The Intention to Adopt Short Messaging Service (SMS) Among People With Visual Impairment From The Expanded Technology Acceptance Model Perspective: The Case Of Malaysian Association Of Blind (MAB)

Mohd Aidil Riduan Awang Kader
Suhana Mohezar Ali
Roslina Ali
Nor Khairunnisa Mat Yunus
Shamsul Nizam Mohamed Badri

ABSTRACT

People with visual impairment often encounter difficulties as accessibility and mobility in their daily life, with majority of them having communication problems. Challenges of the individual's ability to interact with others, initiate or maintain friendships as well as participate as a member of a community can lead to isolation. Information and communication technology (ICT) has opened new opportunities for people with visual impairment. Technology promises to enable and empower people with vision loss to the same degree as their non-visual impairment peers. The growing ubiquity of mobile phones and short messaging service (SMS) has opened up a range of possibilities for people with visual impairments. There is wide agreement that information and communication technology (ICT) is a valuable tool for people with visual impairment, with various research disciplines have focused on how people with vision loss can reap advantage of the technology available for social, educational and personal purposes. Yet, there is little research on how visually impaired people perceived the short message service (SMS), particularly from the educational perspective. Therefore the objective of this research is to investigate the influence factors that affect people with visual impairment intention to adopt Short Messaging Service (SMS) by applying the expanded technology acceptance model (TAM). The finding discovered that only usefulness has significant relationship with user's behavioral intention of SMS. However, there were lack of support for enjoyment, ease of use and perceived fees on SMS adoption among people with visual impairment particularly at MAB.

Keywords: *Technology Acceptance Model, Malaysian Association of Blind, Short Messaging Service, Visual Impairment*

Introduction

There is wide agreement that information and communication technology (ICT) is a valuable tool for people with visual impairment, with various research disciplines have focused on how people with vision loss can reap advantage of the technology available for social, educational and personal purposes. Yet, there is little research on how visually impaired people perceived the short message service (SMS), particularly from the perspective of an emerging economy. This research attempts to investigate the influence factors that affect people with visual impairment intention to adopt Short Messaging Service (SMS) by applying the expanded technology acceptance model (TAM). There are three common software applications namely Morse SMS, Mobile Speak and Nokia Braille Reader to facilitate the blind or visually impaired while using text messaging service.

Research Model (TAM Model)

TAM was originally developed by Davis (1989) to explain the individual's adoption of traditional technology (e.g. spreadsheet, email and software development tools) in an organization setting (Davis, 1989) and has since become the most prominent model employed to explain the adoption and usage of technology by individuals. As mentioned earlier, TAM focuses on 2 theoretical constructs; *Perceived Usefulness* (PU) and *Perceived Ease Of Use* (PEOU). PU is the degree to which a person believes that using a particular system would enhance his or her performance. A system high in perceived usefulness is one, which a user believes in the existence of a positive performance relationship. PEOU in contrast refers to "the degree to which a person believes that using a particular system would be free of effort". These constructs are of significant

importance as proposed by Davis (1989) since people tend to use or not use an. Based on TAM (Davis, 1989) the research model can be further illustrated by the following figure.

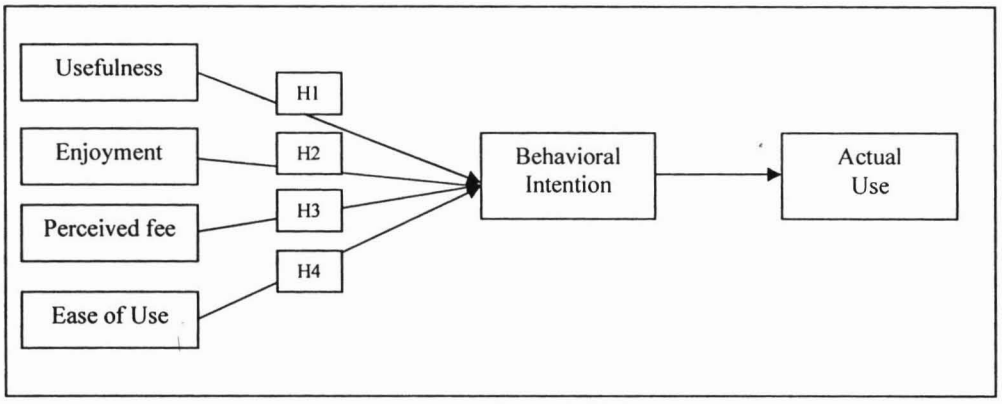

Figure 1: Research Model

Based on the research model above, four hypotheses formulated are as follows:

Hypothesis 1: There is a significance relationship between usefulness and behavioral intention of SMS
Hypothesis 2: There is a significance relationship between enjoyment and behavioral intention of SMS
Hypothesis 3: There is a significance relationship between perceived fee and behavioral intention of SMS
Hypothesis 4: There is a significance relationship between ease of use and behavioral intention of SMS

Research methodology

The population of this study consisted of people with visual impaired at Malaysian Association of Blind (MAB) Kuala Lumpur who is using SMS. Most of them are rehabilitation and vocational training services students. A key person was engaged to act as the distributing agent and to facilitate the respondent to read the questionnaire survey and tick the answer due to the fact that the respondents have visual impaired. Survey approach was chosen because it provides quick, inexpensive, efficient and accurate means of assessing information about the population.

The questionnaire was divided into 2 sections; section A and B. Part A was designed to measure the SMS behavior. A 5-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree) was used. For each statement, respondents were required to indicate their level of agreement to the statements. The statements measure constructs that are relevant in measuring SMS adoption. Amongst the construct were 'behavioral intention', 'perceived usefulness', 'perceived ease of use', 'perceived enjoyment' and 'perceived fees'. The input for the SMS behavior statements were derived from Brady et al., 2002; Lai, 2004 and Kim et al., 2005. Part B was designed to obtain the demographic information of the respondents. The variables measured using a close-ended multiple choice format

The survey data was analyzed using the latest Statistical Package for Social Sciences (SPSS) version 20.0. The analysis consisted of four major parts. Firstly, summarization of the general characteristics of all the SMS users in terms of their demographic information and SMS usage profile. Secondly, factor analysis technique was used to identify important dimensions of SMS behavior. The component items of each factors extracted will be tested for internal consistency reliability using Cronbach's coefficient alpha. Thirdly, Pearson correlation analysis was used to describe the strength and direction of the factors extracted and to test the hypotheses. Finally, regressions analysis was analyzed to identify how well a set of independent variables from the factors extracted able to predict or explain SMS adoption. In order to provide an adequate level of confidence in the study, a sample size of 100 was targeted. However, only 59 questionnaires were returned which is equivalent to a response rate of 59%.

Results

Profile of respondents

Table 1 presents the demographic profile of respondents. Most of the respondents were male, aged between 20 to 25 years old, single with a large majority being Malays and blindness.

Table 1Demographic Profile of Respondents

	Variable	Value Description	Frequency	Valid Percentage (%)
1	**Gender**	Male	40	67.8
		Female	19	32.2
		Total	**59**	**100.0**
2	**Age**	Below 20	9	15.3
	(Years)	20-25	23	39.0
		26-30	7	11.9
		31-35	5	8.5
		36-40	9	15.3
		Above 40	6	10.2
		Total	**59**	**100.0**
3	**Race**	Malay	43	72.9
		Chinese	12	20.3
		Indian	4	6.8
		Others	0	0
		Total	**59**	**100.0**
4	**Marital status**	Married	12	20.3
		Bachelor	47	79.7
		Total	**59**	**100.0**
5	**Type of Visual**	Low vision	29	49.2
	Impairment	Blindness	30	50.8
		Total	**59**	**100.0**

Factor Analysis

Factor analysis was conducted to identify the underlying constructs that were deemed important in determining the overall level of SMS usage amongst people with visual impaired. Principal component analysis was used as the method of extraction. The Kaiser rule for number of factors to extract was utilized. Factor components with Eigenvalue greater than one were retained and Varimax was selected as the rotation method. The criteria was employed to avoid a situation of cross-loading, to determine and interpret whether the factors extracted were similar to those used by Igbaria et al. (1998) and Jusoh et al. (2008) in which the cut-off loading was 0.5 or greater on one factor and 0.35 or lower in the other factors. To determine sampling adequacy, the KMO and Bartlett's test was carried out. The results indicated that the KMO value of 0.761 indicates that the sample is great to be performed with factor analysis, as posited by Kaiser (1970). After performing several rounds of factor analysis, a total of three items were deleted from the analysis. The items removed due to cross-loading and values below 0.5 were PA16, PA17 and PA23. Five components were extracted with Eigenvalue exceeding 1, which explain the total variance of 69.21. The breakdowns of its values are seen in the Table 2.

Table 2 Rotated Component Matrix

		Component				
		1	2	3	4	5
PA7	Using SMS enables me to accomplish task more quickly	**0.746**				
PA8	Using SMS enhances my task effectiveness	**0.834**				
PA9	SMS makes it easier to do my task	**0.695**				
PA10	SMS improves my task performance	**0.809**				
PA11	SMS allows me to save time and effort in performing my tasks	**0.714**				
PA12	SMS is useful in performing my task	**0.795**				
PA22	SMS takes a short time to respond	**0.537**				
PA13	I have fun interacting with SMS		**0.872**			
PA14	Using SMS provides me with a lot of enjoyment		**0.892**			
PA15	I enjoy using SMS		**0.853**			
PA21	SMS can be sent instantly			**0.629**		
PA20	It is easy to use SMS			**0.536**		
PA1	I will use SMS more in the future			**0.771**		
PA2	I will recommend my friends to use SMS			**0.580**		
PA3	Compared to the charges that I need to pay, the use of SMS offers value for money			**0.591**		
PA19	I am pleased with the charges that I have to pay for the use of SMS				**0.841**	
PA18	The charges that I have to pay for the use of SMS is reasonable				**0.840**	
PA24	It is convenient to access to SMS				**0.518**	

PA6	The use of SMS is very valuable					**0.805**
PA5	Compared to the time that I need to spend, the use of SMS is worthwhile to me					**0.734**
PA4	Compared to the effort that I need to spend, the use of SMS is worthwhile to me					**0.634**
	Number of Items	7	3	5	3	3
	Eigenvalues	**8.795**	**2.975**	**2.005**	**1.666**	**1.171**
	Percent of Variance Explained (69.213)	**36.644**	**12.397**	**8.354**	**6.940**	**4.879**
	Cronbach's Alpha	**0.914**	**0.967**	**0.749**	**0.748**	**0.802**
	Decision	**Retain**	**Retain**	**Retain**	**Retain**	**Retain**

Reliability Analysis

The results showed that the coefficient alpha values for all the measured variables were all above 0.5 as summarized in Table 3 below. According to Nunnally (1978), a Cronbach alpha of above 0.7 will be accepted. The findings indicate that all the questionnaires scales score has adequate internal consistency reliability as the lowest score is 0.748 which is more than acceptable value.

Table 3 Summary of Reliability Analysis

Factor	Cronbach's Alpha	Number of Items
1 (Usefulness)	0.914	7
2 (Enjoyment)	0.967	3
3(Ease of Use)	0.749	5
4 (Perceived Fee)	0.748	3
5 (Behavioral Intention)	0.802	3

Table 4 Pearson Correlation Analysis

Variables	Behavioral Intention	Usefulness	Enjoyment	Perceived Fee	Ease of Use
Behavioral Intention	1.00				
Usefulness	0.546(**)	1.00			
Enjoyment	0.362(**)	0.595(**)	1.00		
Perceived Fee	0.159(**)	0.004(**)	0.246(**)	1.00	
Ease of Use	0.443(**)	0.459(**)	0.484(**)	0.317(**)	1.00

** Correlation is significant at the 0.01 level.

Regression Analysis

Regression analysis was carried out to test the four hypotheses.

Table 5 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.596[a]	.355	.307	.68749	.355	7.422	4	54	.000

a. Predictors: (Constant), perceived fee, usefulness, ease of use, enjoyment

Table 6 Regression Analysis

Predictors (Independent Variables)	**Standardized Coefficient Beta**	**Significant (*p*)**
Usefulness	0.480	0.002
Enjoyment	0.054	0.715
Ease of Use	0.215	0.117
Perceived Fee	0.106	0.382

Dependent Variable: Behavioral Intention
Adjusted $R^2 = 0.307$

Table 7 Summary of statistics

Hypotheses	**Coefficient (*r*)**	**Sig (*p*)**	**Result**
H1: There is a significant relationship between usefulness and behavioural intention.	0.546	0.002	Accept
H2: There is a significant relationship between enjoyment and behavioural intention.	0.362	0.715	Reject
H3: There is a significant relationship between perceived fee and behavioural intention.	0.159	0.382	Reject
H4: There is a significant relationship between ease of use and behavioural intention.	0.443	0.117	Reject

Based on the Table 5 above, the value of R = 0.596 indicates that the strength of the relationship between the independent and dependent variables is quite high. The R^2 value of 0.307 suggests that 30.7% of the variance in user satisfaction is explained by the four variables i.e. ease of use, perceived fee, enjoyment, and usefulness in this sample. This deduces that 69.3% of the variance in behavioural intention is explained by other variables not included in this study. Regression analysis was carried out in order to assess the predictive

power of the predictors (or independent variables) i.e. ease of use, perceived fee, enjoyment, and usefulness in explaining the variance of dependent variable i.e. behavioural intention. According to the Table 6 above, only usefulness has significance level below 0.05. This indicated that there is a significant relationship between usefulness and behavioural intention. The standardized coefficients value for usefulness ($\beta = 0.480$) is the highest among the predictors, which indicates that usefulness is the most important variable in the predicting behavioural intention to use SMS by people with visual impairment. This result further supported the reason of usefulness construct being used extensively in information systems and technology research, and has strong empirical support as an important predictor of technology adoption (Matheison, 1991, Lu, Deng & Wang ,2010, Susanto & Goodwin, 2010). Surprisingly, enjoyment, perceived fee and ease of use are not statistically significant in explaining the variance in behavioural intention despite the correlation analysis results showed positive relationship between the two variables.

The analyses discussed above have successfully tested and supported the hypotheses except for H2, H3 and H4. The first hypothesis, *H1: There is a significant relationship between between usefulness and behavioural intention.;* is supported since its regression significance level is less than the selected significant level of 0.05 and the correlation analysis shows a strong positive relationship between the two variable ($r = 0.546$). However, there is lack of support for *H2: There is a significant relationship between enjoyment and behavioural intention;* even though the correlation analysis shows a medium positive relationship between the two variables ($r = 0.362$). Further analysis to test H2 using regression analysis indicated an insignificant relationship between enjoyment and behavioural intention (significance value is 0.715 which is more than $p= 0.05$). This is incongruent with the findings by Eric et al. (2012), Hong et al. (2006) and Davis et al. (1989), whereby, individuals, who experience immediate pleasure or joy from using any technology (including SMS) are more likely to adopt the technology and use it more extensively than others. The third hypothesis, *H3: There is a significant relationship between perceived fee and behavioural intention* is not supported since its regression significant level, ($p = 0.382$) which is more than the selected significant level of 0.05 and the correlation analysis shows a weak positive relationship between the two variable ($r = 0.159$). This finding suggested that monetary cost did not serve as a barrier to adoption. Further, it was coherent with Chong et al. (2012) who found that cost or perceived fee don't have direct significant relationship with Chinese consumers' intention to adopt 3G. However, Kim et al. (2005) found that perceived fees was the top concern for M-internet adoption, as users are deterred more by the costs than they are attracted by benefits. Finally, hypothesis #4, *H4: There is a significant relationship between ease of use and behavioural intention,* also not supported as the relationships between the variables were statistically insignificant (significance value is 0.117 which is more than p=0.05). This is congruent with Alain et al. (2012) who found that perceived ease of use doesn't have a direct and significant influence with Chinese consumers' intention to adopt a technology.

Conclusion

Drawing upon Theory Acceptance Model (TAM), this research develops a model of SMS acceptance among visually impaired, which argues that discussion on the technology acceptance should not be limited to perceived ease of use and perceived usefulness, yet should include perceived fee and enjoyment. In order to predict the model developed, four hypotheses linking the motivations behind a visual impaired individual's commitment towards SMS were formulated and discussed. The finding discovered that only usefulness has significant relationship with user's behavioral intention of SMS. However, there were lack of support for enjoyment, ease of use and perceived fees on SMS adoption among people with visual impairment particularly at MAB. In the future, the creation of ease of use, more interesting services to cater this type of users, and improving the simplicity and transparency of charging plans become essential in order to facilitate the blind and low vision in using the SMS and the assistive technology that are embedded into the mobile devices. Understanding the current SMS users' behavior towards the current SMS service is important to the telecommunication service providers given the similarity between normal people and people with visual impairment users. Further research can be conducted over a more heterogeneous sample of Malaysians with a better formulated and in depth survey so as to yield more representative results.

References

Alain Yee-Loong Chong, et al. (2012). An empirical analysis of the determinants of 3G adoption in China. *Computers in Human Behavior*, *28* (2), *360-369.*

Chong, A. Y. L., et al. (2012). Determinants of 3G adoption in Malaysia: A structural analysis. *Journal of Computer Information Systems*, 51, 71–80.

Davis, F. (1989). Perceived usefulness, perceived ease of use and user acceptance of information technology. *MIS Quartely*, 319-340.

Eric, W.K. (2012). User experience on mobile video appreciation: How to engross users and to enhance their enjoyment in watching mobile video clips *Technological Forecasting and Social Change, In Press, Corrected Proof, Available online 18 April 2012.*

Hong, S.H., and Tam, K., (2006). Understanding the adoption of multipurpose information appliances: The case of mobile data services. *Information Systems Research*, 17 (2), 162–179.

Igbaria, M., and Tan, M (1997). The consequences of information technology acceptance on subsequent individual performance. *Information & Management*, 32(3), 113-121.

Jusoh, R., Ibrahim, D.N., and Zainuddin. (2008). Selection Approach to Assessing the Alignment between Business Strategy and Use of Multiple Performance Measures in Malaysian Manufacturing Firms. *Asian Journal of Business and Accounting*, 1(1), 67-91.

Kim, Y.J., Eom,M.I.I., and Ahn, J.H. (2005). Measuring IS Service Quality in the Context of the Service Quality-User Satisfaction Relationship. *Journal of Information Technology Theory and Application*, 7(2), 53-70.

Lai, T.T. (2004). Service quality and perceive value's impact on satisfaction, intention and usage of short message service. *Information System Frontiers*, 6(4), 353-368.

Lu, Y. Deng, Z., and Wang, B. (2010). Exploring factors affecting Chinese consumers' usage of short message service for personal communication. *Info Systems Journal*, 20, 183–208.

Mathieson, K. (1991). Predicting user intentions: comparing the technology acceptance with the theory of planned behavior. *Information System Research*, 2 (3), 173-191.

Nunnally, J.C. (1978). Psychometric Theory. New York:McGraw Hill.

Susanto, T. D., and Goodwin, R. (2010). Factors Influencing Citizen Adoption of SMS-Based e-Government Services. *Electronic Journal of e-Government*, 8 (1), 55 – 71.

MOHD AIDIL RIDUAN AWANG KADER, ROSLINA ALI, NOR KHAIRUNNISA MAT YUNUS, SHAMSUL NIZAM MOHAMED BADRI, Universiti Teknologi MARA (Pahang).
aidilriduan@pahang.uitm.edu.my,roslinaali@pahang.uitm.edu.my,norkhairunnisa@pahang.uitm.edu.my, shamsulnizam@pahang.uitm.edu.my.

SUHANA MOHEZAR ALI, Universiti Malaya, suhanamohezar@um.edu.my.