

Investigating the Users' Behavioral Intention Toward Using 3G Mobile VAS in Macedonia

Arsim Fidani

Natural Science and Math Faculty, Department of Informatics, State University of Tetova, 1200 Tetovo, Macedonia

arsim.fidani@unite.edu.mk

Abstract. The launch of 3G networks in Macedonia opened up a new revenue opportunity in mobile broadband offerings. Although the importance of 3G mobile value-added services (MVAS), it is surprising that Macedonia's society show little interest towards them. Based on extant literature, the factors which are observed as more influential in the 3G MVAS adoption, together with the factors derived from previously proposed models on technology adoption, such as technology acceptance model and Innovation Diffusion Theory (TAM, IDT), constitute the research model of this study. The results reveal that the total effect of the factors that influence the behavioral intention of Macedonian consumers to use 3G MVAS is ranked as follows: Compatibility, Perceived Enjoyment, Self – Efficacy, Perceived Cost, Perceived Ease of Use, Perceived Usefulness and Attitude. The results give telecom service providers in Macedonia an insight on the behavioral intention criteria of their customers, suggesting them to focus on educating their consumers about the offered services, foster the expansion of their 3G network coverage and also introduce new versatile and entertaining services which are easy to use in order to attract new customers and also to retain the old ones.

Keywords: 3G, mobile, value-added, services, Macedonia

1 Introduction

Mobile phones have become ubiquitous in our society and an integral part of people's everyday life. The advances in the mobile technology have increased the number of people using mobile services [1]. The growing number of mobile users and the decline in conventional voice service tariffs have gradually reduced average revenue per user (ARPU), thus decreasing the service providers profits [2]. In a 3G market, the major revenue source for telecommunications operators will originate from packet-based value-added services provided by independent value-added service providers, rather than traditional voice telephony [3]. Thus, imposing the mobile service providers to introduce various 3G MVAS, such as Mp3 ring tone download service, MMS, video news, photo download, mobile Java-based games, mobile TV etc. which have become a new opportunity for providers to create revenue. However, ARPU

could be substantially elevated when consumers are willing to use 3G MVAS and utilize them [2].

The annual report of AEC [4] in Macedonia reveals that the number of the mobile users is increasing, and until the 4th quarter of 2009 the penetration of mobile subscribers is 95%. Regarding the 3G services, in spite of the considerable investments by the service providers to take advantage offered by the new technologies, people in Macedonia show little interest towards adopting these services. According to the agency for electronic communication in Macedonia the penetration of the 3G users is about 15 % [4]. Given the difference between rapid growth rates in the adoption of mobile technologies and associated services in some countries and the relatively slow growth rates in others, such as Macedonia, is the first reason that makes the research worthwhile to conduct. The second reason is that 3G mobile services adoption and acceptance have been at the forefront of several research projects in different geographical and social context [5-7], however the use and the adoption intentions of the Macedonian users have not been investigated.

To take an extended perspective for examining consumers behavior [8], this study integrates Technology Acceptance Model [9], IDT [8, 10] and other significant external factors.

The results from this study give service providers in Macedonia an insight on the behavioral intention criteria of their customers regarding the offered 3G services, how to tailor particular services, understand the customers' needs and measures that telecom service providers should take to handle the adoption of these services.

2 Theoretical Framework and Hypothesis Development

Since the mid-1970s several theoretical models have been proposed [11] which are developed gradually and built up on each other [12].

TAM is intended to provide a conceptual model featuring a theoretic foundation and parsimony, to explain and predict the behavioral intention and practical behaviors of information technology (IT) users, based on the acceptance and use of IT [8]. On the other hand, IDT is also a theory associated with research on technology innovation, which tries to explain the innovation decision process, the determining factors of rate of adoption, and different categories of adopters. In addition to these theoretical models, there are some studies that have focused specifically on the users' intention to adopt mobile services [2, 7, 13-20].

To enhance the prediction of consumers' behavioral intention towards using of 3G MVAS in Macedonia while maintaining the model simplicity at the same time, four constructs from TAM and IDT are selected, such as: perceived ease of use, perceived usefulness, attitude and compatibility. Five other constructs, which are not found in traditional TAM and IDT model and are selected based on an extant literature review, are the following: self-efficacy, service availability, perceived cost, perceived enjoyment, and social influence. (see Fig.1)

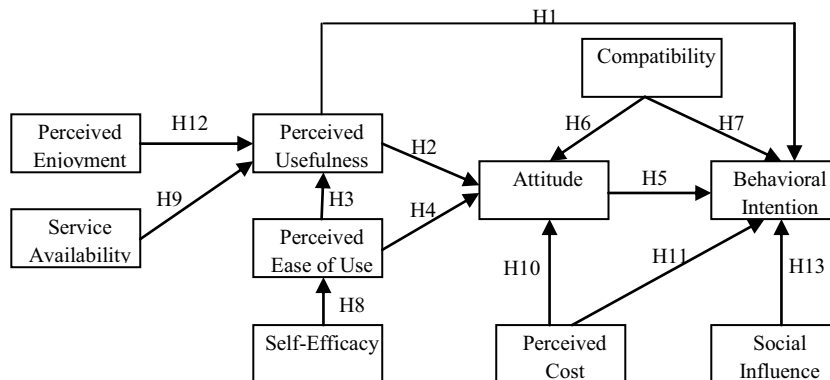


Fig. 1. Research framework

2.1 Perceived Usefulness, Perceived Ease of Use, Attitude and Compatibility

Perceived usefulness, first explored in the TAM, is found to be a crucial construct affecting the acceptance of the innovations. From the review of the existing literature is derived that perceived usefulness has a significant positive effect on user attitude [2, 15, 20]. On the other hand, higher perceived ease of use leads to higher perceived usefulness and it has a significant positive effect on user attitude [2]. Moreover, attitude is found to be determinant factor in individuals use intention and adoption of 3G MVAS [16] and having significantly positive effects on behavioral intention [2]. Compatibility, which has been selected from the IDT, is best described where an innovation is more likely to be adopted when it supports an individual's lifestyle, needs, job responsibilities and values [21]. Compatibility has been found to have a strong effect on users' attitudes and their behavioral intention [8].

The hypotheses are as follows:

H1: Perceived usefulness is positively related to behavioral intention of 3G MVAS

H2: Perceived usefulness has a positive influence on attitude of 3G MVAS

H3: Perceived ease of use has a positive influence on perceived usefulness of 3G MVAS.

H4: Perceived ease of use has a positive influence on attitude of 3G MVAS

H5: Attitude is positively related to behavioral intention of 3G MVAS.

H6: Compatibility is positively related to attitude of 3G MVAS

H7: Compatibility is positively related to behavioral intention of 3G MVAS

2.2 Self Efficacy, Service Availability, Perceived Cost, Perceived Enjoyment and Social Influence

In the context of this study, the more confident an individual is in his/her technical skills or the greater the experience he/she has with a cell phone, the more likely that 3G MVAS would be adopted [22]. On the other hand, service availability is defined

as the extent to which an information appliance is perceived as being able to provide pervasive and timely connections [13]. Regarding cost, many scholars considered it as an important factor affecting user's behavioral intention [2, 7, 13, 15, 18], to adopt 3G mobile services. The greater the cost the less likely would be the intention to adopt the technology. Perceived enjoyment, on the other hand, was proven to be an important antecedent of usage intentions and had a significant effect on mobile services [15, 23], while social influence has been found to have significant influence on the behavioral intention to use 3G mobile phones.

Thus, the following hypotheses are developed:

H 8: Self efficacy is positively related to perceived ease of use of 3G MVAS

H9: Service availability significantly affects perceived usefulness of 3G MVAS

H10: Perceived cost is negatively related to attitude of 3G MVAS

H11: Perceived cost is negatively related to behavioral intention of 3G MVAS

H12: Perceived enjoyment positively affects the perceived usefulness of 3G MVAS

H13: Social influence positively affects the behavioral intention of 3G MVAS

3 Research Methodology

This research adopts the positivist paradigm as it involves hypothesis testing through data collection and statistical analysis [24]. The quantitative approach was found to be most suitable for the purpose of this study, as the main objective of this study is to investigate the behavioral intention towards using 3G MVAS by individuals in Macedonia, by applying survey as a research strategy.

3.1 Sample, Questionnaire and Data Collection

The population of interest in this study is, all the individuals in Macedonia who own a 3G enabled mobile device. Because of the time constraints, and the fact of the respondents' availability in the specified places, the sampling frame is limited to the cities in western Macedonia Gostivar, Tetovo, including the capital Skopje, thus convenience sampling method best fits in this study. Beside the criticisms about this sampling technique, that the sample may not represent the whole population, as a non probabilistic sampling method does not mean that the sample is not a representative of the population, although it is very hard to represent the whole population well [25]. A sample of 500 respondents is used to gather the empirical data.

The questionnaire consists of two sections: the first section gathers the demographic information of the respondents, while the second section is about the respondents' perception about the 3G mobile services. The data collection is conducted with more focus on young people, mainly in universities; various mobile phone shops as well as prepaid phone reload shops, located in these cities. From the 500 distributed questionnaires, 361 valid responses were collected.

3.2 Validity and Reliability

Regarding the validity of this study, all the measures for constructs in this research are obtained from instruments which were already used and validated in existing and related literature [25], and it has been approved with the help of the research advisor and supervisor by which one type of validity - content validity is achieved. Moreover, to ensure validity of the study, factorial validity, as a favored technique in Information Systems [26], a subtype of construct validity is examined using factor analytic techniques.

Since the questionnaire used in this research contains constructs with multiple items the internal consistency reliability has been applied for each construct independently and also for all the items by using the Cronbach's alpha value, which range from 0.780 to 0.936 and the value for all the items in this study is equal to 0.877 that means it is internally consistent and acceptable. (see Table 2).

4 Data Analysis

The research model and the proposed hypotheses in this study are evaluated by the structural equation model. For the reliability coefficients, variance analysis, explanatory factor analysis, SPSS version 18 was used. Confirmatory factor analysis was conducted by LISREL version 8.80.

4.1 Demographic Characteristics

The demographic results reveal 76.5% of the respondents are male and 23.5 % female. In terms of age most of the respondents from 19-23 years, which constitute 64.5 % of the total respondents.. For the educational background, most of the respondents have a bachelor degree constituting 67.9 % of the total number of the respondents, 21.9 % have finished secondary school, 8.6 % of the respondents have a master degree and the rest have doctorate 1.7 % and none of the respondents' is with a primary school. Among the 361 valid responses, only 32 respondents were reported to have used 3G MVAS. Out of 32, 27 users reported that they used 3G MVAS for more than 1 hour in a month, 3 users used the services for 30 min – 1 hour, and 2 users used the services for less than 10 min in a month. Moreover, among 32 users, 17 of them spent more than 600 denars on 3G MVAS each month, 7 respondents spent 300 to 600 denars, and 8 respondents have stated that they spent 100 to 300 denars on 3G MVAS each month.

4.2 Factor Analysis

The results' from the factor analysis reveal that partial correlations among variables are all greater than 0.5 and the factor model is appropriate whereby all the relationships are significant ($p < 0.05$). Moreover, convergent validity is adequate

when constructs have an Average Variance Extracted (AVE) of at least 0.5 [27] as shown in Table 2. Having the AVE values greater than the variance shared between a particular construct and other constructs in the model [28], the results reveal a satisfactory discriminate validity.

Table 1. Descriptive statistics of items

	KMO > 0.5	Bartlett's Test of Sphericity p < 0.005	Total Variance Explained	Cronobach alpha > 0.7	Average Variance Extracted > 0.5
PU	0.797	0.000	72 %	0.870	0.788
PEU	0.683	0.000	73 %	0.808	0.777
A	0.690	0.000	69 %	0.780	0.743
C	0.755	0.000	88 %	0.933	0.907
SE	0.730	0.000	80 %	0.875	0.840
SA	0.739	0.000	80 %	0.854	0.843
PC	0.680	0.000	74 %	0.823	0.783
PE	0.716	0.000	87%	0.927	0.903
SI	0.703	0.000	72 %	0.810	0.770
BI	0.756	0.000	88 %	0.936	0.910

4.3 Hypothesis Testing

In the confirmatory factor model, the researcher imposes substantively motivated constraints that determine which pairs of common factors are correlated, which observed variables are affected by which common factors, which observed variables are affected by a unique factor, and which pairs of unique factors are correlated [29]. Therefore the estimated path coefficients of the structural model were studied to evaluate the hypotheses presented in Fig 1. The hypothesis results are summarized in Table 3.

Table 3. Hypothesis results

Hypothesis	Effect	T-value	Results
H1	PU → BI	2.50	Accepted
H2	PU → A	1.35	Rejected
H3	PEU → PU	3.26	Accepted
H4	PEU → A	0.38	Rejected
H5	A → BI	2.13	Accepted
H6	C → A	0.06	Rejected
H7	C → BI	12.41	Accepted
H8	SE → PEU	6.65	Accepted
H9	SA → PU	1.23	Rejected
H10	PC → A	4.09	Accepted
H11	PC → BI	1.71	Rejected
H12	PE → PU	11.46	Accepted
H13	SI → BI	0.08	Rejected

4.4 Goodness of Fit

Confirmatory factor analysis (CFA) is used to assess the structural model fit. Table 4 shows the common model-fit indices, recommended values and results of the test of structural model fitness, indicate a good model fit.

Table 4. Fit indices for structural model

Fit Indices	Recommended Value	Result
Chi-square/Degree of Freedom (χ^2 / df)	<3	2.288
Goodness of-Fit Index (GFI)	>0.8	0.86
Adjusted Goodness of Fit Index (AGFI)	>0.8	0.83
Root Mean Square Error of Approximation (RMSEA)	<0.08	0.060
Root Mean Square Residual (RMR)	<0.08	0.08
Normed Fit Index (NFI)	>0.9	0.92
Comparative Fit Index (CFI)	>0.9	0.95

5 Discussion

The results show that Perceived Usefulness (**H1**), consistent with prior studies [30], in this study is found to be significant determinant to predict the Behavioral Intention of 3G MVAS. Thus, in order for users to use the 3G MVAS, they must feel that these services are useful to them, such as increasing their efficiency in their life and work, increasing their mobility and providing them with better internet surfing. Hence, telecom service providers should focus on informing and educating their users about the usefulness of the offered 3G MVAS in order to retain and also attract new consumers. The relationship between Perceived Usefulness and Attitude (**H2**) is not significant. The outcome of these results in this study could be ascribed to the fact that a small number of respondents use the actual offered 3G MVAS, or the range and the availability of the services offered by the telecom service providers in Macedonia.

The results reveal that Perceived Ease of Use has a significantly positive effect on Perceived Usefulness (**H3**). These results imply that telecom service providers need to consider the ease of use of services when identifying the 3G MVAS that can offer practical values to consumers and also telecom service providers should focus on developing customized user interfaces that are easy to use. On the other hand, the relationship between Perceived Ease of Use and Attitude (**H4**) is not found significant.

Next, the results indicate that Attitude (**H5**) significantly affects Behavioral Intention of 3G MVAS. As there are Attitude's antecedents or factors that influence the consumers' attitudes, therefore telecom service providers should take into consideration all the recommendations presented for each factor in order for the Macedonian consumers to have positive attitudes towards behavioral intention of 3G MVAS.

Compatibility is found to have an insignificant effect on users' Attitude (**H6**), but on the other hand it shows a high effect on Behavioral Intention (**H7**), implying that

telecom service providers have to emphasize how their offered services fit with the targeted group's lifestyle.

Self-Efficacy in this study is found to have a significant influence on Perceived Ease of Use (**H8**), which is consistent with previous studies [19]. These results from the third highest ranked factor, Self-Efficacy, are attributed to the fact that respondents educational level is high, consistent with the theoretical argument [9] and [31] that an individual with high expertise might rate a system as easier to use than an individual with lower expertise. This implies that telecom service providers should focus on developing customized user interfaces that are easy to use in order to attract new consumers.

The relationship between Service Availability and Perceived Usefulness is found to be insignificant (**H9**), which contradicts to findings that Service Availability to have a strong effect on Perceived Usefulness [13]. Consistent with the results of a prior study [2], (**H10**) Perceived Cost is found to have a significant influence on Attitudes, but contradicting to their results regarding the relationship between Perceived Cost and Behavior Intention (**H11**), which is in this study is found to be insignificant. The result from this relationship are consistent with prior [20] findings, that the results might indicate that the users are more concerned with what 3G can offer rather than its costs. However, in this study the results from Perceived Cost are attributed to the fact that Macedonian consumers perceive that the tariff of these services is still high. Therefore, telecom service providers are recommended to adopt promotions to reduce the threshold of service tariff in order to promote 3G MVAS. If the service tariff cannot be reduced, then service providers should develop more valuable and special services, so that consumers can enjoy the benefits or effectiveness of 3G MVAS at a lower cost.

Regarding Perceived Enjoyment, the results in this study indicate that this construct has a significant influence on Perceived Usefulness (**H12**) which in turn had a significant influence on Behavioral Intention of 3G MVAS. These findings suggest that users of 3G mobile services need to be provided with more diverse and entertaining ways, which can greatly contribute to the efficiency and convenience of communicating. Social influence, in this study, exhibits insignificant correlation on Behavioral Intention of 3G MVAS (**H13**), which contradicts with prior findings [20] and [32]. The outcome of these results in this study could be explained by the statement that the relationship between social influence and behavioral intention exhibited different results for different service categories, in some, the relationship was significant and in others it was insignificant [13]. This implies that the service category of mobile services can be an important boundary condition in explaining consumers' behavioral intention.

6 Conclusion

The results of this study reveal that the total effect of the factors that influence the behavioral intention of Macedonian consumers to use 3G MVAS, is ranked as follows: Compatibility, Perceived Enjoyment, Self – Efficacy, Perceived Cost, Perceived Ease of Use, Perceived Usefulness and Attitude. Thus implying that telecom service providers in Macedonia should consider the above mentioned

recommendations, such as focus on educating their consumers about the offered services, foster the expansion of their 3G network coverage and also introduce new versatile and entertaining 3G MVAS which are easy to use, in order to attract new customers and also to retain the old ones. Moreover, as a theoretical contribution, contrary to many technology adoption models in the past studies [2, 7, 9, 13, 15, 19], the model used in this study shows that both perceived usefulness and perceived ease of use have an insignificant effect on attitude, rather, only perceived usefulness shows to be significantly related to behavioral intention directly, which is in line with the extended technology acceptance model [30].

Since the respondents that constitute the main user group of 3G MVAS are relatively young, future studies should include users who are older. Further, the model used in this study measures perceptions and intentions at a single point in time, and the 3G telecom service market in Macedonia is still under development, implying for a longitudinal study, and also an in-depth investigation is also required in order to acquire more objective arguments when consumers have a higher level of involvement in 3G. Future research should also consider the demographic characteristics of the respondents, and may also consider other external factors such as culture [20], which allows the researchers to conduct a multi-country comparison study.

Acknowledgements

I would like to express my gratitude to my supervisor Dr. Jaime Campos, and also to Dr. Anita Mirijamdotter and Dr. Jan Aidemark for their support, insight and diligent guidance. This research was done at Linnaeus University as part of master's thesis.

References

1. Tang, L.: Key success factors in 3G services adoption: a consumer perspective. (2008) 1-7
2. Kuo, Y., Yen, S.: Towards an understanding of the behavioral intention to use 3G mobile value-added services. *Computers in Human Behavior* 25 (2009) 103-110
3. Gazis, V., Koutsopoulou, M., Farmakis, C., Kaloxylas, A.: A flexible charging and billing approach for the emerging UMTS network operator role. *SIMULATION SERIES* 33 (2001) 85-94
4. AEC: Report on the development of the electronic communication market in the 4th quarter., AEC Macedonia Retrieved, from: <http://www.aek.mk/> (2009)
5. López-Nicolás, C., Molina-Castillo, F., Bouwman, H.: An assessment of advanced mobile services acceptance: Contributions from TAM and diffusion theory models. *Information & Management* 45 (2008) 359-364
6. Rao Hill, S., Troshani, I.: Factors influencing the adoption of personalisation mobile services: empirical evidence from young Australians. *International Journal of Mobile Communications* 8 (2010) 150-168
7. Sun, Q., Cao, H., You, J.: Factors influencing the adoption of mobile service in China: An integration of TAM. *Journal of Computers* 5 (2010) 799
8. Chen, L., Gillenson, M., Sherrell, D.: Enticing online consumers: an extended technology acceptance perspective. *Information & Management* 39 (2002) 705-719
9. Davis, F.: Perceived usefulness, perceived ease of use, and user acceptance of information technology. *Mis Quarterly* 13 (1989) 319-340

10. Hsu, C., Lu, H., Hsu, H.: Adoption of the mobile Internet: An empirical study of multimedia message service (MMS). *Omega* 35 (2007) 715-726
11. Compeau, D., Higgins, C.: Computer self-efficacy: Development of a measure and initial test. *Mis Quarterly* 19 (1995) 189-211
12. Sendekka, L.: Adoption of mobile services: Moderating effects of service's information intensity. NORGES HANDELSHOY University, Norway (2006)
13. Hong, S., Tam, K.: Understanding the adoption of multipurpose information appliances: The case of mobile data services. *IS research* 17 (2006) 162
14. Wu, Y., Tao, Y., Yang, P.: Using UTAUT to explore the behavior of 3G mobile communication users. (2007) 199-203
15. Pagani, M.: Determinants of adoption of third generation mobile multimedia services. *Journal of Interactive Marketing* 18 (2004) 46-59
16. Bouwman, H., Carlsson, C., Walden, P., Molina-Castillo, F.: Reconsidering the actual and future use of mobile services. *Information Systems and E-Business Management* 7 (2009) 301-317
17. Luarn, P., Lin, H.: Toward an understanding of the behavioral intention to use mobile banking. *Computers in Human Behavior* 21 (2005) 873-891
18. Agarwal, N., Wang, Z., Xu, Y., Poo, D.: Factors Affecting 3G Adoption: An Empirical Study. *PACIS 2007 Proceedings* (2007) 3
19. Wang, Y., Lin, H., Luarn, P.: Predicting consumer intention to use mobile service. *Information Systems Journal* 16 (2006) 157-179
20. Chong, A., Darmawan, N., Ooi, K., Lin, B.: Adoption of 3G services among Malaysian consumers: an empirical analysis. *International Journal of Mobile Communications* 8 (2010) 129-149
21. Agarwal, R., Prasad, J.: The role of innovation characteristics and perceived voluntariness in the acceptance of information technologies. *Decision Sciences* 28 (1997) 557-582
22. Taylor, S., Todd, P.: Understanding information technology usage: A test of competing models. *Information systems research* 6 (1995) 144-176
23. Nysveen, H., Pedersen, P., Thorbjørnsen, H.: Intentions to use mobile services: antecedents and cross-service comparisons. *Journal of the Academy of Marketing Science* 33 (2005) 330-346
24. Orlikowski, W., Baroudi, J.: Studying information technology in organizations: Research approaches and assumptions. *Information systems research* 2 (1991) 1-28
25. Trochim, P.: *Research methods*. Dreamtech Press (2003)
26. Straub, D., Boudreau, M., Gefen, D.: Validation guidelines for IS positivist research. *Communications of the Association for IS* 13 (2004) 380-427
27. Fornell, C., Larcker, D.: Structural equation models with unobservable variables and measurement error: Algebra and statistics. *Journal of Marketing Research* 18 (1981) 382-388
28. Chin, W.: *Commentary: Issues and opinion on structural equation modeling*. Vol. 22. JSTOR (1998)
29. Long, J.: *Confirmatory factor analysis: A preface to LISREL*. Sage Publications, Inc (1983)
30. Venkatesh, V., Davis, F.: A theoretical extension of the technology acceptance model: four longitudinal field studies. *Management science* 46 (2000) 186-204
31. Mathieson, K.: Predicting user intentions: comparing the technology acceptance model with the theory of planned behavior. *Information systems research* 2 (1991) 173-191
32. Venkatesh, V., Morris, M., Davis, G., Davis, F., DeLone, W., McLean, E., Jarvis, C., MacKenzie, S., Podsakoff, P., Chin, W.: User acceptance of information technology: Toward a unified view. *Information & Management* 27 (2003) 425-478