

Integrating TTF and TAM perspectives to explain mobile knowledge work adoption

Yongqin Jin¹, Dongsheng Liu^{2, 3*}

¹ Zhejiang Digital Financial Management Center, HangZhou, China

² College of Computer Science & Information Engineering Zhejiang Gongshang University, Hangzhou, China

³ Centre for Studies of Modern Business Zhejiang Gongshang University, Hangzhou, China

Received 1 March 2014, www.tsi.lv

Abstract

It is an advanced research subject to information technology as well as a great influence to the development of mobile work that how mobile work service is adopted and how it provides effectiveness. This article refers to 1) Analyse principles of TAM & TTF models, clarify the precondition and strength & weakness of the model, and propose a new mobile work service model combined with TAM & TTF; 2) Practical study to the new model. The conclusion for this model is as follow: a) two basic characteristics of mobile work and support from up-level managers in a firm are the preconditions whether service will be adopted. b) task-technology matching is the significant factor on service acceptance. c) It could improve employees' efficiency within the practical use of task-technology matching mobile work service.

Keywords: mobile work, TTF, TAM, Embedded model

1 Introduction

Mobile knowledge workers or the mobile official workers, generally refer to people who spend more than 20% of the time away from office [1], such as sale staff, negotiators, after-service staff and the like. With the sharp development of Internet, Mobile Device (Cell phone, PDA, etc.) and the 3G communication network, the scale of mobile knowledge workers has been expanded continuously. Yankee Group's research results show that mobile knowledge workers amounted to 55 million in USA in 2005, close to 40% of the total workers, and it even rose to 65% the next year [2, 3]. Based on the mobile office service condition supported by each corporation to their staff and the pressure of the balance between work and life, experts from IDC predicate that in 2015, USA will become the world second mobile applications popular country with narrowly 5-percentage-point weakness to Japan, the leader of mobile knowledge workers in the world with 80% mobile knowledge works. Currently mobile knowledge works in Japan occupy 53 percentage points. Apparently, most workers are eager to apply mobile technology in working so that they can do things much more efficiently out of office [3]. China owns the largest mobile-phone users and Internet users [4, 5], due to 3G's spring up, Internet and mobile service tend to blend itself with the other. China's mobile knowledge work-groups will certainly expand rapidly with mobile commerce for its largest subscribers. However, according to past experience, it's acceptability problems that always

becomes barrier to new system and new technology's adoption, therefore, we should pay more attention to its acceptability. Acceptability makes great sense to both service providers and users. To providers, they can find out factors to user's acceptability, users' needs and expectation further so that they could offer services that users are willing to use; to users, they can realize their needs with awareness of providers' motivation so that they could choose the best service for themselves.

Compared to mobile commerce in China and abroad, Dehua He and Yaobin Lu concluded that whereas special conditions of China, acceptance and involved factors that effect users' adoption must have something different to others. To this point, after probing into the structure, complexity, frequency, urgency and mobility and so forth of mobile commerce, Chu and Huang set up Task-technology fit mobile commercial applications adopt model to instruct industry's development, it is a pity that they didn't explain relevant technology in detail, so the model always acts as a referenced framework for the latter period [6]. Chaohua Deng, et al came up with a model integrated with IDT/TTF, and studies enterprise mobile message service as an example, achieving good results to explain. Nevertheless, current mobile service has been far beyond message service, so the research is not universal. In addition, the personalization, location awareness, task complexity, time constraint, ubiquitous and so on of mobile knowledge worker make users' actions quite different from ordinal users' in mobile business cooperation [7, 8], therefore, acceptance of mobile knowledge worker problems cannot be simply

*Corresponding author e-mail: lds1118@zjgsu.edu.cn

equated with mobile commerce research. So far, little research has been done but for some papers presented by Zheng and Yuan. Zheng and Yuan proposed a concept framework of mobile knowledge worker, through the definition of the technical characteristics, they explained the nature of mobile, offering good basis for the research and development of mobile devices, but they did not go on further study on factors that lead users adopt mobile knowledge worker, lacking of convincingness in practice [9].

This paper hopes to explore the main theory framework of users' acceptance and method to study based on summary of domestic and internal related problems about the acceptability and adoption of mobile knowledge worker, to pave the way for deep researches. There're two main points in this paper: (1) based on actual System use and Task-technology fit, construct an integrated relation model which is able to explain and predicate mobile knowledge worker's mobile service adoption; (2) empirical research on the model, confirm validity of the model.

2 Literature review

On the base of TRA, Davis extends to a relationship among attitude, behaviour and intention, proposing the Technology Acceptance Model (TAM) to successfully explain the decisive factors about the personal computer which is widely accepted [10]. Because TAM has a solid theoretical foundation and can be effectively used to understand and explain the behaviour of IS, once made, having aroused extensive attention in theoretical circles. In the past 20 years, TAM model is widely used in more than 50 kinds of information technology adoption and use of research.

An Empirical Study of the above not only prove the versatility of the TAM model in the field of information technology, but also validate the model perceived usefulness and perceived ease of use of the powerful explanatory power. However, we also have noticed that as the TAM model empirical results suggest that the behavioural intention is proportional to actual usage and the unpredictable nature of actual usage behaviour, the follow-up studies based on TAM simply take the behavioural intention as an end-user adoption of standards, only a few studies discuss the correlation of the behavioural intention and the actual usage. Standish Group in 1998 on the implementation of IS's findings on the secondary permitted the final thesis of these scholars that the behavioural intention could not be representative of the actual usage. Only 26% of the MIS projects and less than 23.6% of the projects of large companies could be completed according to requirements, on time and on budget. Close to 1/3 (28%) of the projects were cancelled in the end [11]. The system acceptance and use of the end users is mandatory, for example, in the mobile office system applications, the end-users' usage behaviour is not only mandatory, but the tasks of each user are also tightly

integrated with the coupling [12, 13]. For these reasons, Rawstorne, etc. and Karahanna, etc. proposed to replace the accepted model of behavioural intentions by Symbolic Adoption [14, 15]. Symbolic acceptance refers to the individual's acceptance of new technologies in the ideological, while the actual acceptance refers to the actual use of technology. Based on this understanding, Fiona FuiHoon Nah, etc. figured that, for the application of complex systems, the concept of symbolic acceptance is more suited in acceptance model [16]. In this study, we also use the concept of symbolic acceptance. However, in the interpretation of its practical application, due to the TAM model's lack of concern about the organization's mission, it results in confusion between the perceived usefulness of information technology and the perceived usefulness of this information technology for specific tasks, there exist obvious structural defects in its theory.

To make up for deficiencies in information technology cognitive for of TAM, Goodhue and Thompson focused on information systems and the relationship among individual behaviours of users, and proposed the Task/Technology Fit Model [17]. In their theory, the function of information technology will be adopted only when it supports work well, on the contrary, the technology will not be accepted [17, 18]. Since the TTF has been raised, it has been quoted as many as more than 1000 times during the short period of 10 years of development history. The representative studies include: a model of Task/Technology Fit was used to assessing organizational decision-making system by Ziguers and Buckland, which further fully proved the availability of TTF at the organizational level [19]; Dishaw and Strong used TTF to explore the impact on the willingness of organizations using software maintenance tools, it not only conducted a study on the organizational level successfully, but also successfully described the TTF can be used to study the adoption of information systems [20]. There are still many research articles about TTF contributed to the development of TTF and enhanced the operationalization of TTF. Such as Benslimane, Plaisent and Bernard used TTF in the adoption studies of E-Commerce technology and so on [21].

In spite of the comprehensive application of the Task/Technology Fit Model within information technology research, Goodhue and Thompson mentioned the limitation exists when we focus on matching model, which lack of the notice that information technology application should be prior to the effect generated by it. In other word, the premise of the foundation of TTF is adoption of this technique. On the other side, although two factors, task demands of enterprise and information technology, have been involved in this model, the absention of a communication between technology fit and information technology adoption which leads the failure of internal mechanism reflection of individual behaviour exposed to technology fit. This is the bottleneck of the further development of TTF [22].

In the research, Dishaw and Strong found that, the model of Task/Technology Fit is counterbalanced by TAM model on the care to IT application, the key point of TAM. Therefore, in 1999 they supposed to combine TAM and TTF together to solve the challenge of technique adoption. The result demonstrated that TTF worked better than TAM when using in explain “job-related” task, in their research. It was found, that job and technique affect TTF, TTF make an impact on “usability of recognition” and “practical application”. However, no significant influence was shown in the preconceived effect of “usefulness of recognition”. Another conclusion was drawn from this research, which is the combination model of TTF and TAM can better explained than TTF or TAM respectively did.

Throughout the history of the development of TAM and TTF, scholars have applied TTF into the adoption studies of more than 50 emerging technology, and have got fruitful achievement. However, these studies either remain in the theory development phase, or lack of representation in the empirical research process, and the study for the mobile office is inadequate. Therefore, both in theory and in practice, it is very meaningful to apply TAM and TTF theory into more representative and universal adoption research of mobile office.

3 Hypothesis and model

3.1 CHARACTERISTICS OF MOBILE KNOWLEDGE WORKER

(1) *Task-carried context*

The user's need is a sequence over time and changes of events. When an event occurred, the needs will also change, and the change of events depends on a certain context. When some changes in certain context cause the failure in occurrence of the event, the subsequent series of events may be affected. Changes in the new context may also lead to a new task events, such as the event of heavy rain, traffic disruption, leading to the suppression of existing business itinerary, and create a new itinerary task. Thus, completion of the tasks requires some contexts; however, the contexts are also the conditions or triggers for completing a certain task. Extant research has found that situation relevance influence perceived usefulness significantly [23]. Based on the above analysis, the following hypotheses are proposed:

H1a: Task-carried context has a direct effect on perceived usefulness.

H1b: Task-carried context has a direct effect on perceived ease of use.

(2) *Resource Availability*

The effective personalized service to meet the user's needs which occurs in moving is the cornerstone of mobile knowledge worker. When the user is moving and constant interaction occurs with a fixed remote service, network performance will not very stable sometimes. The worst case is the network link interruption, so that the

running services will be also interrupted; In addition, users may sometimes need the appliance of services previously in their own devices, but the current system cannot configure this service. In the face of above problems, the design of mobile knowledge worker that whether the system allows the user to select the provision of remote services, allows the user's local machine to run off-line services, or supporting the users device to run a new service in a more powerful neighbour, or supporting the re-orientation of running service has a direct impact on users' perceived ease of use and perceived usefulness. Therefore, the following hypotheses are proposed:

H2a: The availability of resources has a direct effect on perceived usefulness.

H2b: The availability of resources has a direct effect on perceived ease of use.

3.2 PERCEIVED EASE OF USE

Perceived ease of use can be regarded as the extent of user understanding of technology. In general, the technology which is easier to understand and use has greater chance of being accepted. The technology that the more easy to be use is the more to be applied under the same conditions.

Szajna puts experience into the model and proves that Perceived ease of use influences behavioural intention no matter before or after people taking up the technology [24]. David Gefen made a gender-specific study about the influence of Perceived ease of use. The empirical results show that the impact to Behavioural Intention to Use is still there [25]. Furthermore, Venkatesh in 2003, and Davis, Morris co-operation of the article, is also demonstrated in detail the existence of such relationship [26]. Therefore, the study in the mobile office, the same applies to the following theorem: Users who have higher perceptual level of perceived ease of use about mobile office technology, namely, regard it requires less effort and resources, is easier to accept the technology. On the contrast, users who regard the technology require more effort will reduce the positive effect to Behavioural Intention to Use. The above theory put forward this hypothesis:

H3a: Perceived ease of use of mobile office service has positively correlated with the symbolic acceptance.

Perceived ease of use can also indirectly, by influencing the role of perceived usefulness on the symbolic acceptance. Szajna who made a more detailed exploration about the difference of perceived ease of use in two stages -before and after, found that, before use, because users have no enough experience to the new technology, perceived ease of use fails to impact perceived usefulness, after use, the experience of ease of use increased, in addition to direct effects on the symbolic acceptance. Perceived ease of use will indirectly, by influencing the role of perceived usefulness on the symbolic acceptance. The impact of perceived ease

of use on perceived usefulness, although unlike their direct effect on the symbolic acceptance, but it reflects the association between the two main factors, the situation also reflects the people's cognitive habits. It is also adopted by many scholars. The technology with stronger perceived ease of use will be regarded as more useful, however, the technology which is not ease to use will be limited to improve the performance no matter how many strong functions it carried and how much useful it will be to work. Based on the above analysis, put forward this hypothesis:

H3b: The perceived ease of use of mobile office service has positively correlated with the perceived usefulness.

3.3 PERCEIVED USEFULNESS

Perceived usefulness is on behalf of the information systems users' awareness of the use of that technology can bring to improve the job performance. As the main factor in the prototype of Technology Acceptance Model, perceived usefulness is considered strong predictor that impacts the symbolic acceptance. Davis proposed in the original model that perceived usefulness and perceived ease of use, two factors would have a direct impact on symbolic acceptance, also stressed the perceived usefulness is relatively stronger in terms of influencing factors, and it has a closer relationship with symbolic acceptance. Although, Taylor etc. focused on greater level comparison the difference between Technology Acceptance Model and TPB model, the result further verified the perceived usefulness' significant role in symbolic acceptance [27]. Szajna (1996), Patrick Chau (2001), Morris (2003) is all validated the relationship in the study. In a word, in the research field of Technology Acceptance Model, the perceived usefulness is widely recognized as the most basic factors. The users believe that the more useful a technology, the more inclined to use the technology. On the contrary, if users think the technology cannot significantly improve performance, usefulness is low, and then its use tendency will be significantly lower. On the above theories, this hypothesis is:

H4: Perceived usefulness of mobile knowledge worker operations and the symbolic acceptance are positive correlated.

3.4 SUBJECTIVE NORM

Subjective norm refers to the individual whether to take a specific act perceived social pressure. Azjen think, on the mandatory conditions, the behaviour affected by the pressure impact of the social environment will be greater than the individual's own attitude. Theory of Reasoned Action (TRA) pointed out that Subjective Norm is one of the determinants of Behavioural Intention. In 2000, by the study of Venkatesh and Davis, information system usage scenarios proposed to be divided into two types,

voluntary use and mandatory use. Research shows that when the user is in a voluntary state, the Subjective Norm have little effect on the user's acceptance, but when the user is in a mandatory state, the Subjective Norm have a significant effect on user's acceptance. In the application of mobile knowledge worker services, end user's usage behaviour is not only mandatory, but also the task of each user is also tightly integrated with the coupling. No matter how the end-user attitudes and acceptance of the system will be, they generally do not have the right to choose the system. Therefore, in this case, the subjective norm has a significant impact on the symbolic acceptance. The above theories, this hypothesis:

H5a: Subjective norm and symbolic acceptance are positive correlated.

In the relevant practice, more is the company's high-level decision-making, the involvement of middle-level leadership, which separate the user from the involvement in decision-making stimulate the staff's usefulness of perception due to the higher mandatory. In addition, as a result of high-level participation, in contrast, funding for the system implementation is in a certain degree of protection, thus it will facilitate the realization of a variety of technical training to enhance the user perceived ease of use. Accordingly, proposed this hypothesis:

H5b: Subjective norms and perceived usefulness are positive correlated.

H5c: Subjective norms and perceived ease of use are positive correlated.

3.5 SYMBOLIC ACCEPTANCE

Symbolic acceptance refers to the individual's acceptance of new technologies in the thought, but the actual acceptance refers to the actual use of technology. In the aforementioned article, we have already discussed in the mandatory conditions, symbolically accept the feasibility of alternatives to the use of intent, but also discussed the TAM does not apply to the reasons for the organizational level as well as TTF as a basic theory research is required to use this technology has been a prerequisite. Therefore, users for the use of the technology is uncertain and with the organizations to adopt the decision-making and change, this time it is only "forced to adopt", which TTF of the state already meet the prerequisite. Based on the above analysis, we put forward this hypothesis:

H6: Symbolic acceptance is a prerequisite for task-technology fit.

3.6 TASK-TECHNOLOGY FIT

People are always using an information technology in order to meet certain mission requirements. Weil and Olson found that research assignments matching the better performance is better. Goodhue thought only when the use of information technology to support the task, the employees could not show a good performance [28]. Accordingly, we assume that: H7a: Task-technology fit

forward for users of the perceived usefulness of mobile knowledge worker.

Because different development goals and tasks of the organization there is diversity, and therefore the demand for services on the mobile knowledge worker is not the same. The mobile knowledge worker services, only for a particular task to design in order to meet their needs, did not meet the needs of the organization's mission will reduce the organization to the service or understanding of the usefulness of technology will reduce the ease of use of the technology organization Awareness, when the information technology is looked as the research object, only when the information technology function can well support the organization's mission requirements, it will be adopted, otherwise, not be adopted [28]. Accordingly, we assume that:

H7b: Task-technology fit with the use of a positive correlation.

4 Scale and data collection

4.1 SCALE

The proposed hypothetical model in mobile knowledge work was tested empirically using a survey study. Questionnaires consist of two parts. The first part is demographical information include gender, age, education, etc. The second part is the variables in the model and eight key constructs was measured with multiple items. These items were either adopted or adapted from the extant literature. The scales of perceived usefulness, perceived ease of use and symbolic intention were adopted from TAM. The characteristics of mobile knowledge worker including task-carried context and availability were adopted from some mobile commerce and situation perception literatures [29-31]. The scales of task-technology fit were adapted from the research of Goodhue D.L. Each item was measured with the five-point Likert scale, ranging from 'strongly disagree' to 'strongly agree'.

4.2 SAMPLING

Empirical data for this study was collected via a survey of a retail group in Hangzhou, a southeastern city of China. We adopted stratified sampling in a certain proportion in order to get representative sample. Firstly, departments are divided into three categories on the principle of demand for mobile office service: high, medium and low. Then, respondents needed decrease proportionally. The objects of sampling are 15 branches from five cities. In order to improve the precision of data, the author increases the size of the sample and participation of managers promotes the number of finished questionnaires. In total, 300 questionnaires were returned, of which 63 questionnaires were discarded as they were only partly

completed. Therefore, 237 questionnaires were retained for analysis, giving an effective response rate of 79 percent. Demographically 57% of the respondents were male and 43% were female.

5 Data analysis

5.1 SACLE RELIABILITY AND VALIDITY

As showed in Table 1, the Cronbach's alpha for all constructs exceeded 0.6 and most is 0.8 around, indicating that the item reliability were judged to be adequate.

TABLE 1 Reliability test

Variables	Items	Mean	Standard deviation	Scale	Alpha
Task-driven situation	3	2.9660	0.367	1-5	0.6952
Availability of resources	3	3.5625	0.0132	1-5	0.8067
Perceived ease of use	4	3.3439	0.0184	1-5	0.8601
Perceived usefulness	4	3.3449	0.0279	1-5	0.8159
Subjective norm	3	3.6326	0.0213	1-5	0.8437
Symbolic adoption	3	3.5971	0.0179	1-5	0.8742
Task-technology fit	3	3.1449	0.0722	1-5	0.7839
Task-driven situation	3	3.5935	0.0075	1-5	0.7915

Table 2 shows KMO and Bartlett's Test. KMO is the coefficient of sampling adequacy. The bigger KMO is, the more common factors in variables are and the more appropriate factor analysis is. According to the viewpoints of Kaiser, it is inappropriate to conduct factor analysis if KMO < 0.5. KMO here is 0.815, shows significant. Data is suitable to factor analysis.

TABLE 2 KMO and Bartlett's Test

Kaiser. Meyer. Olkin Measure of Sampling Adequacy		.815
Bartlett's Test of Sphericity	Approx. Chi. Square df sig.	1380.347 476 .000

Validity includes convergent and discriminant validity. Convergent validity measures whether items can effectively reflect their corresponding factor, whereas discriminant validity measures whether two factors are statistically different. In these models, CR and Cronbach's alpha are bigger than 0.8, which shows good reliability [32]. The CRs and AVEs of all the constructs exceed the recommended threshold of 0.8 and 0.5 respectively, thereby indicating good internal consistency.

TABLE 3 Result of exploratory fact analysis

	Fact1	Fact2	Fact3	Fact4	Fact5	Fact6	Fact7	Fact8
C1	0.878	0.070	0.102	0.078	0.055	0.102	0.139	0.035
C2	0.878	-0.027	-0.011	0.175	0.149	0.073	0.130	0.081
C3	0.716	0.151	0.048	0.033	0.054	0.067	-0.008	0.212
R1	0.068	0.860	0.062	0.091	0.073	-0.046	-0.014	-0.034
R2	0.016	0.849	-0.086	0.067	0.048	0.074	0.137	0.011
R3	0.035	0.789	0.045	0.160	-0.032	-0.113	0.188	0.058
PU1	0.057	0.074	0.832	-0.029	0.098	0.112	0.021	0.191
PU2	0.118	-0.027	0.792	0.057	0.046	0.112	0.125	0.090
PU3	0.070	0.135	0.707	0.068	0.361	0.131	0.192	0.064
PU4	0.153	0.103	0.509	-0.051	0.203	-0.096	0.243	-0.007
PE1	0.004	0.024	0.127	0.818	0.154	-0.015	0.059	0.029
PE2	0.058	0.160	-0.080	0.787	0.052	0.124	0.097	0.033
PE3	0.129	0.062	0.026	0.766	0.100	-0.076	-0.022	0.011
PE4	0.122	0.196	-0.032	0.756	-0.074	-0.032	-0.041	0.039
SA1	0.029	0.079	0.132	0.054	0.856	0.049	0.185	0.127
SA2	0.110	0.060	0.201	0.045	0.823	0.207	-0.008	0.067
SA3	0.140	0.025	0.165	0.152	0.815	0.169	-0.060	0.061
TTF1	0.204	-0.018	0.094	0.092	0.197	0.729	0.153	0.045
TTF2	0.210	-0.063	0.017	-0.028	-0.113	0.720	-0.019	0.106
TTF3	0.022	-0.094	-0.021	0.014	0.221	0.716	0.195	0.032
SN1	0.158	0.067	0.132	0.089	0.130	0.126	0.800	0.178
SN2	0.242	0.124	0.330	0.044	0.011	0.160	0.660	0.134
SN3	0.353	0.049	0.156	-0.056	-0.015	0.113	0.631	0.309
A1	0.151	-0.005	0.199	0.066	0.042	0.080	0.315	0.763
A2	0.283	0.023	0.289	0.031	0.041	0.230	-0.045	0.690
A3	0.181	0.027	-0.045	0.031	0.151	0.002	0.203	0.665

To examine the discriminant validity, we compared the square root of AVE and factor correlation coefficients. As listed in Table 3, for each factor, the square root of AVE is significantly larger than its correlation coefficients with other factors. This indicates that each construct is more closely related to its own measures than to those of other constructs. Therefore, discriminant validity is supported.

5.2 STRUCTURED EQUATION MODELLING

This paper tests the validity of the model using structured equation modelling by combining measurement equation and structured equation.

We assessed the structural model to determine its explanatory power and the significance of the hypothesized paths. Figure 2 shows the results of the PLS analysis for the research model. Explained variance of perceived usefulness, Task-technology fit, Actual System use is 43%, 51% and 32% respectively.

The level of significance is 0.000 and most of path coefficients are significant in the level of $P < 0.001$ significance level, and all the hypotheses were supported. $X^2 / d.f.$ value is 2.87. According to suggestion of Joreskog and Sorbom, it is acceptable between 2 and 5. Other results are shown as Table4.

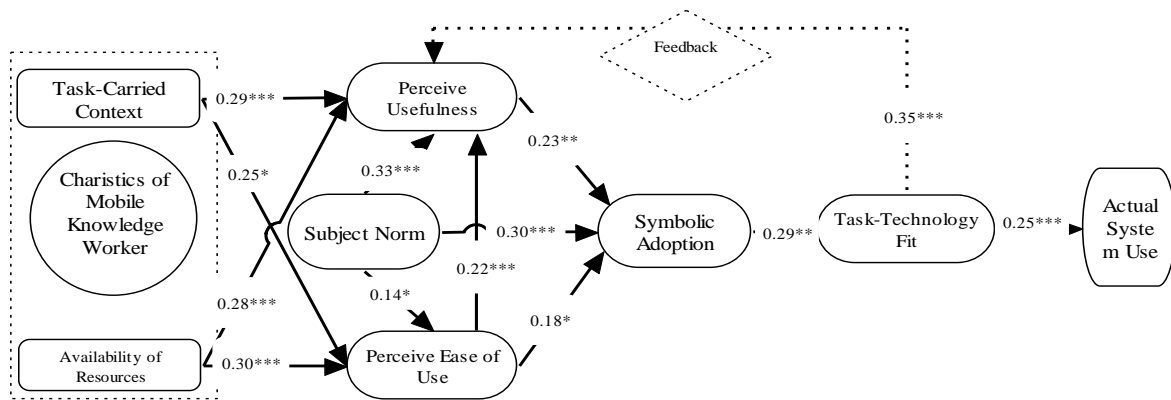


FIGURE 1 Hypothetical model

TABLE 4 Model evaluation overall fit measurement

Measure	Value
X ² /df.(2-5)	2.89
Root mean square residual(RMR)(<0.05)	0.03
Goodness of fit index(GFI)(>0.9)	0.91
Normed fit index(NFI)(>0.9)	0.95
Non-normed fit index(>0.9)	0.93
Comparative fit index(>0.9)	0.94
Root mean square error of approximation(RMSEA)(<0.05-0.08)	0.04

5.3 RESULT DISCUSSION

On the above data analysis, we can make the following discussion:

(1) The results show that, the features of mobile office have a significant positive effect on perceived ease of use and perceived usefulness. Therefore, a successful mobile office service system should not only provide the functions required, it should also be possible to provide maximum convenience for the customers, Such as the user interface vivid, friendly and intuitive, with easy to operate, easy maintenance and so on. In terms of the staff, useful perception is also not limited to the software interface, different software designs that affect the matching degree of the mission requirements and Information-technology will also influence it.

(2) In this study, users' perceived usefulness have a significant positive impact on perceived ease of use, while the impact on symbolic acceptance is not obvious. According to Davis and others' study, users' perceived ease of use will intensify its perceived usefulness of technology, the influence of perceived usefulness on people's attitude is relatively significant at the stage of the technology was just launched. With the technology develop after a period; its significance will be obviously decreased. However, this research shows that, usefulness in the initial stage of technology does not affect the technology adoption significantly; this may be the impact of subjective norm. Because Venkatesh and Davis think, on the mandatory condition, the users will break the perception of ease of use and usefulness and be forced to choose a new technology application. The conclusion on

Subjective Norm in this paper seems to support this view from the side: the positive influence of Subjective Norm on perceived ease of use and symbolic acceptance is enormous, but little on perceived usefulness.

(3) In this study, the matching relationship between symbolic acceptance and task-technology is proposed the first time, but it has also been supported by good data. Investigating its cause deeply, mainly because symbolic acceptance has been the substantial but not necessary conditions of tech-application when mandatory, and has meet the pre-condition of TTF research. The task-technology match makes a further promotion of users' ease of use perception, and is further upgraded to increase self-efficacy, thus has solved the issue how the technology affects the effectiveness.

6 Conclusion

Mobile knowledge worker is not a new concept, but because of the limitations of technology and a variety of factors, its practical application is still in its infancy. With the rapid development of mobile commerce, industry and researchers are interested in mobile office for its innovative technical characteristics, so to understand what factors affect the needs of the Enterprises of the adoption of mobile office technology and the nature of the adoption of mobile office brought with it the need. Based on TAM theory and TTF theory, this paper presents an embedded TAM/TTF model, empirical studies have shown that this model has a better interpretation of results.

Acknowledgments

This research is supported by National Natural Science Foundation of China (Grant No. 71071140 and 71301070005), National Natural Science Foundation of Zhejiang Province (Grand No.Y1090617), Key Innovation Team of Zhejiang Province (Grand No. 2010R50041) and Modern business centre of Zhejiang GongShang University.

References

- [1] Gartner 2002 *Trends and Developments in Wireless Data Applications* (TCMC-WW-FR-0116) Aug 13
- [2] Yankee Group 2005 Mobile workers number almost 50 million *Business Communications Review* 35(8) 8-12
- [3] The IDC study Worldwide Mobile Worker 2007-2011 Forecast and Analysis (IDC #209813) Business Wire, Jan 15, 2008
- [4] *The People's Republic of China Ministry of Information Industry Telecommunications industry in August 2008 Monthly Bulletin of Statistics* [EB/OL] [2008-09-13] <http://www.mii.gov.cn/col/col166/index.html>
- [5] China Internet Network Information Center, 24th China Internet Development Statistics Survey July, 2009
- [6] Chu Yan, Huang Lihua 2005 Mobile Business Applications Adoption Model Based on the Concepts of Task-Technology Fit *Proceedings of ICSSSM '05. IEEE Publishers* 2 13-15
- [7] Yao-bin LV, Chao-hua DENG, Zhi-yu CHEN 2008 *Mobile Commerce application mode and the adoption of research* Science Press 9
- [8] Chen Tianjiao, Xu Zhengchuan 2005 Mobile Commerce Adoption Research: A Literature Review and a Proposed Framework *Proc. of CoDE, July 29-30, Shanghai, China*
- [9] Zheng W, Yuan Y 2007 Identifying the differences between stationary office support and mobile work support: a conceptual framework *Int. J. Mobile Communications* 5(1) 107-22
- [10] Davis F D, Bagozzi R P, Warshaw P R 1989 User acceptance of computer technology: A comparison of two theoretical models *Management Science* 35(8) 982-1003
- [11] Legris Paul, Ingham John, Colletette Pierre 2003 Why do people use information technology? A critical review of the technology acceptance model *Information & Management* 40(3) 191-204
- [12] Brown S A, Massey A P, et al. 2002 Do I really have to? User acceptance of mandated technology *European Journal of Information Systems* 11(4) 283-95
- [13] Pozzebon M 2002 Combining a saturation approach with a behavioral-based model to investigate ERP usage *Americas Conference on Information Systems* Houston, TX
- [14] Rawstorne P, Jayasuriya R, Caputi P 1998 An integrative model of information systems use in mandatory environments *International Conference on Information Systems* Helsinki, Finland
- [15] Karahanna E 1999 Symbolic adoption of information technology *International Decision Science Institute* Athens, Greece
- [16] Fiona Fui-Hoon Nah, Xin Tan 2004 Soon Hing Teh An Empirical Investigation on End - Users' Acceptance of Enterprise Systems *Information Resources Management Journal* 17(3) 32-53
- [17] Goodhue D L, Thompson R L 1995 Task-technology Fit and Individual Performance *MIS Quarterly* 19(2) 213 - 36
- [18] Goodhue D L 1995 Understanding User Evaluations of Information Systems *Management Science* 41(12) 1827-44
- [19] Zigurs I, Buckland B K A 1998 Theory of Task/Technology Fit and Group Support Systems Effectiveness *MIS Quarterly* 22(3) 313-34
- [20] Dishaw M T, Strong D M 1998 Assessing software maintenance tool utilization using task-technology fit and fitness-for-use models *Journal of Software Maintenance: Research and Practice* 10(3) 151-79
- [21] Benslimane Y, Plaisent M, Bernard P 2003 Applying the Task-Technology Fit Model to WWW-based Procurement: Conceptualization and Measurement *IEEE Proceedings of the 36th Hawaii International Conference on System Sciences* (1) 6-9
- [22] Hao Tian, Dongsheng Liu, Jianming Lin, Yongqin Jin 2010 What drives mobile office service? A revised technology acceptance model based on the characteristics of Wireless mobile office technology *International Conference of Information Science and Management Engineering*
- [23] Dishaw M T, Strong D M 1999 Extending the Technology Acceptance Model with Task-technology Fit Constructs *Information & Management* 36(3) 9-21
- [24] Szajna, Bernadette Davis et al. 1996 Empirical evaluation of the revised technology acceptance model *Management Science* 42(1) 85-92
- [25] Gefen D, Straub D 1997 Gender differences in the perception and use of E-mail: An extension to the technology acceptance model *MIS Quarterly* 21(4) 389-400
- [26] Patrick Y K, Chau Paul, Jen-Hwa Hu 2001 Information Technology Acceptance by Individual Professionals: A Model Comparison Approach *Decision Sciences* 32(4) 699-719
- [27] Kamal A Munir 2003 Competitive dynamics in face of technological discontinuity: a framework for action *Journal of High Technology Management Research* 14(1) 93-109
- [28] Elena Karahanna, Detmar W Straub, Norman L 1999 Chervany. Information Technology Adoption Across Time: A Cross-Sectional Comparison of Pre-Adoption and Post-Adoption Beliefs *MIS Quarterly* 23(2) 183-213
- [29] Chiu D K W, Cheung S C, Kafeza E, Leung H F 2003 A Three-Tier View Methodology for adapting M-services *IEEE Transactions on Systems Man and Cybernetics Part A* 33(6) 725-41
- [30] Leung F S K, Cheung C M K Consumer Attitude toward Mobile Advertising *Proceedings of the Tenth Americas Conference on Information Systems, New York, August 2004*
- [31] Anderson J, Gerbing D W. 1988 Structure Equation Modelling in Practise: A Review and Recommended Two-step Approach *Psychological Bulletin* 103(3) 411-23

Authors



Yongqin Jin, born on June 6, 1968

Current position, grades: a senior engineer in Department of Finance of Zhejiang Province

Scientific interest: data mining, electronic commerce and wireless network.

Experience: Yongqin Jin received his master degree in 2002, Zhejiang University, China. He is currently a senior engineer in Department of Finance of Zhejiang Province. His research interests include data mining, electronic commerce and wireless network.



Dongsheng Liu

Current position, grades: an associate Professor in the school of information engineering at ZJGSU

Scientific interest: data mining, electronic commerce and wireless network

Experience: Dongsheng Liu received his PHD degree in the school of information engineering, in 2008, Zhejiang Gongshang University (ZJGSU), China. He is currently an associate Professor in the school of information engineering at ZJGSU. His research interests include data mining, electronic commerce and wireless network