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CREATING SUCCESSFUL TRAVEL GUIDE SERVICES INNOVATION THROUGH WIRELESS TECHNOLOGY ADOPTION: THE TAM PERSPECTIVE

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ABSTRACT

This paper's research starts at consumer experience, examining 'relative advantage' effects of new technologies and business models. By stimulating experienced economy development as well as construct novel business models for the recreational industry, this paper's research targeted the Taipei populace in the survey process, being as the city is the global leader in WLAN accessibility, possessing the largest scope of WI-FI network. Extensive analysis of the 240 returned surveys affirms the level of acceptance to mobile guide services. Surveyed Taipei citizens showed positive response to vital factors such as operating convenience, usage security, and cost. Evaluation of such feedback indicates directions for business models, guiding to increase service usage willingness. Research pinpointed significant attributes, such as saved-costs in information storage, improved time/location convenience, secure transmission mechanisms, and reliable privacy-rights policies.

Keywords: Mobile Travel Guide Services, Mobile Commerce, M-tourism Service, Technology Acceptance Model (TAM), Wireless Technology Adoption.

INTRODUCTION

In recent years, as 'wireless' and 'mobile' connectivity to the internet advanced and matured, the public's usage and demand of internet access through these means has gradually surfaced. On the global scale, many countries are adapting to the new trend, developing the infrastructure to support a 'wireless city'. Envisioned with the concepts of 'any location', 'any time', and 'any device' in wireless internet access, hopes are to promote public WLAN usage while stimulate the communications industry as well as related research and development.

The factors which influence the populace's use of such services have long been subject to scrutiny and discussion. Most notably, in an era of mobile devices and new added-value services, service planners and providers must seek to understand consumer acceptance levels, for future strategic business purposes. This paper will focus on three points as research targets: (1) Factors influencing the user's choice of innovative mobile guide services. (2) Fusion of TAM (Technology Acceptance Model) and DOI (Diffusion of Innovation) to construct a compiled and acceptable mobile guide service model. (3) Derive from research results and provide mobile servicers with business suggestions, for effective strategy planning in the mobile guide industry.

LITERATURE REVIEW

In 1989, Fred Davis posited TAM (Technology Acceptance Model) as a means to explain computer usage behavior, track external variables, and relationships between the user's recognition, attitude, and willingness, so as to explain and predict the user's operating behavior in IT (Information Technology). TAM explains that a person's 'actual use' is affected by 'intent to use', while 'intent to use' is influenced by 'behavior', 'perceived usefulness', and 'perceived ease of use'. 'Perceived usefulness' and 'perceived ease of use' directly influence attitude in operation of technology and eventual actual use. Also, the model's 'external variables' are TAM's internal beliefs, identifying attitude, intent, and differences in individuals and environments as the connecting bridges in controlling behavior; these act as potential indirect factors in actual technology usage. Research results from latter scholars indicate that by de-emphasizing 'behavior', it is easier to understand the relationships between 'perceived usefulness', 'perceived ease of use', and 'intent to use'. As such, this research disregards 'behavior' so as to maintain TAM simplicity.

Within the multitude of innovative application and diffusion models, Rogers' theory of DOI (Diffusion of Innovation) in 1983 is most commonly used to explain and predict IT usage and diffusion behavior. Rogers asserts the existence of recognition differences in innovative features (relative advantage, complexity, compatibility, usability, evaluation), from the individual's as well as other decision makers' standpoints. Such will consequently affect acceptance rate of such innovations, and so these innovative features can be used to explain the process in user acceptance and decision to employ new technologies. Principally, 'relative advantage' purports to increased advantage levels when comparing new technology to its predecessor. This includes economic efficiency (cost reduction), image (evaluation and acceptance from the social view), advancements, convenience, and satisfaction. These are pivotal issues which influence acceptance of fresh innovations. Essentially, increased recognition in relative advantage will lead to faster adaptation and diffusion. Currently, Taiwan's mobile guide services are in the initial stages of development, thus the majority of consumers have not used these on a practical level. Therefore, this research will focus on and utilize the concept of relative advantage, with the intent to surface benefits from innovative technologies to potential users. As mentioned, the more recognition in relative advantage, the quicker adaptation and diffusion will occur.

From the consumers' standpoint, cost is an important facet in the intent to use of mobile devices/services. [11, 12, 13, 24] In addition, multiple research results have indicated that cost relatively affects diffusion and use of innovative technologies. [17, 22] In an age of advanced information, where 'time equals money', 'convenience' is what consumers desire. [15] This is another key factor of influence to be considered, as 'convenience' is a main factor when using mobile devices and related

services to connect to the Internet. Many scholars also believe that as service providers implement improved convenience, services will attract increased attention from consumers, thereby generating sales and usage willingness. [6, 20] Additionally, Coursaris, Hassanein, and Head [5] identified security, reliability, cost, usability content and personal privacy issues as another main concern of mobile consumers, and when unaddressed will decrease usage of mobile services. Scholars have stressed that when it comes to transmitting important data through the wireless medium, establishing feelings of confidence and security to the consumer are a must, so as to maintain and increase willingness of such services. [9, 10] As such, security regarding information exchange, confidentiality of data, user authentication, etc. must be seriously monitored, as the issue has heavy influence on consumers' willingness in usage of mobile business services.

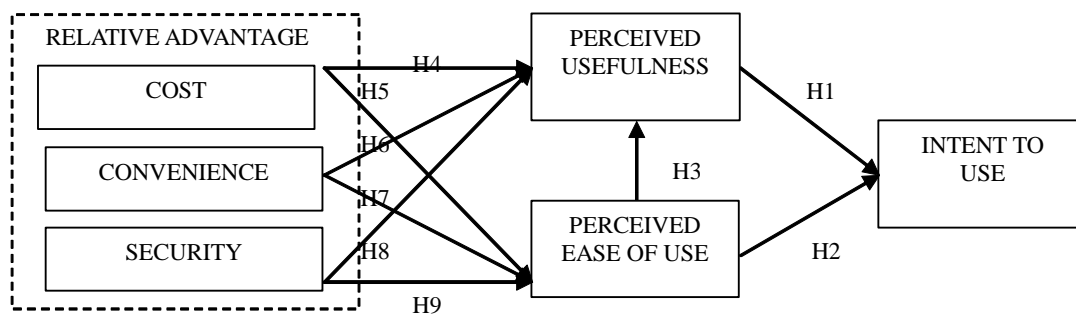
RESEARCH FRAMEWORK AND METHODOLOGY

Research Framework

This research framework (Figures 1) uses TAM as the theoretical basis and combines the DOI concept of relative advantage, adding external factors of cost, convenience, and security to construct research hypothesis. This paper proposes:

- H1: 'Perceived Usefulness' has a positive effect on 'Intent to use'.
H2: 'Perceived ease of use' has a positive effect on 'Intent to use'.
H3: 'Perceived ease of use' has a positive effect on 'Perceived Usefulness'.
H4: 'Cost' has a positive effect on 'Perceived Usefulness'.
H5: 'Cost' has a positive effect on 'Perceived ease of use'.
H6: 'Convenience' has a positive effect on 'Perceived Usefulness'.
H7: 'Convenience' has a positive effect on 'Perceived ease of use'.
H8: 'Security' has a positive effect on 'Perceived Usefulness'.
H9: 'Security' has a positive effect on 'Perceived ease of use'.

Figures 1. Research Framework



Questionnaire Dynamics

At the initial phase of survey development, this research first focused on definitions in operating variables, referencing to reliable and effective charts to correct for validity in regards to mobile guide services. Additionally, this research used the Likert five-point scale and results were evaluated by associated scholars and experts to correct for minor errors. A pretest was also initiated before the actual survey, so as to identify and rectify unclear issues and other problems. This research structure also possesses a Cronbach's alpha value of over 0.734, thereby attesting to its validity and credibility.

Table 1. Operating Definition in Research Framework

Frame	Operating Definition	Reference	Topic Item
Perceived Usefulness	User acknowledgement level: Mobile guide services are useful in improving recreational quality and enhance efficiency.	[6]	1~4
Perceived Ease of Use	User acknowledgement level: Ease to learn and use such mobile guide services.	[6],[20]	5~8
Cost	User acknowledgement level: Understanding of costs related with mobile guide services, such as equipment, storage, and transfer costs.	[23]	9~12
Convenience	User acknowledgement level: Mobile guide services can save time and energy.	[4],[13]	13~18
Security	User acknowledgement level: Mobile guide services provide mechanisms for secure data transmission, preventing personal and private data.	[15],[8]	19~20
Intent to Use	User's willingness/likelihood to use services in the future	[3],[7]	21~23

As the intent of this research is to understand the consumers' intention of using mobile guide services, survey mainly targeted those in Taiwan with mobile phones and handheld devices equipped with internet connectivity. Due to limitations in manpower, 500 surveys were sent at random through postal service. After eliminating incomplete and invalid questionnaires, 240 returned

surveys were deemed valid for analysis, resulting in a return ratio of 48%.

STATISTICAL ANALYSIS

Descriptive Statistical Analysis

Within the returned samples, male respondents had a 57.9% weighting, while respondents under the age of 35 had an 81.7% weighting. 97% of respondents had an educational level of a college degree or above, in which 63% were students and employees in the telecommunication and finance industry. Overall, 76.7% of respondents indicated that frequency of service usage was 'on average no more than once a month'. Such result shows that the profile for mobile business providers remains in a small niche: the upper-tier of society, and has not reached the general populace as of yet. Evidently, such newly innovative services and related business models have much room to expand upon.

Correlation Analysis

Variables with high relativity degrees imply significantly similar concepts, and when factored into regression analysis could adversely affect analysis and explanation of such variables. As such, this research adopts the Pearson method of analysis to test variable correlation levels. If correlation values deviate over the acceptable level, collinearity problems will occur during regression analysis. As indicated in (Table 2), all correlation values are under 0.587, with variables showing positive correlation, thereby verifying the absence of collinearity problems.

Table 2. Pearson Correlation Analysis

		Perceived Usefulness	Perceived Ease of Use	Cost	Convenience	Security	Intent to use
PU	Pearson Correlation Sig. (2-tailed)	1					
P EOU	Pearson Correlation Sig. (2-tailed)	.346** .000	1				
C S	Pearson Correlation Sig. (2-tailed)	.450** .000	.563** .000	1			
C O N	Pearson Correlation Sig. (2-tailed)	.538** .000	.321** .000	.512** .000	1		
S E	Pearson Correlation Sig. (2-tailed)	.383** .000	.200** .002	.273** .000	.509** .000	1	
B I	Pearson Correlation Sig. (2-tailed)	.587** .000	.345** .000	.523** .000	.522** .000	.479** .000	1

** : Correlation is significant at the 0.01 level (2-tailed)

Regression Analysis and Test of Hypothesis

Each variable's regression analysis and test of hypothesis are organized in (Table 3). Three regression models are applied; Durbin-Watson analysis shows low correlation levels, while VIF and CI analysis also show low tolerance levels. Such empirical result assures our research methodology, confidently eliminates possibilities of collinearity problems, and affirms consistency to the proposed hypotheses.

Table 3. Basic Hypothesis Test

Dependent Variable	Independent Variable	Normality	Durbin-Watson Test	Tolerance	VIF	CI
PU	PEOU	Consistent	2.122	0.677	1.477	1.478
	CS			0.561	1.782	1.541
	CON			0.607	1.646	2.055
	SE			0.748	1.336	2.474
PEOU	CS	Consistent	1.859	0.765	1.308	1.358
	CON			0.693	1.443	1.685
	SE			0.769	1.301	1.905
BI	PU	Consistent	2.018	0.948	1.055	1.109
	PEOU			0.948	1.055	1.262

Note : Perceived Usefulness (PU) , Perceived Ease of Use (PEOU) , Cost (CS) , Convenience (CON) , Security (SE) , Intent to Use (BI), Data Source: Internal Research

Path Analysis

This research utilizes SPSS 13.0 to estimate path values, and through t-value validation verifies the significance of paths. Results from path analysis are shown in Table 4. Research results found no significant influence between ‘Security’ and ‘Perceived Ease of Use’, indicating no cause-and-effect relationship between the two. As such, H9 (Hypothesis 9) is disregarded, while the remaining hypotheses stand.

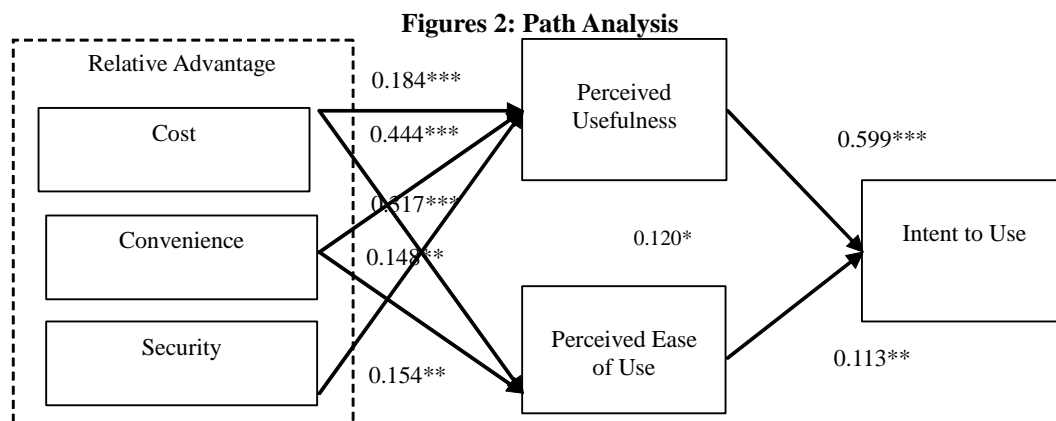
Table 4. Path Analysis Results

Dependent Variable	Independent Variable	Standard-ized β	A-R2	Residual Value	T	Sig.	Hypot-hesis	Sustai-nable
Perceived Usefulness	Perceived Ease of Use	0.120	0.357	0.802	1.874	0.062*	H3	Yes
	Cost	0.184			2.605	0.010**	H4	Yes
	Convenience	0.317			4.683	0.000***	H6	Yes
	Security	0.154			2.525	0.012**	H8	Yes
Perceived Ease of Use	Cost	0.444	0.251	0.865	6.885	0.000***	H5	Yes
	Convenience	0.148			2.180	0.030**	H7	Yes
	Security	-0.076			-1.185	0.237	H9	No
Intent to Use	Perceived Usefulness	0.599	0.397	0.776	11.588	0.000***	H1	Yes
	Perceived Ease of Use	0.113			2.186	0.030**	H2	Yes

Note : *=p value<0.1; **=p value<0.05; ***=p value<0.01

In regards to ‘intent to use’ of mobile guide services, path analysis (Figures 2) reveal ten significant paths.

- (1) Perceived Usefulness -> Intent to use mobile guide services.
- (2) Perceived Ease of Use -> Intent to use mobile guide services.
- (3) Perceived Ease of Use -> Perceived Usefulness -> Intent to use mobile guide services.
- (4) Cost -> Perceived Usefulness -> Intent to use mobile guide services.
- (5) Cost -> Perceived Ease of Use -> Intent to use mobile guide services.
- (6) Cost -> Perceived Ease of Use -> Perceived Usefulness -> Intent to use mobile guide services.
- (7) Convenience -> Perceived Usefulness -> Intent to use mobile guide services.
- (8) Convenience -> Perceived Ease of Use -> Intent to use mobile guide services.
- (9) Convenience -> Perceived Ease of Use -> Perceived Usefulness -> Intent to use mobile guide services.
- (10) Security -> Perceived Usefulness -> Intent to use mobile guide services; this result comes from indirect influence.



RESEARCH RESULTS

First, analysis results indicate the impact on the user’s ‘Intent to Use’ in the mobile guide service, identifying factors of ‘Perceived Usefulness’ and ‘Perceived Ease of Use’. In the area of ‘Perceived Usefulness’, this research proposes for service providers to offer products of practical cost to the user, thereby taking the first step in promoting the practicality and

saved-costs in its basic services. As for 'Perceived Ease of Use', industry players should scrutinize difficulty issues in learning and using offered services, so as to assure consumers' concern over the operation of such new services. Regression analysis show that 'Perceived Usefulness' is of higher consideration than 'Perceived Ease of Use', clearly indicating respondents are more focused on the usefulness of services, and satisfaction of service usefulness directly guides to 'Intent to Use'. In other words, users should first be shown the increased benefits of newly innovative services, become comfortable with the learning process, and by adapting to usage with ease will ultimately increase intent to use.

As for external variables, 'cost', 'convenience', and 'security' all affect 'Perceived Usefulness'. If the user feels mobile guide services will save costs in information storage, provide convenience in time/location, and possesses the security mechanisms for transmission and privacy, such will influence the user's 'Perceived Usefulness' of mobile guide services and steer towards 'Intent to Use'. Regarding 'Perceived Usefulness', we classify 'Convenience', 'Cost', and 'Security' respectively, in order of importance. Respondents showed high interest in 'Convenience' with influence to 'Perceived Usefulness', and as such providers should stress the simplicity in operating its services, as to enhance 'Intent to Use'. Looking at current hardware, usage of mobile phones to check data (through added-value services) is common, but the devices are not at the convenience level for further internet purposes (small keypads, complicated functionality). With the introduction of the i-Phone and current devices including the Blackberry, palmtops, and advanced PDAs, providers should maintain focus on such hardware as well as future smart phones (with enhanced capabilities in voice recognition/command, portable keypads, user-friendly interface, etc.), to improve what consumers seek: the vital issue of convenience, and employ imminent opportunities as the abovementioned devices grow in visibility and popularity while decreasing in cost.

The user's considerations of 'cost' and 'convenience' have an effect on 'Perceived Ease of Use' as well, and if providers improve the consumers' concerns regarding cost and convenience, 'Perceived Ease of Use' will improve and positively affect 'Intent to Use'. In terms of importance regarding 'Perceived Ease of Use', 'Cost' is of high importance, followed by 'Convenience'. Such indicates the consumer's focus on cost concerns, and providers should concentrate on related cost-saving issues, such as information storage and information exchange costs. Again, the purpose of this is to increase acceptability and 'Intent to Use'. Additionally, path analysis shows that 'Perceived Usefulness' is influenced by 'Perceived Ease of Use', indicative of the difficulty in learning and operating innovative services as a major factor in user acceptance. As such, providers must strengthen operating ease of its services while providing added assistance in familiarizing the user with such innovations, thus lowering operating barriers. The main focus should be on reducing complexity in the user's service access. Otherwise, consumers will discourage from unfamiliar and complicated procedures.

DISCUSSION AND IMPLICATIONS

Research results show a limited number of users in mobile guide services, indicating a vast range of potential for development in the market. With this in mind, primary objective should focus on the attraction of potential customers. The creation of appropriate business strategies and tactics, increasing visibility, and service promotion through appealing devices are the first tasks to consider in enhancing user recognition and acceptance. Based on the DOI viewpoint, as new innovations and products enter the initial stage of development in the market, 'innovators', defined as educated in areas of expertise as well as venturesome, are usually the first to purchase. 'Early adopters' are the second to enter, as they are educated and more importantly, possess significant social standing and popularity. Thereby, 'early adopters' are likely to grasp the future importance of innovations. The ensuring entry of the 'early majority' will indicate the spark of market growth. This third wave of adopters tends to deliberate issues of product benefit and relative cost, and upon reaching a satisfactory level will enter the market. In accordance with the abovementioned and based on this paper's research results, future business strategy should expand upon the 'relative advantage' aspect of mobile guide services. By introducing new innovations to the public on a large scale, consumers will be able to easily recognize points of convenience, derived added-value, and eventually come to accept such innovative products and services. At the same time, other issues must be taken into consideration to complement the innovations, such as new devices or application of telematics and multimedia required in mobile service. Under a reasonable level of cost control, such tactics will effectively stimulate mobile business services, notably in the area of convenience.

Since these innovative services are in the initial stage, users are obviously limited. As such, providers need to create methods for consumers to use and experience trial services, free of charge. The low cost associated with this is insignificant compared to the potential impact on consumer willingness of usage. Such market strategy inherently has positive effects in the diffusion of innovative services and acts as a guide for potential users on all levels to enter the market as consumers.

Considering the number of mobile added-value service providers in Taiwan, market competition is considerably intense. Needless to say, development of competitive advantages is a must. Customer satisfaction is a key factor; the provider must be able to offer diversified services while reduce consumer costs. To effectively develop mobile added-value services and applications, strategic scope should encompass mobile service in areas such as food, clothing, housing, and travel. New innovations from the mobile guide industry in these sectors could be a breakthrough point, distinguishing the provider from its competitors. On the other hand, service providers need to develop new business models, and through WLAN applications provide the consumer with affordable and enriched mobile services. One feature would be a mobile guide service; the user is able to make travel activities without an actual guide, operating language support, GPS (Global Positioning System), and LBS (Location-based Service) features with ease and comfort. In addition, at any given time and/or location, the user is able to view multimedia and use functions such as travel guides and video/image applications. The quality and flawless integration of such

services will help to attain the ultimate goal: complete customer satisfaction. Collateral benefits incurred from this include increased consumer spending at the local area of travel, improved mobility for travelers, broader visibility of such new innovations, and create new needs for additional enhanced services. The results from such a win-win setting between providers and consumers will lead to more business opportunities, multi-faceted growth, and further innovations. Ultimately, the vision of an accomplished networked system benefiting society in boundless aspects can be truly realized.

In addition, in order to make conditions for consumers in respect to Perceived Usefulness, the tasks address the issues of cost, convenience, and security, subject to not only m-tourism service providers but business users as well. However, the m-reachability and location communication applications are indispensable to m-tourism services, and the innovative business model, sufficient public information, trust-worthy demonstration and interesting content from the business users are critical factors for the successful adoption of m-tourism. The pervasion of the novel m-tourism service needs to promote collaborations and interdependence among business users, m-tourism service providers and telecommunication operators. In order to provide consumers with affordable and numerous m-tourism content and services, successful partnership among parties, innovative services provision and business model redesign will influence the perceived usefulness of consumers and reinforce the intention of use as well as the acceptance.

CONCLUSION

This paper identifies the significant factors of consumers' cognition on acceptance of mobile guide service and manifests user adoption to novel technology and services that rely on the relative advantages of the m-tourism service. These findings will contribute to the facilitation of the factors that will influence the user's choice of innovative mobile m-tourism services. Furthermore, this paper provides suggestions of different mobile business strategies for effective strategic planning and action in the mobile guiding industry based on research findings. Therefore, these suggestions will be beneficial to the penetration of 3G and/or WiMAX in the future, accelerating the development of wireless technology application, and spawning the success of m-service modes. However, given that the initial stage of m-tourism services provision in Taiwan, and that users are few and opportunities to experience the service are scarce, the use of these results in regards to this research has taken into consideration this limitation in this study.

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REFERENCES

- [1] 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, pp. 227-247.
- [2] Agarwal, R. and Prasad, J. (1998) "A conceptual and operational definition of personal innovativeness in the domain of information technology", *Information Systems Research*, Vol. 9, No. 2, pp. 204-301.
- [3] Ajzen, I. and Fishbein, M. (1980) *Understanding attitudes & predicting social behavior*, Prentice-Hall, NJ.
- [4] Burke Raymond R. (1997) "Do You See What I See? The Future of Virtual Shopping", *Journal of the Academy of Marketing Science*, Vol. 5, pp. 352-360.
- [5] Coursaris, C., Hassanein, K. and Head, M. (2004) "Understanding the mobile consumer", in Nan Si Shi (ed.), *Wireless Communications and Mobile Commerce*, IIRM Press, Hershey, PA, pp.132-165.
- [6] Brown, L.G., (1989) "The strategic and tactical implications of convenience in consumer product marketing", *The Journal of Consumer Marketing*, Vol. 6, No. 3, pp. 13-19.
- [7] Davis, F.D. (1989) "Perceived usefulness, perceived ease of use, and user acceptance of information technology", *MIS Quarterly*, Vol. 13, No. 3, pp. 318-340.
- [8] Davis, F.D., Bagozzi, R.P. and Warshaw, P.R. (1989) "User acceptance of computer technology: a comparison of two theoretical models", *Management Science*, Vol. 35, No. 8, pp. 982-1003.
- [9] Fang, X., Chan, S., Brzezinski, J. and Xu, S. (2006) "Moderating effects of task type on wireless technology acceptance", *Journal of Management Information Systems*, Vol. 22, No. 3, pp. 123-157.
- [10] Frolick, M.N. and Chen, L.D. (2004) "Assessing M-commerce opportunities", *Information Systems Management*, Vol. 21, No. 2, pp. 53-61.
- [11] Hung, S.Y., Ku, C.Y., and Chang, C.M. (2003) "Critical Factors of WAP services adoption: an empirical study", *Electronic Commerce Research and Applications*, Vol. 2, No. 1, pp. 46-60.
- [12] Liang, T.P. and Huang, J.S. (1998) "An empirical study on consumer acceptance of products in electronic markets: a transaction cost model", *Decision support systems*, Vol. 24, No. 1, pp. 29-43.
- [13] Luarn, P., and Lin, H.H. (2005) "Toward an understanding of the behavioral intention to use mobile banking", *Computers in Human Behavior*, Vol. 21, No. 6, pp. 873-891.
- [14] Mathwick, Malhotra, and Rigdon (2001) "Experiential value: conceptualization, measurement and application in the catalog and Internet shopping environment", *Journal of Retailing*, Vol. 77, pp. 39-59.
- [15] Mort, G.S., and Drennan, J. (2002) "Mobile digital technology: emerging issues for marketing", *Journal of Database Marketing & Customer Strategy Management*, Vol. 10, No. 1, pp. 9-23.

- [16] Pavlou, P.A. (2003) "Consumer acceptance of electronic commerce - integrating trust and risk, with the technology acceptance model", *International Journal of Electronic Commerce*, Vol. 7, No. 3, pp. 69-103.
- [17] Premkumar, G., Ramamurthy, G.K. and Nilakanta, S. (1994) "Implementation of electronic data interchange: an innovation diffusion perspective", *Journal of Management Information System*, Vol. 11, No. 2, pp. 157-186.
- [18] Rogers, E.M. (2003) *Diffusion of innovations (5th ed.)*, The Free Press, NY.
- [19] Straub, D., Limayem, M. and Karahanna-Evaristo, E. (1995) "Measuring system usage: implications for IS theory testing", *Management Science*, Vol. 41, No. 8, pp. 1328-1342.
- [20] Tang, J. and Veijalainen, J. (2001) "Using agents to improve security and convenience in mobile e-commerce", *Proceedings of the 34th HICSS*.
- [21] Taylor, S. and Todd, P. (1995) "Decomposition and Crossover Effects in the Theory of Planned Behavior: a Study of Consumer Adoption Intentions", *International Journal of Research in Marketing*, Vol. 12, pp. 137-155.
- [22] Tornatzky, L.G. and Klein, K.J. (1982) "Innovation characteristics and innovation adoption implementation: a meta-analysis of findings", *IEEE Transactions on Engineering Management*, Vol. 29, pp. 28-45.
- [23] Venkatesh, V. and Davis, F.D. (2000) "A theoretical extension of the technology acceptance model: four longitudinal field studies", *Management Science*, Vol. 46, No. 2, pp. 186-205.
- [24] Wu, J.H. and Wang, S.C. (2005) "What drives mobile commerce? An empirical evaluation of the revised technology acceptance model", *Information & Management*, Vol. 42, No. 5, pp. 719-729.