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IMPROVING THE ADOPTABILITY OF A MOBILE SERVICE: A CASE STUDY

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Abstract

Mobile technologies are penetrating into everyday lives of people and are providing miscellaneous services on the mobile device for users. Most of researches in this area have been done after the introduction of the service to the market. In this tough market, service providers need to know exactly which elements of their services or technologies can be improved before final stage of development and surely before launching the application or service. This article studies intentions to use a service, through a mobile application, for possible improvements in adoptability of the service. The Nysveen et al's integrated model (2005) has been utilized for conducting the research and data was collected over a survey study. Such insights allow mobile service providers and mobile marketers to create more customized services. This paper concludes with both theoretical and practical implications and limitations of the study results.

Keywords: Service adoption, adoption model, mobile services, mobile application, mobile service usage, mobile service optimization, attitude towards the use, intention towards the use

Introduction

Wireless communication enables users and businesses to transcend time and place, and it has resulted in increased accessibility and expanded both social and business networks (Palen, 2002). Wireless communication also promises to provide a convenience, localization, and personalization of services (Clarke, 2001). Advances in mobile technology have changed the business environment significantly. Devices and technological mobile applications have become a common place in our everyday lives (Balasubramanian et al., 2002), increasing the accessibility, frequency and the speed of communication. As a result, mobile technologies have the potential to create new markets, change the competitive landscape of business, create new opportunities, and change existing community and market structures (Stewart and Pavlou, 2002). The concept of mobile services has been defined as something for which the provider can charge the mobile user for taking part in (Nordman and Liljander, 2003). The original concept of mobile service was voicing communications with mobility. Understanding market needs, users' adoptions and knowing what services to be offered and where are the crucial

dimensions to success of new service development's success. Hence, it becomes evident to mobile service providers that they have to identify their users' needs and tastes in order to develop the right service to the right market.

Traditional marketing methodologies are not sufficient when it comes to non existing products. Investigations in the sociology of technology are essential to evaluate if new applications are good responses to market needs and user taste or not. For widespread adoption of mobile services, a set of requirements including technological, business strategic and behavioral are to be considered (Pedersen, 2002). For researchers, an important issue is to learn how mobile services differ from stationary services in regard to users' adoption (Pedersen et al., 2005). Considerable developments in mobile technologies and related services create new motives for users and also strong need for studies in the area of service adoption to maximize service penetration and user engagement in different markets (Balasubramanian et al., 2002, Nysveen et al., 2005).

This article investigates intension to use a new service in development stage to improve and optimize the service before delivering to the market. The service was targeted to provide free content and generate revenue through advertising. Understanding users' attitude toward a service, using the Nysveen et al's integrated adoption model (2005), allows us to understand user's expectations and experiences on the tested service to optimize and customize the service to achieve the highest adoption rate. This paper is composed as follows: In the next section, there is a review of previous studies related to technology adoption models, specially the integrated model by Nysveen et al. (2005) and its application to mobile Internet usage. Then, a description of the research procedures employed and eventually a final data analyzing the data. Authors conclude that the paper by acknowledging limitations of studies, discussing the implications of the findings, and possible future research in this area.

Literature Review

There are many different models for technology adoption that were developed during the recent years. The development of these models resulted in better understanding and prediction of mobile technologies and services adoption. Applying these models to analyze the adoption of a service is very useful as it gives the chance to the service

providers to improve the service in the areas that have the highest impact on the adoption.

The first studies on this topic, were carried out by Schultz and Slevin (1975). Their analysis resulted to seven explanatory dimensions, of which the performance dimension, “perceived effect of the model on the manager’s job performance”, was found to be the most highly correlated with the self-predicted use of a decision model. Further studies revealed that several specific user attitudes or perceptions are highly related to system use (Robey, 1979). According to Robey’s model, “user perceptions or attitudes are formed concerning the value of rewards received from performance, the likelihood that rewards result from performance, and the likelihood that performance results from the use”. Fishbein’s multi-attribute model (Ajzen and Fishbein, 1980) is supported by behavioral learning theory (Kassarjian and Robertson, 1991) which says “an attitude toward an object is more or less automatically learned as one learns about a new product, and that learning occurs in the form of beliefs about product attributes”.

Theory of reasoned action, TRA, (Fishbein and Ajzen, 1975) was proposed to clarify the relationship between attitudes and behavior. In other words, it is used to predict user’s behavior with the assumption that the customer controls his own behavior. According to TRA, the “intention to perform a behavior” is the most significant determinant of user actual behavior. It is a function of “attitude towards behavior” and “subjective norms”. To include the impact of external sources of influence on “intention” and “attitude” the theory of planned behavior (TPB) was proposed by Ajzen (1991). This model has been proven to be useful for conditions where individuals do not have complete control over their behavior (Taylor and Todd, 1995). A third determinant of “behavioral intention”, “perceived behavioral control” was included in TPB.

Technology Acceptance Model, TAM, (Davis 1989) was designed to predict user’s acceptance of information technology. In TAM, Davis (1989) defined perceived usefulness as the degree to which a person believes that using a particular system would be advantageous in performing his or her task. TAM is applied for predicting user acceptance (Venkatesh and Davis, 2000), and it has become the most applicable model of user acceptance and usage (Ma and Liu, 2004). This model illustrates that, users, who find mobile technology useful and easy to use, are users

with more positive attitudes towards mobile services. In addition to the researches that have been conducted on the subject of technology adoption, there have been some studies that have focused specifically on the concept of mobile services and mobile technologies adoption (Vatanparast 2009).

Based on domestication studies, “expressiveness” is another effective driver for intention to use mobile technology and services. The definition of Nysveen et al (2005) for expressiveness is: “the degree to which users of mobile services perceives the services as suitable for expressing their emotions and social and or personal identity”. Finally, Nysveen et al (2005) proposed an integrated model based on information system theories, gratification and domestic theories that can be utilized to explain user intentions to use mobile services (Figure 1). Nysveen et al. (2005) claimed that; perceived expressiveness and perceived enjoyment show the most promising and considerable effect; perceived usefulness, perceived ease of use and attitude toward the use are direct or indirect determinants of mobile service’s usage and finally subjective norms and perceived control are important antecedents of users’ intentions to use mobile services as it has been proven. The technological development along with high penetration of mobile phones has created a whole research area of adoption around mobile services and mobile marketing (Vatanparast 2009). Nysveen et al (2005) could explain user intentions to use mobile services, by constructing the integrated model. Pedersen (2002 and 2005) found that the intention to use is influenced by perceived expressiveness, enjoyment, subjective norm and behavioral control. Nysveen et al (2005) confirmed that perceived usefulness and attitude toward the use are direct or indirect determinants of mobile services’ usage. Li et al. (2005) suggested that enjoyment shows a significant effect on intention to use instant messaging and will increase when the multimedia communication and entertainment are getting richer e.g. moving from SMS to MMS (Hsu et al., 2007). Nysveen’s integrated model has been designed around mobile services, and it has been tested successfully in many research studies, as mentioned above. Based on literature review, we decided to use Nysveen’s integrated model in our research study to understand the user’s attitude toward use and intention to use of our application based mobile service to optimize the service before launch of service.

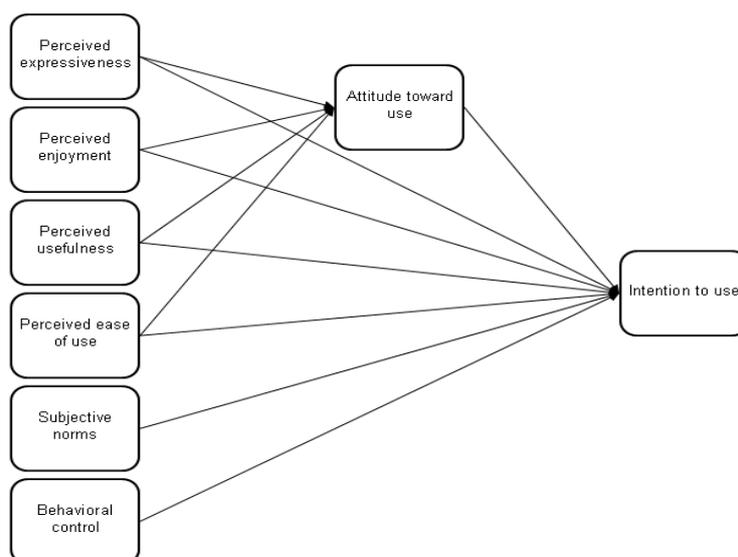


Figure 1: Nysveen et al's model (2005)

Research Method

As it was discussed in the literature review, the Nysveen et al's integrated model is a very suitable model for the case study, as it provides better a prediction of users' attitudes towards usage of mobile services. Therefore, the integrated model was utilized in this research study to comprehend the attitudes toward uses and intentions to use of a mobile service which was under development by a tele communication company. It was initially intended to have a larger number of participants in public, but due to confidentiality of the service, legal and liability issues, there was no permission to run the trial version in public. As the result, it was limited to the company's internal participants to run this trial of service and to do this research. The participants in this study did not have any experience or knowledge about this service and its focus prior to their usages. User recruiting was done through an Email marketing campaign which was targeted to approximately three hundred employees. It was asked from voluntary participants to go to a particular website to register and download a client application, and start using the service during a trial period of four weeks. Hundred thirty five users registered to download the application and among those seventy seven successfully downloaded the application and activated their service. Eighty six percent of users were recruited by the end of the first week. After the period of trial, they were asked to fill in the research questionnaire which was designed around the integrated model, a collection of fifty two questions. The questions included ten areas to cover different constructs of the integrated model. The questionnaire was in English and was sent to the participants via email. In order to measure the real sense of the consumers in each user in the

integrated model, the five point Likert System scale in which the data were in an ordinal format was used. Ordinal format indicates the data of each category with a specific quantity as an index of that category.

The Kendal Tau correlation was found more suitable as it represents a probability for a non-interval scaled ordinal format (Bolboaca and Jantschi, 2006). It should be noted that there were a couple of questions for each construct. Kendal Tau method is utilized to do a correlation analysis in our case, as the data were in a non-interval scaled format. By applying Kendal Tau method, the coefficients of the correlations became less and the differences became more sensible. Before applying Kendal Tau method, we have applied rank based approach in which we transferred the data into ranks, which are invariant and the mathematical operations on them are construable (Madden, 2004). Kendal Tau correlation was applied on the averages of the ranks of each construct according to the integrated model. This approach is much more suitable for studies with a limited number of data, rather than using Spearman or Pearson approach. Since our research model is greatly based on the Nysveen et al's (2005) model, we used the same measures as they used in their study for measuring perceived usefulness, ease of use, expressiveness, enjoyment, subjective norms, behavioral control and intention to use. We adapted the measures for the particular mobile service relevant for our own study.

Data analysis

A data reduction factor analysis was conducted to determine the existence of subcategories among the questions included in each of the constructs. The results of each factor analysis conducted on the

data are gathered for each construct in the Table 1. Factor analysis determines whether there is any sub-categories in any set of questions under one category or not. All questions loaded strongly together except question 23 for behavioral control and question 21 for attitude toward the use. The Eigen values are computed and all values were over 1, which is the significance in the model (Hair et al., 1998). The results revealed that in all the constructs, we have only one component. This

means that all the questions were in the same category in all the constructs. Therefore, we could calculate the average of ranks in every construct for each person. The results helped us to provide one set of data for each construct that could be easily correlated with other constructs based on the integrated model. Table 1 shows the result of data reduction analysis.

Table 1- Factor analysis results

Questions	Usefulness	Ease of Use	Expressiveness	Enjoyment	Subjective Norms	Behavioral Control	Attitude	Intention
Usefulness	Q41	.981						
	Q42	.975						
	Q43	.946						
Ease of Use	Q38		.982					
	Q39		.980					
	Q40		.984					
Expressiveness	Q35		.965					
	Q36		.960					
	Q37		.961					
Enjoyment	Q31			.954				
	Q32			.839				
	Q33			.963				
	Q34			.904				
Subjective Norms	Q26				.964			
	Q27				.948			
	Q28				.936			
	Q29				.956			
	Q30				.900			
Behavioral Control	Q22					.897		
	Q23					.509		
	Q24					.880		
	Q25					.867		
	Q15						.897	
Attitude Towards Use	Q16						.904	
	Q17						.953	
	Q18						.972	
	Q19						.777	
	Q20						.907	
	Q21						.604	
	Q9							.941
Intention to use	Q10							.942
	Q11							.947
	Q12							.919
	Q13							.870
	% of variance	93.6	96.3	92.5	84	88.5	64.7	75.2
Eigen values	2.8	2.9	2.8	3.4	4.4	2.6	5.3	4.3

Table 2 shows some descriptive data for the variables used in this study. The table shows the minimum, maximum and the median for all variables. Minimum and maximum values show that all the variables are consistently within the points on the scale. Correlation analysis was conducted based on the integrated model, in order to determine the most effective construct on the users' attitudes and intention to use the service. Having transferred the data into rank orders, the Kendal Tau correlation was applied (Table 3). According to Hair et al (1998), when a single independent variable is highly correlated with the set of other independent variables, multicollinearity occurs. Multicollinearity represents the degree to

which one variable can be predicted by the other variables in the analysis. Hair et al (1998) suggest that calculating tolerance and VIF values are good measures for testing multicollinearity. Table 4 shows collinearity statistics for the dataset. Either tolerance or VIF values in our data are within the accepted values according to Hair et al (1998). Tolerance value should lay somewhere between 0 to 1 and, VIF values should vary between 1 to 10 but should not exceed 10, and the closer to 1 the better. High multicollinearity contributes negatively to the interpretation of the result as it makes it difficult to ascertain the effects of a single variable. This indicates that the data do not suffer any collinearity problems.

Table 2- Descriptive for the variables of each construct

	Minimum	Median	Maximum
Usefulness	6.2	13.8	34.8
Ease of Use	8.43	14.29	29

Expressiveness	7.75	15.5	25.25
Enjoyment	6	14.8	34.8
Subjective Norms	6	13.5	32.5
Behaviorial Control	6.67	12.67	32.67
Attitude	6	15.67	35.67
intention	6	15.33	34

Table 3- Kendal tau correlation coefficients

	Attitude	Intention
Perceived Usefulness	.673*	.667*
Perceived Ease of use	.482*	.575*
Perceived Expressiveness	.628*	.615*
Perceived Enjoyment	.634*	.656*
Subjective norms	-	.505*
Behavioral control	-	.579*
Attitude	-	.779*

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

Table 4 – Measures testing the impact of multicollinearity, Tolerance and VIF values for the dataset

Model		Collinearity Statistics for the dataset	
		Tolerance	VIF
Attitude toward use	Usefulness	.338	2.958
	Ease of use	.235	4.259
	Expressiveness	.365	2.739
	Enjoyment	.192	5.217
Intention to use	Usefulness	.221	4.527
	Ease of use	.213	4.691
	Expressiveness	.233	4.293
	Enjoyment	.152	6.575
	Subjective norms	.289	3.465
	Behavioral control	.375	2.665
	Attitude	.242	4.126

Results

The summary of the results of correlation analysis is schematically shown in Figure 2. The result shows that the service is high in perceived usefulness and then in perceived enjoyment, which means that users believe in the existence of a positive use-performance relationship. Davis (1989) supports that; the perceived usefulness is a direct determinant of the users' intentions to use a technology. The justification behind is that if the service will improve a person's daily life performance, then it will be considered as useful. Thus a person will have a higher incentive to use the service. Doll et al. (1998) define that; systems will be useful in general if they "contribute to accomplish the end-user's purpose". The result shows that, the information intensive service, which was provided during the trial, led to a positive usage intension. The service helped users to accomplish certain tasks, get useful information and gain positive value and satisfaction.

The result shows that, perceived expressiveness was unexpectedly considerable for

the tested mobile service which is information intensive. It is uncharacteristic, to see this significance, since it was predicted that expressiveness would not have strong effect on the adoption of mobile services. As a result, expressive services are experiential services. We can assume that since the service is experiential and expressive services are also experiential, there is a connection between the service and expressiveness. This reasoning could explain the significant effect on the relationship between perceived expressiveness and intention to use the mobile services. Other studies highlighted that; the use of mobile services can serve as a way of expressing personality, status and image in a public context (Nysveen et al., 2005; Leung and Wei, 2000; and Höflich and Rossler, 2001). In other hands, higher perceived expressiveness may contribute to higher probability of using the mobile service. This confirms the direct link between expressiveness and intention to use of mobile service, which was also supported by a fair amount of domestication researches done by other scholars (e.g. Ling, 2001; Skog, 2002).

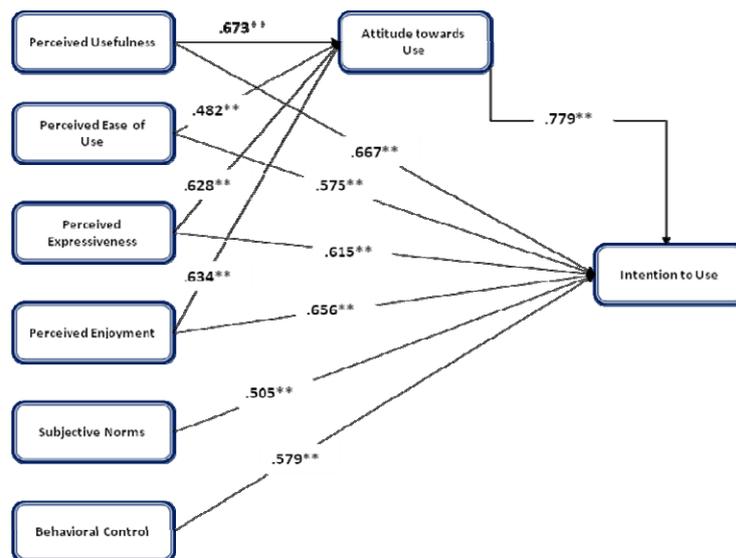


Figure 2 – Correlation Results Summary

When it comes to perceived enjoyment, it is understandable that this variable is significant with low information intensive services. The original intention of the service was built around delivering free content and information. High information intensive services are meant to collect or to process big amount of information and content, not for fun and relaxation originally. However, it seems that users, value enjoy-ability and looking for fun and relaxing time while consuming information and content. In other words, from user's view, the service is used not only for receiving information but also for enjoyment. In their gratification studies, Höflich and Rössler (2001) indicate, that among others, enjoyment is a significant factor influencing intention to use mobile services. As we delivered a set of quizzes with prizes during the trial period, promoting usage of the service, the mobile service led to an intrinsic reward, which enhanced enjoyment. This surely brings a higher probability for users to use this service. Perceived enjoyment was proven to be an important antecedent of usage intentions and had a significant effect on all services that had been studied regardless of being information intensive or not, such as SMS, contact services, payment services and gaming services (Nysveen et al., 2003).

The perceived behavioral control was not that significant in this study in comparison to other ascendances, but it shows a positive direct effect due to high information intensive characteristics of the service. Nysveen et al. (2005) and Sendekca (2006) explain that the positive effect of behavioral control on intention to use mobile services will be stronger for services with a high degree of information intensity comparing other services with a low degree of information intensity. The more information one has, the more confident he or she

becomes about the behavior. This in turn, increases the intention to use the mobile service. The user interface design of a service can affect information access, collection and processing of a user. This means that even though, the service is information intensive, but the user interface can facilitate handling of the information and make it easy to consume content. As a result we can see that, some services could be information intensive but having a positive effect on intention to use, due to easy to use user interface. Since manipulation of a goal oriented services requires high levels of behavior control, we expect that managing of highly information intensive services will also require high levels of behavioral control.

To summarize, the results of correlation analysis reveal that, there exists a high positive relation between the constructs of the model and also all the correlations were significant (at 0.01 level). There is a high positive correlation between attitude and intention to use. Attitude has the highest impact on the intention of the users towards the use comparing to other constructs. Usefulness and enjoyment have higher coefficients of correlation with attitude. Usefulness has a higher positive correlation with the intention to use comparing to the other three constructs. Ease of use, on the other hand, has the least impact on the attitude of the users towards the use.

Conclusion and Discussions

The scale to measure the variables in this study was highly reliable, based on the results of factor analysis. All factors analysed in this paper showed that, every variable or concept was measured properly. It was shown that, measure for each variable fitted properly, as each of them loaded strongly and well to the respective factors proves

paper's high convergent validity. Each variable was computed in order to run the regression analysis to study the direct effects of adoption drivers on the intention to use of the mobile service with the target of delivering free content to mobile users. Hair et al. (1998) explain that a successful multivariate regression requires selection of independent variables based on their theoretical relationships to the dependent variable. The regression result shows the overall significance of the integrated model. The model was found to have high explanatory power and was robustly significant. This means, that the model as a whole explains user's intentions to use mobile services very well. The results of the analysis show strong overall significance of the model in the study of services under development. It means that the model, or the drivers of adoption, significantly explains the usage intention towards the mobile service.

As our results show two variables of perceived usefulness and perceived enjoyment have the strongest effect on the intention to use the mobile service. However, all the variables in the model have considerable effect in this regard. An increase in any of these two variables during the development process will lead to increased users' intentions to use the mobile service. The constructs that affect the attitude such as perceived usefulness and perceived enjoyment are more important than expressiveness, subjective norms and behavioral control. This emphasizes the importance of improving these two constructs for increasing the users' adoptions in this particular mobile service. Furthermore, perceived ease of use is proven to have the least impact. However, impact is still considerable. Considering the averages of the ranks of each of the constructs, presented in Table 2, and the maximum ranks for each of the constructs, it is concluded that, this mobile service should be improved in all areas specifically in the areas, related to usefulness, enjoyment and expressiveness of the service.

The results of this paper make implications relevant, both for theoretical and for managerial purposes. Such a study allows mobile service designers to apply user's feedback in the early stage to improve the service before official launch. With such approach, user's intention towards using mobile services can be studied even earlier and more comprehensively. The research also highlights that information intensive services need additional treatment in order to increase the positive effect on intention to use the service. Modification on user interface design and/or add complimentary rewarding or value adding side services could be named to increase the positive intention to use information intensive services.

This paper introduces a new approach to utilize adoption models in the future studies. The results from this paper offer several managerial implications when developing services and increasing users to use mobile services. The result of the overall regression shows the importance and the advantages of adoption study of mobile services during the period of development to impact final design of a mobile service. The finding implies that industry players must be aware of drivers' effects on attitude toward use and intention to use when developing services. It will be important for mobile service developers to pay attention to fun, excitement and expressiveness, especially when developing high information intensive services. High information intensive services also have to be designed to enable their users to express their social and personal identities. It can surely be challenging for service producers to combine information, usefulness, enjoyment and expressiveness factors in one service. However, it shows that mobile service industry is willing to take on any challenges to enable mass adoption.

There are some factors that could have led to some weaknesses in this paper. Small quantity of the data does affect the integrity of data analysis. On the other hand, the sample was not representative of the population, due to confidentiality and legal issues. Basically, the sample used in this study, only consisted of people who were working for the same company which was developing the service, consisting highly educated and technology savvy respondents. This had its advantage in the fact that participants have enough experience and knowledge of using different mobile services, no need to educate participants and collect the result very quickly. At the end, authors conclude importance of utilizing adoption models to determine the constructs that have the highest impact on the user's attitude and intention towards usage of mobile service in an early stage of service development. This kind of knowledge in the development stages of the service preparation allows additional optimization to maximize adoption. By utilizing this approach the service providers will be able to tune the elements of a particular service and improve and utilize the areas that have the highest impact on the adoption of the service.

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