An Empirical Analysis on Users' Usage Intention of Enterprise Smart Application Influencing Users' Job Performance

Veronica LEE[1]

Abstract

Enterprises face rapidly changing organizational environment and work culture, with consumption of information technology and Smart applications. As IT develops, IT paradigm has been changed in enterprises from location-centric and centralized Industrial Era to collaborative and peer-to-peer based Work 2.0. The latest key IT paradigm emerging after Work 2.0 is Smart Work. Despite enterprises' awareness of the positive correlation between business productivity and Smart Work usage, application of the Smart Work model in business environment is still in adoption staging as many organizational workers confront entry barriers such as but not limited to technical difficulties and security issues. Although many researches study on the correlation between environment's productivity and Smart Work model usage, there are relatively little analysis on the relationship between Smart Work services users' usage intention and their job performance. The research is about analysis about the relationship between Smart Work services users' usage intention and their job performance. Also it is studied on the possible positive influencing factors and entry barriers to the adoption of the Smart Work model in the organizational working environments. This empirical analysis covers Enterprise Smart Applications (ESA) among various Smart Work services, ranging from ESA services to pervasive cloud-based network services and shared drives, and examines a questionnaire survey to the ESA service users to collect their perceived usefulness for task purpose and perceived facilities of use for task purpose. Based on the questionnaire results, this study further analyses how their level of perception impacts to their usage intention of ESA and the key factors promoting individuals' efficient adoption of ESA services in organizational working environment, enhancing their actual job performances. While former studies on ESA technology acceptance model focused on users' involuntary technology acceptance and usage for PC-based Enterprise Application Program, this study investigates on users' voluntary technology acceptance, driven by personalization trend in ESA technology acceptance model based on ESA's mobility.

Keywords

Enterprise Smart Application, Task Mobility, Organization Agility, Expended TAM, Perceived Usefulness for Task Purpose

1. Introduction

Enterprises face rapidly changing organizational environment and work culture, with consumption of information technology and mobile applications. As IT develops, IT paradigm has been changed in enterprises from location-centric and centralized Industrial Era to collaborative and peer-to-peer based Work 2.0. The latest key IT paradigm emerging after Work 2.0 is Smart Work. Smart Work model is ubiquitous, service-centric cloud business model, based on enhanced network service enables mobility to workers even in distributed business settings.

[1] Bank of America Merrill Lynch, veronica.sm.lee@gmail.com,

Enterprises challenge to utilize Smart Work services, such as Enterprise Smart Applications (ESA) and cloud-based network services progressing ubiquitous working environment, allow the individual users to be independent from time and location enabled by Smart Work services' mobility, when users work to maximize enterprises' operational efficiency and business profits. Despite enterprises' awareness of the positive correlation between business productivity and Smart Work usage, application of the Smart Work model in business environment is still in adoption staging as many organizational workers confront entry barriers such as but not limited to technical difficulties and security issues. Although many researches study on the correlation between environment's productivity and Smart Work model usage, there are relatively little analysis on the relationship between Smart Work services users' usage intention and their job performance.

This empirical analysis covers Enterprise Smart Applications (ESA) among various Smart Work services, ranging from ESA services to pervasive cloud-based network services and shared drives, and examines a questionnaire survey to the ESA service users to collect their perceived usefulness for task purpose and perceived facilities of use for task purpose. Based on the questionnaire results, this study further analyses how their level of perception impacts to their usage intention of ESA and the key factors promoting individuals' efficient adoption of ESA services in organizational working environment, enhancing their actual job performances. While former studies on ESA technology acceptance model focused on users' involuntary technology acceptance and usage for PC-based Enterprise Application Program, this study investigates on users' voluntary technology acceptance, driven by personalization trend in ESA technology acceptance model based on ESA's mobility.

2. Theoretical background

In this section, we present an overview of the widely used theories that have been applied within the context of adoption and use of smart mobile technology in order to build a foundation for our research model and introduce the concepts of *Perceived Usefulness for Task Purpose and Perceived Facilities of Use for Task Purpose depends on personalization.*

2.1. Adoption and use of information technology

Technology acceptance model (TAM) [Davis, 1989] has been widely used to explain users' acceptance and use of mobile technology [Kim and Garrison, 2009, Kim et al., 2008, Negahban, 2012, Oi et al., 2009 and Son et al., 2012] and various mobile services including mobile internet [Chong et al., 2010, Chong et al., 2012,Kuo and Yen, 2009, Lee et al., 2012 and López-Nicolás et al., 2008], mobile games [Liu & Li, 2011], financial mobile services [Chen, 2008, Hsu et al., 2011, Jaradat and Twaissi, 2010, Kim et al., 2010, Liu et al., 2011,Luarn and Lin, 2005 and Teo et al., 2012], mobile health-care services [Lin, 2011], mobile TV [Jung, Perez-Mira, & Wiley-Patton, 2009], and mobile text alert systems [Lee, Chung, & Kim, 2013]. TAM posits that perceived usefulness (PU) and perceived Facilities of use (PEOU) are the determinants of behavioral intention to use (BI). Perceived usefulness is defined as "the degree to which a person believes that using a particular system would enhance his or her job performance" [Davis, 1989, p. 320]. Perceived Facilities of use is defined as "the degree to which a person believes that using a particular system would be free of effort" [Davis, 1989, p. 320]. Despite its widely use, TAM has some limitations in explaining acceptance and use of mobile technology [López-Nicolás et al., 2008]; which were later on addressed by other complementary theories.

The united theory of acceptance and use of technology (UTAUT) developed by Venkatesh, Morris, Davis, and Davis (2003) was used to evaluate the probability of success for new technology overviews. Moreover, in order to design interventions for users that may be less inclined to adopt and use new systems, it also supports them to understand the drivers of acceptance. UTAUT incorporated TAM, Theory of planned behavior (TPB), innovation

diffusion theory (IDT), motivation model, and social cognitive theory to develop a unified theory for technology acceptance. In addition, it tested independent variables, such as, performance expectancy, effort expectancy, social influence, facilitating conditions, to use of technology, controlling for gender, age, experience, and voluntariness of use. UTAUT also accounts for internal and external motivations. However, although the UTAUT provides a more detailed model for acceptance and use of technology, it was still has certain limitations. Therefore, Venkatesh, Thong, and Xu (2012) developed UTAUT2 and added hedonic motivation, price value, and habit to explain the model of acceptance and use of technology. UTAUT2 provides an integrated model of acceptance and use of technology, which improves TAM. UTAUT and UTAU2 provide more detailed conceptions about the relationships between external, internal motivations, and acceptance and use of mobile technology. These two models hold that social influence (symbolic value) influences perceived usefulness. They have been used in previous research to investigate acceptance of various mobile services.

2.2 Personalization.

By definition, personalization can mean all of the followings: in marketing, the formation of one-on-one customer relationships in order to win the loyalty of the customers; in cognitive science, the categorization of the characteristics of individual users to distinguish from other users; in social science, the techniques by which individuals can enhance their relationships with the social network; in information science, the provision of appropriate information to individuals; in computer science, the customer-focused media based on the actions of the users.

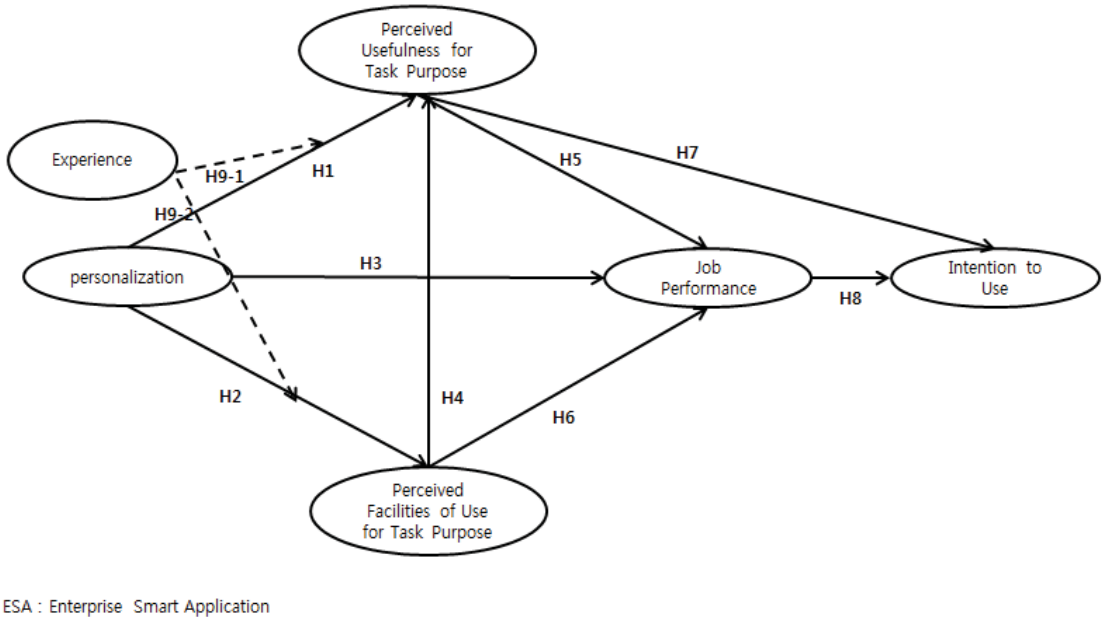
2.3. Functionality fit

Theory of task–technology fit (TTF)[Goodhue & Thompson, 1995] focuses on the fit between a task's/user's needs and a specific technology/functionality. TTF argues that users adopt a technology based on the fit between their task requirements and technology characteristics and how it can improve their performance [Gebauer and Ginsburg, 2009, Goodhue, 1995 and Goodhue and Thompson, 1995]. TTF has been widely used along with other technology adoption models such as TAM and UTAUT to explain user's adoption of a technology [Dishaw and Strong, 1999, Yen et al., 2010 and Zhou et al., 2010]. By combining attitudes toward use and the fit between user's needs and a technology's functionalities through TAM and TTF respectively, we can provide a better explanation for technology adoption [Dishaw & Strong, 1999]. User's characteristics can also affect the task technology fit [Lee et al., 2007]. Therefore, the adoption of a technology is the product of both task's and technology's characteristics which consequently influence user's performance and actual utilization [Zhou et al., 2010]. This implies that a rich task technology fit will encourage user's adoption of a technology while a poor task technology fit will negatively influence users' intention to adopt a technology [Lee et al., 2007; Lin and Huang, 2008 and Zhou et al., 2010].

3. Research model and hypotheses

3.1 Research Model

In this study, TTF is unified with the extended TAM so as to propose a new research model (Pic.1).



Pic 1. Research Variable Model

3.2 Research Hypotheses

The hypotheses are based on the model where TTF and TAM are unified, and make use of a variable of voluntary personalization. Individual tasks, experience, gender, age and work techniques are reflected in the research hypotheses listed below.

- H1 : Personalization has a positive impact towards perceived usefulness for task purpose.
  - H2 : Personalization has a positive impact towards perceived facilities for task purpose.
  - H3 : Personalization has a positive impact towards perceived job performance.
  - H4 : Perceived facilities for task purpose have a positive impact towards perceived usefulness for task purpose.
  - H5 : Perceived facilities for task purpose have a positive impact towards job performance.
  - H6 : Perceived usefulness for task purpose has a positive impact towards job performance.
  - H7 : Perceived usefulness for task purpose has a positive impact towards intention to use.
  - H8 : Job performance has a positive impact towards intention to use.
  - H9-1 : Those with experience will better improve perceived usefulness for task purpose.
  - H9-2 : Those with experience will better improve perceived facilities for task purpose.

4. Research Method

4.1 The operational definition of research variables

The measurement scales for each variable have been adopted from those of the preceding research that has been verified of its reliability and validity. The definition and related research of the variables are listed in Table 1.

A survey was conducted in order to verify the research model proposed by this study. Since the purpose of this study is to measure the intention to use ESA which has a direct impact on job performance, the participants of the survey are the office workers who actually use this in their daily job. To measure the impact ESA has on job performance as well as the intention to use it in different regions (Republic of Korea and the United States of America), an online survey was also conducted and the various participants of different job positions as well as genders were encouraged to participate in the survey through e-mails. ESA can be perceived differently by different people; hence, the application of ESA (e-mail, electronic approval system, linkage to work system, channel of free communication between employees) and the range of the system (linkage to ERP, CRM, and KMS) were exemplified before the survey so that the participants could similarly realize ESA.

4.2 Research method

Table1. Variable for personalization and Measurement Indicators

Variable for personalization	Concept	Previous Researches
personalization	Structural, instrumental, social, service, business and job position personalization	Fan and Deng [2008]
Perceived Usefulness for Task Purpose	The degree of confidence to believe that a personalized system to fit task purpose will improve both the use rate and the task efficiency	Davis[1989] Venkatesh and Davis[2000]
Perceived Facilities of Use for Task Purpose	The degree of confidence to believe that the use of a personalized system to fit task purpose will be convenient	Davis[1989] Venkatesh and Davis[2000]
Job Performance	Job performance dependent on a personalized system, usefulness and convenience	Taylor et al. [1995], S. Chung[2014]
Intention to Use	Intention to continuously use a personalized system	Bhattercher-jee [2001]
Experience	The length of the period of using a personalized system and an education on it, and the extent of experience on using similar applications	Thompson et al.[1994] Igbaria et al.

Additionally, smart devices have been exemplified and those who have experiences of using them for work have beenchosen to take part in the survey. The responses to the survey have been collected over the month of August, 2014. From a total of 427 participants, 257 participants were considered to be an adequate pool to be the subject of this study, and their responses have been analyzed.

The measuring variables are listed in table 1. Likert scale on a scale of 5 was utilized as the measurement method.

Table 2. A summary of the demographics of the survey participants

Items		Frequency(N=257)	Ratio(%)
Gender	Male/Female	187/70	72.8/27.2
Age	20/30/40/over 50	96/120/31/10	37.4/46.6/12.1/3.9
Level of education	High school graduate/Community college graduate/University graduate/Graduate school graduate	68/63 113/13	26.5/26.4/42/5.1
Number of service years	Less than 2 years/2~5 years/5~10 years/10~15 years/over 15 years (missing)	105/85/44/10 (missing 13)	40.9/33.1/21 (5)

5. Research Result

Table 3. Common method bias analysis

Construct	Item	Substantive Factor Loading	T value	complex reliablity	AVE
personalization	arch	0.829	22.2	0.926	0.758
	inst	0.903	72.8		
	soci	0.841	28.2		
	comm	0.906	72.1		
Perceived Facilities of Use for Task Purpose	peou1	0.843	41.1	0.942	0.730
	peou2	0.823	32.6		
	peou3	0.864	47.2		
	peou4	0.892	63.1		
	peou5	0.855	34.9		
	peou6	0.846	31.1		
Perceived Usefulness for Task Purpose	pu1	0.849	35.2	0.967	0.830
	pu2	0.921	65.0		
	pu3	0.924	79.5		
	pu4	0.924	85.6		
	pu5	0.920	68.9		
	pu6	0.926	97.0		
Job Performance	att1	0.904	66.9	0.941	0.801
	att2	0.909	59.5		
	att3	0.868	45.7		
	att4	0.897	50.9		
Intention to Use	bi1	0.922	72.2	0.970	0.865
	bi2	0.9534	100.7		
	bi3	0.9556	95.4		
	bi4	0.9366	56.1		
	bi5	0.8808	45.7		

The partial least square using SmarPLS[Ringle et al., 2005] was utilized to conduct the analysis on the research model. Prior to the analysis, SPSS version 20.0 was used and the normality of the data was investigated using Kolmogorov-Smimov and Shapiro Wilk test. The sample data of this research has been found not to follow the normal distribution. Due to the fact that this study is of a course model background and the data used for the analysis is of a non-normal distribution nature, the use of least square is appropriate for the analysis of structural equating model.

5.1 An analysis on the reliability and the validity of the research model variables

Table 4. Variables Correlation Coefficient

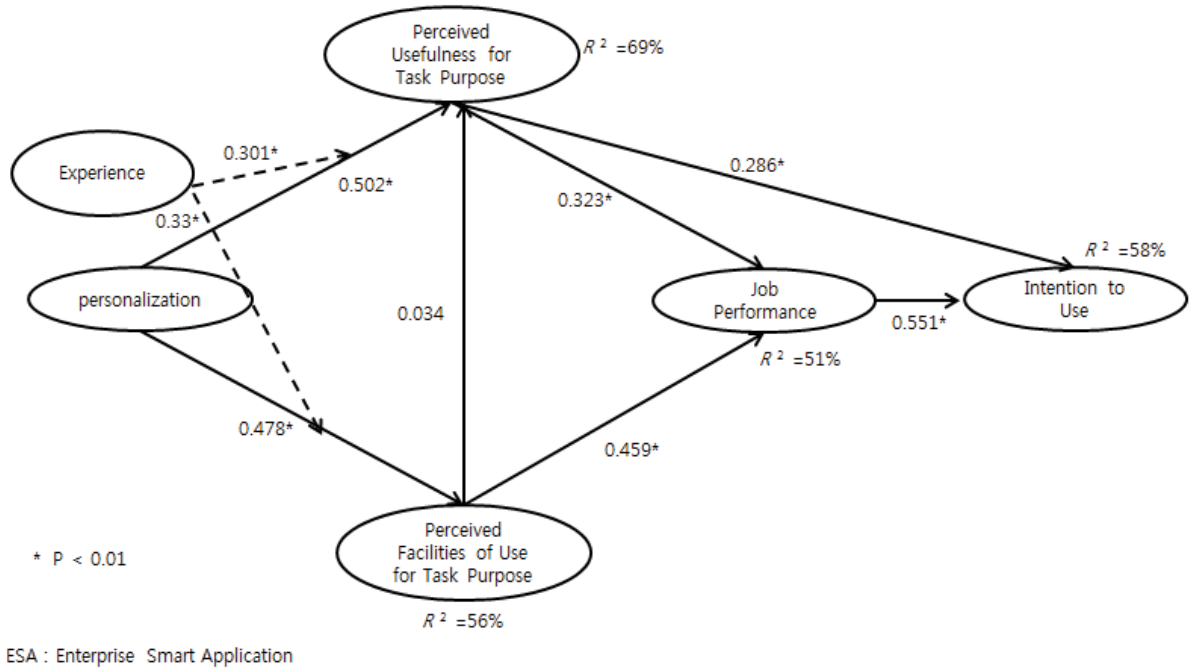
Variable	Personalization	facilities of use(easiness)	Usefulness	Job Performance	Intention to use	Experience
personalization	1					
Facilities	0.734	1				
Usefulness	0.812	0.639	1			
Job Performance	0.743	0.666	0.617	1		
Intention to use	0.751	0.682	0.626	0.727	1	
Experience	0.850	0.708	0.786	0.678	0.759	1

A confirmatory factor analysis was used to analyze the reliability and the validity of the research model. To achieve this, basic inner consistency of each of the variables was assessed using Cronbach's alpha. According to Nunally and Bernstein [1994], if the value of alpha is greater than or equal to 0.7, the variables are considered reliable. In this study, the alpha's are between 0.8 and 0.96 for the reliability of the variables, which proves its inner consistency. As for the convergence validity and the discriminant validity, the average variance extracted (to be called AVE here on) was utilized. It is known that an AVE value greater than 0.5 satisfies the convergence validity [Fornell and Larcher, 1981]. The discriminant validity is satisfied if the square root of AVE is greater than the correlation coefficient of other variables. Table 3 illustrates the factor discretion, reliability and AVE. Table 4. is the analysis of the correlation between the
concepts; it is evident that variables are highly correlated. This may lead to a prediction of multicollinearity in regression analysis. However, from an analysis through SPSS20.0, the standard VIF is below 10 and the tolerance limit is close to 1, which implies no multicollinearity in this case. In addition, the structural equating model can be treated under the causal relation model, and thereby improve statistical power when estimating the relationship between variables [Fornell et al., 1990].

Moreover, all AVE values are above 0.5, which satisfies the convergence validity. Furthermore, all correlation coefficients and the square root values of AVE are above 0.5, and the square root of AVE of each of the latent variables is greater than the coefficient variables, both of which satisfy the discriminant validity. Meanwhile, the R^2 values of all variables exceed 10%, which is the power proposed by Falk and Miller [1992]; hence, the validity of the research model can be verified.

5.2 The verification of the research hypotheses

The verification of the hypotheses was measured by the size of course variable, statistical significance and dispersion value of the final subordinate variables described by leading variables. The verification of the theoretical model predetermined for this study was done by the data analysis program of SmartPLS and is illustrated as Pic 2. The intention to use, which is the final subordinate variable, has a value of 58% for R^2. That of perceived usefulness is 69%, of perceived facilities 56%, and of job position 51%. As shown in the results of the verification of the research model, the path coefficient of SmartPLS reflects the standardized regression coefficient. The results of the verification of the research hypotheses show that H3 has a regression coefficient of 0.034(t=0.40, p>0.01) and is rejected. All other hypotheses are accepted and verified.



Pic 2. Research Result

6. Conclusion

In order to enhance the competitiveness of the rapidly changing business processes, ESA must effectively be utilized. To achieve this, the intention to use of each individual must also be improved. This study proves that this can be achieved when the individual's perceived facilities and usefulness related to work are provided. Instead of ESA customized for work, personalized ESA taking into account the user's work experience, gender and experience of using ESA must be developed. More accurate analysis can be expected when and if the elements affecting the personalized ESA are thoroughly researched.

Reference

Adams, D. A., Nelson, R. R., and Todd, P.A.(1992), Perceived Usefulness, Ease of Use,and Usage of Information Technology : A Replication", MIS Quarterly, Vol. 16, No.2, 227-247.

Chen, L. Da. (2008). A model of consumer acceptance of mobile payment. International Journal of Mobile Communications, 6(1), 32

Chong, A. Y.-L., Darmawan, N., Ooi, K.-B., & Lin, B. (2010). Adoption of 3G services among Malaysian consumers: An empirical analysis. International Journal of Mobile Communications, 8(2), 129–149

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS Quarterly, 319–340.

Dishaw, M. T., & Strong, D. M. (1999). Extending the technology acceptance model with task–technology fit constructs. Information & Management, 36(1), 9–21

Dishaw, M. T., & Strong, D. M. (1999). Extending the technology acceptance model with task–technology fit constructs. Information & Management, 36(1), 9–21.

Gebauer, J., & Ginsburg, M. (2009). Exploring the black box of task–technology fit. Communications of the ACM, 52(1), 130–135.

Goodhue, D. L. (1995). Understanding user evaluations of information systems.Management Science, 41(12), 1827–1844.

Goodhue, D. L., & Thompson, R. L. (1995). Task–technology fit and individual performance. MIS Quarterly, 19(2), 213–236

Igbaria, M., & Tan, M. (1997). The consequences of information technology acceptance on subsequent individual performance. Information & Management, 32(3), 11–121

Jung, Y., Perez-Mira, B., & Wiley-Patton, S. (2009). Consumer adoption of mobile TV: Examining psychological flow and media content. Computers in Human Behavior, 25(1), 123–129

Jung, Y., Perez-Mira, B., & Wiley-Patton, S. (2009). Consumer adoption of mobile TV: Examining psychological flow and media content. Computers in Human Behavior, 25(1), 123–129

Kuo, Y.-F., & Yen, S.-N. (2009). Towards an understanding of the behavioral intention to use 3G mobile value-added services. Computers in Human Behavior, 25(1), 103–110

Lee, K. S., Lee, H. S., & Kim, S. Y. (2007). Factors influencing the adoption behavior of mobile banking. Journal of Internet Banking and Commerce, 12(2), 1–9.

Lin, T. C., & Huang, C. C. (2008). Understanding knowledge management system usage antecedents: An integration of social cognitive theory and task technology fit. Information & Management, 45(6), 410–417.

Liu, Yong, & Li, H. (2011). Exploring the impact of use context on mobile hedonic services adoption: An empirical study on mobile gaming in China. Computers in Human Behavior, 27(2), 890–898.

Liu, Yuan, Wang, S., & Wang, X. (2011). A usability-centred perspective on intention to use mobile payment. International Journal of Mobile Communications, 9(6), 541–562.

López-Nicolás, C., Molina-Castillo, F. J., & Bouwman, H. (2008). An assessment of advanced mobile services acceptance: Contributions from TAM and diffusion theory models. Information & Management, 45(6), 359–364

Negahban, A. (2012). Factors affecting individual's intention to purchase smartphones from technology adoption and technology dependence perspectives. Americas Conference on Information Systems. Seattle, WA.

Oi, J., Li, L., Li, Y., & Shu, H. (2009). An extension of technology acceptance model: Analysis of the adoption of mobile data services in China. Systems Research & Behavioral Science, 26(3), 391–407

Szajna, B., (1996) Empricial evaluation of the revised Technology cceptance Model, agement Science, Vol. 42, No. 1, 561-570.

Teo, A., Tan, G. W., Cheah, C., Ooi, K., & Yew, K. (2012). Can the demographic and subjective norms influence the adoption of mobile banking? International Journal of Mobile Communications, 10(6), 578–597.

Yen, D. C., Wu, C.-S., Cheng, F.-F., & Huang, Y.-W. (2010). Determinants of users' intention to adopt wireless technology: An empirical study by integrating TTF with TAM. Computers in Human Behavior, 26(5), 906–915

Zhou, T., Lu, Y., & Wang, B. (2010). Integrating TTF and UTAUT to explain mobile banking user adoption. Computers in Human Behavior, 26(4), 760–767.