device makes it possible for users to access internet services anyplace, anywhere, and anytime. With the availability of the Internet almost instantaneously at the users' fingertips via internet-enabled mobile device, users can better manage their daily lives.

TAM suggests that external variables may help shape user beliefs. Drawing on anecdotal evidence and on their own observations of the online video gaming industry, Lin proposed that perceived system attributes – technical quality and interaction quality - are the key influences on user perceptions. Technical quality refers to the technological sophistication and the availability of enhanced features that have greatly improved the technical quality of a given hedonic system. They argued that improved technological features and capabilities embedded in hedonic systems tend to enhance users' perceived enjoyment by providing them with greater opportunities for deriving enjoyment or excitement from the usage experience. The empirical data strongly supported this hypothesized effect of technical quality on perceived enjoyment. Mobility represents the technical quality and unique features of ubiquitous computing and mobile access supported by mobile networking, mobile applications and portability of mobile devices. By logic, utilitarian factor such as mobility is capable of reinforcing hedonic enjoyment, since mobility should provide more opportunities to mobile users to access hedonically designed data services.

Studies so far showed significant effects of instant connectivity and location awareness of the intention to adopt mobile Internet services. Studies also showed mobility comprising perceived ubiquity, instant connectivity and portability a significant determinant of mobile adoption intentions, and a determinant of continued use intentions via usefulness and ease of use. According to ECT and the expanded IS continuance model, during the course of actual use, users' pre-usage perceptions will undergo a disconfirmation process and, in turn, influence post-usage perceptions, satisfaction and subsequently, post-usage attitude and continuance intention. Disconfirmation refers to the extent to which subjects' pre-usage expectation of technology usage is contravened during actual usage experience. The dissonance between users' original expectations and observed

performance is captured in the disconfirmation construct. Disconfirmation may be positive or negative depending on whether the observed performance is above or below initial expectations. To keep in line with the findings in prior adoption studies and post adoption studies, we posit the following hypotheses:

H1a: Positive disconfirmation of perceived mobility has a positive influence on post-usage perceived mobility.

H1b: Positive disconfirmation of perceived mobility has a positive influence on satisfaction.

H1c: Post-usage perceived mobility has a positive influence on satisfaction.

H1d: Post-usage mobility has a positive influence on post-usage perceived enjoyment.

H1e: Post-usage perceived mobility has a positive influence on post-usage attitude.

H1f: Post-usage perceived mobility has a positive influence on continuance intention.

Perceived enjoyment is defined as the excitement and happiness derived from use of mobile data services. Therefore, it refers to the degree of hedonic pleasure that users have experienced in mobile data services in this paper. Enjoyment has been extensively researched in the domain of consumer behavior. Enjoyment as a specific hedonic experience refers to the sensations derived from the experience of using products - the fun and the resulting feeling of pleasure. Hedonic enjoyment is also intrinsic, in that it is an end in itself, and personally meaningful. Such intrinsic characteristic of hedonic enjoyment is positively related to an inner need to keep an individual at an optimal, preferred state of comfort, congruent with external stimulation. Csikszentmihalyi's Flow theory claims that enjoyment occurs when there is a harmonistic equilibrium between inner optimal stimulation drive and external stimulation. Thus, consumers may seek and enjoy the externally stimulated hedonic rewards in order to maintain their optimal stimulation level. If the experience of use confirms or positively disconfirms the desired pleasant feeling, enjoyment is reinforced; otherwise, such enjoyment is lowered or destroyed.

Hedonic enjoyment has been demonstrated to influence user attitudes towards utilitarian systems as an intrinsic motivator, even when perceived usefulness is an extrinsic motivator. Hedonic enjoyment exerts a stronger effect on user attitudes towards hedonic systems, because the expressed intent of such systems is to maximize users' enjoyment or entertainment from their use. Conversely, if hedonic systems are perceived as being low in perceived enjoyment, then users are less likely to develop positive attitudes towards their usage. Their empirical data strongly supported this hypothesis.

As a marketing strategy, mobile data service providers are increasingly developing mobile services that incorporate enjoyable and entertaining features in product designs, content and applications, and mobile phone games, thus, providing contextual space for personal hedonistic fun and gratification. An individual may enjoy hedonic rewards from using a mobile data service due to the availability of the desired stimuli that arouse the individual's attention to process such stimuli as online gaming, digital music, movie or video clip downloads, social networking experience, etc. Empirical studies have yielded some positive findings. Researchers who used TAM models recognize that both utilitarian (i.e., usefulness) and hedonic constructs (enjoyable) predict adoption intention or use of mobile device enabled data services regardless of research contexts or countries. In using mobile phones, the effect of perceived usefulness can be marginal when compared to enjoyment. Perceived enjoyment is recently identified the most important predictor of mobile Internet use.

Kim recently found enjoyment one of the four major factors that directly affect Korean mobile phone users' continued intention to use SMS^[10]. Kim and Shin were among the earliest to report that perceived enjoyment of mobile Internet service has positive effects on the intention to reuse the service^[11]. Venkatesh discovered that hedonic motivation is a more critical driver than performance expectancy for technology acceptance in the context of mobile Internet^[12]. Moreover, various individual characteristics, namely gender, age, and experience, jointly moderate the effect of hedonic motivation on behavioral intention. For example, the effect of hedonic

motivation on behavioral intention was stronger for younger men with less experience in their study. However, investigation of how perceived enjoyment works on continuance intention is just beginning. Assuming that the process model is correct, perceived enjoyment as a hedonic determinant should follow the same pattern. Thus, we postulate the following hypotheses:

H2a: Positive disconfirmation of perceived enjoyment has a positive influence on satisfaction.

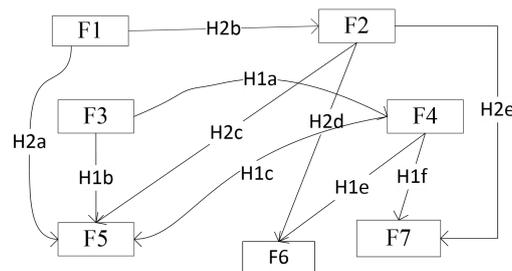
H2b: Positive disconfirmation of perceived enjoyment has a positive influence on post-usage perceived enjoyment.

H2c: Post-usage perceived enjoyment has a positive influence on satisfaction.

H2d: Post-usage perceived enjoyment has a positive influence on post-usage attitude.

H2e: Post-usage perceived enjoyment has a positive influence on continuance intention.

Satisfaction, as an affect construct, is regarded the result of expectation-confirmation and cognitive beliefs and a predictor of post adoption behavioral decisions in the IS Continuance Model. The two-stage model of belief and attitude posits satisfaction as an emergent construct affecting attitudes that in turn influence continuance intention. Supported by the empirical data from two longitudinal studies, Bhattacharjee and Premkumar later recommended that satisfaction be included in future process models of IT usage^[13]. The latest expanded IS continuance model contains the constructs of satisfaction, attitude and continuance intention to help achieve their research objective. For the same reason they also appear in our revised model, not as the focus of our study but as the indispensable parts of the entire model.



F1: Disconfirmation Enjoyment; F2: Post-usage Beliefs Enjoyment; F3: Disconfirmation Mobility; F4: Post-usage Beliefs Mobility; F5: Satisfaction; F6: Post-usage Attitude; F7: Continuance Intention.

Figure 1. A Revised Continuance Model

2.4 Methodology and Instrument Development

We used an online questionnaire survey to collect data on mobile users' perceptions and continuance intentions toward mobile data services. Almost all the items are adapted from those used in previous studies. Specifically, items on mobility were adapted from those developed by Baek, Park and Lee's study^[13]. Items on satisfaction, post-usage attitude and continuance intention were borrowed from Venkatesh^[14]. The adapted items were modified to fit the context of mobile data services that we examined. Seven-point Likert scales, with anchors ranging from strongly disagree to strongly agree, were used for most questions to ensure consistency with previous studies, except the items measuring disconfirmation of enjoyment and mobility. Those items and scales were modeled after relevant items by Wang and his team (2011). Ninety-one participants provided valid data with some very good comments on wording and format changes. The scale reliability tests revealed Cronbach alpha values of above 0.80 on all the model constructs, except that for disconfirmation of mobility (0.68). One of the items was found using a scale of reversed order. The problem was corrected in the last version.

3. SAMPLE ANALYSIS

3.1 Sample introduction

Our target population was the regular users of mobile data services in the United States. Our study was conducted in the context of consumer voluntary use of Internet data services via smart phones. As described by Wang and his team (2013), mobile digital services nowadays range from email exchanges, mobile search, digital

downloading, mobile games, mobile banking and other commercial services. Those services are accessed using high-resolution touchscreens and micro browsers carried on smartphones that display standard web pages as well as mobile-optimized sites. High-speed data access is provided by Wi-Fi and mobile broadband. Majority of our sample (80.3%) was between the ages of 18 and 45, within the largest mobile Internet user group of 19 to 37 as identified by Rainie (2013). The majority of the respondents had college or university education (55%), closely followed by those having graduate education (39%), which is also in line with Rainie's description of mobile Internet users – well educated adults. Our survey covered more of professionals (39%) and students (24%) with medium to high level of mobility. The most selected mobile data services are chat (85.6%), video (75%), maps (73.6%), music (66.3%), news (56%) and banking services (et. zhifubao)(56%).

Data were collected using an online survey system named SOJUMP(The Chinese name is wenjuanxing) from person in Shanghai, respectively and their social circles, from October to December 2013. Nine-hundred and sixty people participated in our survey. Among them, 783 people were smart phone users and 607 (77.5%) people provided valid data points. To test the research model, Statistical packages SPSS 15.0 and AMOS Graphics 7.0 were used to perform scale reliability tests, factor analyses, and structural equation modeling procedures.

3.2 Results

We first examined the data distribution and the general pattern of the data collected on the construct variables. All the univariate skew indexes and kurtosis values indicate a moderate non-symmetric leptokurtic distribution (with average skewness of -2 and kurtosis of 4). non-symmetric distributions with positive kurtosis usually does not result in a larger alpha value than normal distribution, but probably a much smaller average of alpha with a larger SE. Since our valid sample size is 607, such non-symmetric distribution situation should not be a major concern.

In order to ensure that the variables comprising each proposed research construct were internally consistent, reliability assessment was carried out using Cronbach's alpha. Internal consistency reliability coefficients for research constructs under study are well above the commonly accepted level of 0.70. Detailed alpha values are included in Table 1.

As postulated, the actual usage experience somehow adjusted the perceptions of the participants. Most users' perceptions were confirmed or positively disconfirmed after usage in our sample. Regarding mobility, 35% participants believed that mobile data services kept them in touch with the world anytime and anywhere they went as expected, and almost 50% believed that this aspect of mobility was more likely than expected. Thirty percent participants believed that their experience of using mobile data services was as unaffected as expected. A little over 36% believed that such experience was better than expected. 28.4 percent of the participants believed that the quality of mobile data services was unaffected as expected and almost 32% believed that the quality was better than expected. However, almost 40% thought that the quality was affected pending where they were. In terms of disconfirmation of enjoyment, over 90 percent of the participants found mobile data services enjoyable to use as it brings pleasure, fun, relaxation and excitement. Those who felt the level of enjoyment as expected made the largest group. A comparison of the means of the disconfirmation of mobility and enjoyment with those on the same post-usage perceptions, shows a clear pattern and consistent with the theoretical prediction that positive disconfirmation tends to cause an upward revision of IT users' beliefs.

We then conducted a principal components factor analysis adopting rotation method of varimax with Kaiser normalization. The seven factors extracted 81.94% of the variance. Even though a couple of items had relatively high cross-loadings, such cross-loadings were all smaller than the recommended value of 0.5. Furthermore, the reliability of the constructs did not improve when we dropped these items, so we decided to keep them in our data analysis.

Because the data of the constructs were self-reported and collected from a convenience sample, common

method variance (CMV) could exist. In order to test the significance of the CMV, we conducted Harman's one-factor test. The results indicate that the explained variance of a single factor is about 33%. Thus the CMV is not a problem in our study.

We used structural equation modeling (SEM) procedures to test our proposed model. Following the two-step analytical procedures, we first examined the measurement model and then the structural model. We first examined the validity for all the constructs in our model using the confirmatory factor analysis (CFA). The model included 22 variables describing seven latent constructs: Disconfirmation of mobility, disconfirmation of enjoyment, post-usage mobility, post-usage enjoyment, satisfaction, post-usage attitude, and continuance intention. We present the standardized factor loadings in Table 1. Majority of the standard loadings were over 0.70 and all were significant at the 0.001 level. The average variance extracted (AVE) for every construct was over 0.5 (Fornell & Larcker, 1981). Hence, the conditions for convergent validity were met.

Table 1. Confirmatory Factor Analysis Results

Scale Item	Item Mean	Item S.D.	Item Loading*	Cronbach Alpha
Discon-Mobility 1	4.79	1.511	0.667	0.90
Discon-Mobility 2	4.16	1.575	0.816	
Discon-Mobility 3	3.94	1.589	0.840	
Discon-Enjoy 1	4.74	1.369	0.773	0.75
Discon-Enjoy 2	4.80	1.321	0.855	
Discon-Enjoy 3	4.73	1.247	0.862	
Discon-Enjoy 4	4.77	1.342	0.857	
Mobility 1	5.81	1.305	0.701	0.94
Mobility 2	4.82	1.551	0.871	
Mobility 3	3.90	1.854	0.803	
Enjoyment 1	5.33	1.503	0.853	0.70
Enjoyment 2	5.24	1.579	0.901	
Enjoyment 3	5.08	1.552	0.890	
Enjoyment 4	5.16	1.448	0.884	
Satisfaction 1	5.64	1.391	0.860	0.95
Satisfaction 2	5.67	1.364	0.968	
Satisfaction 3	5.69	1.355	0.963	
Attitude 1	5.74	1.391	0.924	0.87
Attitude 2	5.69	1.364	0.949	
Attitude 3	5.79	1.403	0.915	
Con-Intention 1	6.07	1.667	0.936	0.90
Con-Intention 2	6.07	1.656	0.882	

*: All item loadings were significant at $p < 0.001$.

We also tested for the discriminant validity by comparing the square root of the AVE of each factor and the correlation coefficients with other factors, using Fornell and Larcker's criterion. The square root of the AVE was larger than the corresponding correlation coefficients between the factors, suggesting good discriminant validity (See Table 2). As the MSV values and the ASV values are less than the AVE, the constructs validity is also confirmed.

The goodness-of-fit of the overall confirmatory factor analysis (CFA) model was also examined. Since the data set contains missing data, only incremental fit indices are reported. The results showed that an adequate model fit have been achieved using the empirical data (See Table 3). We are ready to move to the next level – hypotheses testing.

Table 2. Reliability, Convergent and Discriminant Validity, and Correlation Matrix (N=607)

Factor	CR	AVE	MSV	ASV	DMO	DEN	MOB	ENJ	SAT	ATT	CIN
DMO	0.82	0.606	0.561	0.27	0.778						
DEN	0.9	0.701	0.561	0.239	0.734	0.837					
MOB	0.83	0.631	0.618	0.464	0.582	0.427	0.794				
ENJ	0.86	0.778	0.653	0.448	0.558	0.547	0.71	0.882			
SAT	0.95	0.867	0.714	0.482	0.464	0.384	0.68	0.781	0.931		
ATT	0.95	0.86	0.714	0.437	0.489	0.424	0.7	0.807	0.844	0.927	
CIN	0.92	0.827	0.394	0.246	0.346	0.288	0.513	0.554	0.63	0.616	0.909

Construct legend: DMO – Disconfirmation of Mobility, DEN – Disconfirmation of Enjoyment, MOB – Mobility, ENJ – Enjoyment, SAT – Satisfaction, ATT – Attitude, CIN – Continuance Intention.

Note: CR – Composite Reliability, AVE = Average Variance Extracted, MSV = Maximum Shared Squared Variance, ASV = Average Shared Squared Variance. Values indicating square roots of AVEs are listed diagonally in the matrix.

Table 3. Model Fit Indices of CFA and Recommended Values

Fit Index	X ² /df	RMSEA	NFI	RFI	IFI	TLI	CFI
Model value	2.331	0.048	0.962	0.948	0.978	0.969	0.978
Recommended value	< 3	< 0.08	> 0.90	> 0.90	> 0.90	> 0.90	> 0.90

Note: X²/df – Chi square to degree of freedom ratio; RMSEA - root mean square error of approximation; NFI – Normed fit index; RFI – relative fit index, IFI – incremental fit index; CFI - Tucker-Lewis Coefficient; CFI - comparative fit index.

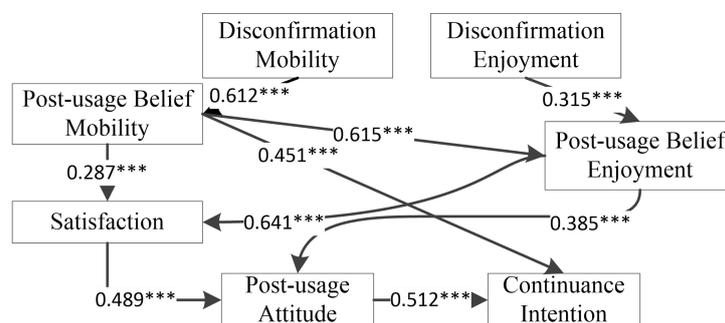
The Structural Model

To test our research model and hypothesized associations, we developed a path model accordingly. Specifically, we examined our proposed model fit and the hypothesized relationships by inspecting the significance and strength of hypothesized effects and comparing relative effect sizes for the dependent variables. Model indexes indicate a moderately acceptable fit (Table 4).

Table 4. Fit Indices of the Structural Model

Fit Index	X ² /df	RMSEA	NFI	RFI	IFI	TLI	CFI
Model value	2.512	0.041	0.972	0.937	0.965	0.974	0.903
Recommended value	< 3	<0.08	>0.90	>0.90	>0.90	>0.90	>0.90

Results of the analysis for the research model, including path coefficients, path significances, and variance explained (R² values) for each dependent variable, are shown in Figure 2. Regression weights of path analysis reveal that both disconfirmation of perceived mobility and disconfirmation of perceived enjoyment strongly influenced the post-usage mobility and post-usage enjoyment as hypothesized, but neither has any significant impact on satisfaction in our study. Thus, hypotheses H1a and H2a are supported, H1b and H2b, rejected. Most hypothesized relationships regarding post-usage mobility and post-usage enjoyment are supported by the empirical data, except those on continuance intention. Thus, H1f and H2e are rejected. In line with the previous findings in literature, satisfaction strongly influenced post-usage attitude which, in turn, significantly influenced continuance intention. In addition, satisfaction is found to have significant direct impact on continuance intention in our study. All the significant causal relationships supported by this study and the variances explained are displayed in Figure 2.



Path significances: ***p<0.001; **p<0.01; *p<0.05.

Parentheses indicate R² values for dependent variables.

Figure 2. Research Model Supported by Empirical Data

3.3 Discussion of Findings

The purpose of this paper was to propose and validate a model, to reveal if actual usage experience impacts user perceptions toward mobile data services; and to explore if the utilitarian and hedonic determinants are both

important in the decision process on continuance usage of mobile data services. The results from our study confirmed most of the hypothesized relationships in our research model -- eight were well supported by the empirical data, three were rejected (See Table 6). Our study reveals that both utilitarian (i.e., mobility) and hedonic constructs (enjoyment) help.

Table 6. Hypotheses Testing Results

Hypothesis	Results
H1a: Positive disconfirmation of perceived mobility has a positive influence on post-usage perceived mobility.	Supported.
H1b: Positive disconfirmation of perceived mobility has a positive influence on satisfaction.	Rejected.
H1c: Post-usage perceived mobility has a positive influence on satisfaction.	Supported.
H1d: Post-usage mobility has a positive influence on post-usage perceived enjoyment.	Supported.
H1e: Post-usage perceived mobility has a positive influence on post-usage attitude.	Supported.
H1f: Post-usage perceived mobility has a positive influence on continuance intention.	Supported.
H2a: Positive disconfirmation of perceived enjoyment has a positive influence on satisfaction.	Rejected.
H2b: Positive disconfirmation of perceived enjoyment has a positive influence on post-usage perceived enjoyment.	Supported.
H2c: Post-usage perceived enjoyment has a positive influence on satisfaction.	Supported.
H2d: Post-usage perceived enjoyment has a positive influence on post-usage attitude.	Supported.
H2e: Post-usage perceived enjoyment has a positive influence on continuance intention.	Rejected.

To predict continuance intention toward mobile data services via smart phones. The fact that perceived mobility, enjoyment and satisfaction constructs jointly explained almost 80 percent of the variance in post-usage attitude, at least, shows the power of our model in explaining attitude toward continuance intention. Disconfirmation of the expectations for mobility and enjoyment strongly and positively affected formation of the participants' post-usage perceptions in the same areas. Such influences were then mediated onto satisfaction and attitude via post-usage perceptions. Such findings seem to support the findings in Bhattacharjee's original IS Continuance Model and partially support Venkatesh and his colleagues' studies in Hong Kong. Our study confirms once more that post-usage attitude was explained jointly by satisfaction and post-usage beliefs. On the other hand, the strong positive influence from post-usage mobility on post-usage enjoyment as shown in our study adds another piece of positive evidence that the availability of enhanced technological features (such as mobile and ubiquitous computing) tend to enhance users' perceived enjoyment.

Unlike the findings from Venkatesh and colleagues' study, satisfaction in our project was explained mainly by the post-usage beliefs, instead of disconfirmation of usage-related beliefs. Disconfirmation of mobility and enjoyment mainly predicted post-usage beliefs. These results seemed to suggest that later beliefs are more critical in the formation of satisfaction. This finding is different from what's postulated in the original IT continuance model that users' extent of confirmation or disconfirmation is positively associated with their satisfaction with IS use. The weak direct effect of disconfirmation on satisfaction suggested that one's satisfaction with IT usage is determined more by one's perceptions based on actual experience, than by disconfirmation of expectations of the system.

Unlike the prior findings in the literature, users' continuance intention in our study was almost solely explained by post-usage attitude. Though the impact of post-usage mobility was significant, the magnitude was not very strong (Regression weight = .20, $p < .05$). And the variance in continuance intention explained by the model is not very high (.41). The fact that some recognized determinants such as perceived usefulness, ease of use, and social influence were not included in the model may serve as a reasonable explanation. It is possible that mobility as a more specific utilitarian perception may contribute to the general belief such as perceived usefulness more strongly, as compared to its effect on continuance intention.

4. CONCLUSIONS

The objective of this study was to validate a revised model of continuance, with a balanced attention to the utilitarian and hedonic determinants. The results demonstrated the roles of mobility and enjoyment beliefs in

predicting satisfaction and post-usage attitudes toward mobile data services in China. Overall, the findings of this work enrich our understanding of the phenomenon of post adoption. Since only 43% of the model power was jointly explained by satisfaction, attitude, mobility and enjoyment, there must be some hidden determinants or relationships important for continuing with mobile data services. Future research efforts should explore more in those areas. Future efforts should also be made in cross-culture, cross-country comparisons to increase our understanding of consumer continuation intention in mobile context on global scale.

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