Predicting Short Message Service (SMS) Usage among University Students using the Technology Acceptance Model (TAM)

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Abstract

This paper uses the Technology Acceptance Model (Davis, 1989) to predict SMS usage amongst university students who form the biggest user of this service. TAM proposes that two constructs ie; perceived ease of use and perceived usefulness will influence the acceptance of a technology. Data was collected from 90 students from a public university with the use of a structured self-administered questionnaire. The findings of the study indicate that both perceived ease of use (β=0.191, p<0.05) and perceived usefulness (β=0.276, p<0.01) are positively related to usage. Furthermore, it was found that the impact of perceived ease of use on usage is partially mediated by perceived usefulness. Perceived usefulness was more influential in predicting usage as compared to ease of use. Thus it can be concluded that the use of SMS is influenced to a larger extent by the utility of the service and to a lesser extent the ease of use of the service.

Keywords: Technology Acceptance Model (TAM), perceived usefulness, perceived ease of use, usage, Short Messaging Service (SMS), university students

1. Introduction

Short Message Service (SMS) is defined as the transmission of short text messages to and from a mobile phone, fax machine and/or IP address. Messages must be no longer than 160 alpha-numeric characters and contain no images or graphics. The growth of text messaging is phenomenal given that it has been less than three years since cellular operators rolled out the inter-operator SMS in October 2001. The biggest contributor to this increase is the growing number of mobile phone users. There were 10 million subscribers of mobile phones in 2003 (42.4% of the total population, 36.9% in 2002 and 30.8% in 2001) and 97% users know how to use SMS.

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2. Conceptual Model

The Technology Acceptance Model (TAM) pioneered by Davis (1989) advances the TRA by postulating that perceived usefulness (PU) and perceived ease of use (PEU) are key determinants that inevitably lead to the actual usage of a particular technology or system. Perceived usefulness is defined as "the degree to which an individual believes that using a particular system would enhance his or her productivity" while perceived ease of use is defined as "the degree an individual believes that using a particular system would be free of effort" (Davis, 1989). Between the two, perceived ease of use has a direct effect on both perceived usefulness and technology usage (Adams, Nelson & Todd, 1992; Davis, 1989).

Based on the TAM (Davis, 1989) the following research model was derived. (see figure 1)
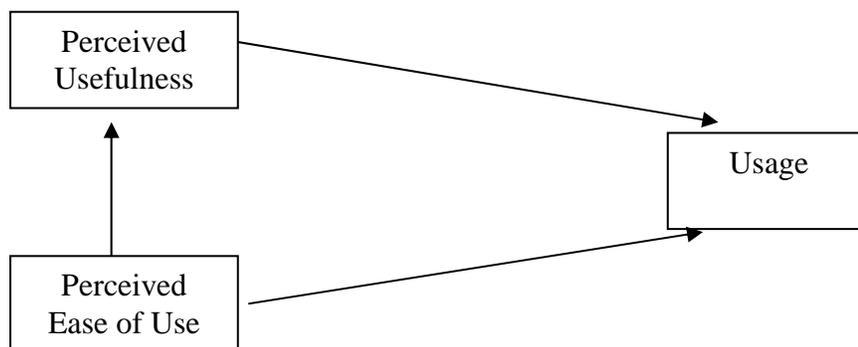
Figure 1: Research Model

   The research hypotheses formulated for this research are as follows:

   H_1:   Perceived ease of use will positively influence the perceived usefulness of SMS.
   H_2:   Perceived ease of use will positively influence the usage of SMS.
   H_3:   Perceived usefulness will positively influence the usage of SMS.

H$_4$:   Perceived usefulness will mediate the relationship between perceived ease of use and usage of SMS.

3. Methodology

The population of this study consisted of all undergraduate students enrolled with a public institution of higher learning. A structured questionnaire consisting three parts (demographic characteristics, perceived ease of use, perceived usefulness, and usage of SMS) was used to collect the data for this study using a convenience sampling. The instruments used were adopted from Davis (198). A total of 90 responses were received from a total of 200 questionnaires distributed which gives a response rate of 45%.

4. Results

4.1 Profile of the respondents

Table 1 presents the profile of respondents. Most of the respondents were females, aged between 22 and 23 years old with a large majority being Malays followed by Chinese students.

Table 1. Profile of the respondents

	Frequency	Percent
Age		
21	22	24.4
22	27	30.0
23	34	37.8
24	7	7.8
Gender		
Male	26	28.9
Female	64	71.1
Ethnicity		
Malay	52	57.8
Chinese	28	31.1
Indian	10	11.1

3.2 Goodness of Measures

A factor analysis with varimax rotation was done to validate whether the respondents perceived the two constructs (PU and PEU) to be distinct. The results showed a two factor solution with eigenvalues greater than 1.0 and the total variance explained was 75.616% of the total variance. Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was 0.635 indicating sufficient intercorrelations while the Bartlett's Test of Sphericity was significant ($\chi2= 167.158$, $p< 0.01$). We used the criteria used by Igbaria et al. (1995) to identify and interpret factors was: each item should load 0.50 or greater on one factor and 0.35 or lower on the other factor. Table 2 shows that

result of the factor analysis. These results confirm that each of these constructs is unidimensional and factorially distinct and that all items used to measure a particular construct loaded on a single factor indicating high discriminant validity.

Table 2. Results of the factor analysis

	Component	
	1	2
PU1	**.885**	-.274
PU2	**.870**	-.208
PU3	**.822**	.102
PEU1	-.138	**.816**
PEU2	-.060	**.866**
Eigenvalue	2.238	1.543
Percentage variance (75.616)	44.753	30.863

Next the reliability of the measures was assessed using the inter-item consistency reliability measure of Cronbach's alpha. According to Nunnally (1978) a Cronbach alpha of above 0.7 will be acceptable. The results showed alpha values that ranged from 0.722 for perceived ease of use to 0.951 for usage thus confirming the reliability of the measures used.

Table 3. Descriptive statistics and reliability.

Variable	Mean	Standard deviation	Number of Items	Cronbach's alpha
Perceived Usefulness	5.00	1.034	3	0.833
Perceived Ease of Use	5.11	0.629	2	0.722
Usage	4.31	0.892	2	0.951

Note: The scale used for perceived usefulness and perceived ease of use ranged from 1 to 7, whereas for usage it was from 1 to 5.
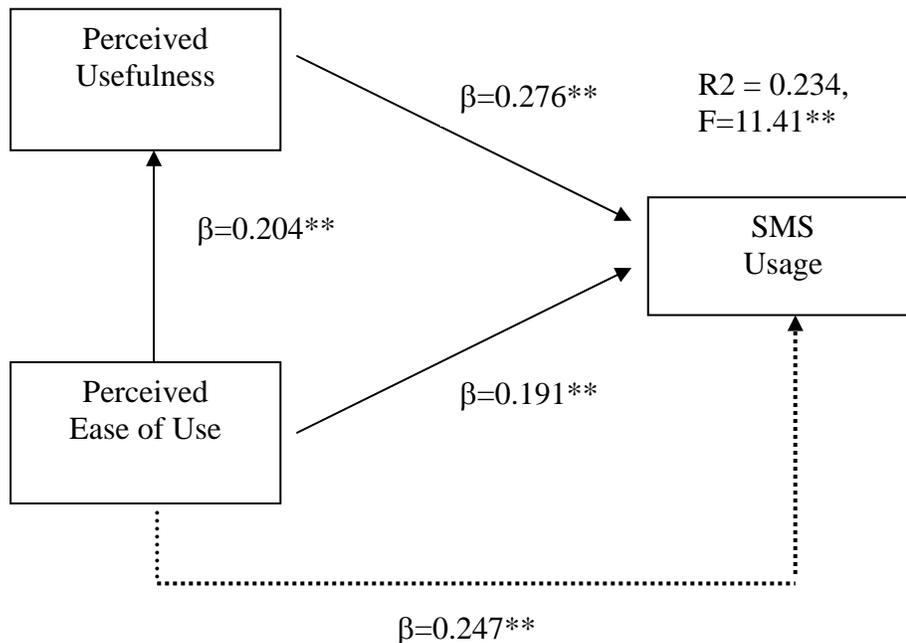
3.3 Results of the regression analysis

To test the four hypotheses generated 2 regression analysis was conducted. One was to gauge the impact of perceived ease of use on usage and the second one was on the impact of perceived ease of use and perceived usefulness on usage. The results of the regression analysis are presented in Figure1.

Perceived ease of use was positively related to perceived usefulness ($\beta = 0.204$, $p < 0.01$) and it was also positively related to usage ($\beta = 0.191$, $p < 0.01$) thus supporting H_1 and H_2 of the study. Perceived usefulness was also positively related to usage ($\beta = 0.309$, $p < 0.01$) and it was also positively related to perceived usefulness ($\beta = 0.276$, $p < 0.01$) thus supporting H_3 of the study. Perceived ease of use and perceived usefulness together explained 23.4% of the variation

in usage. Perceived usefulness exerted a higher influence on usage confirming many other previous studies which found that utility of a technology drives intention to use that particular technology (Ndubisi et al., 2001, Ramayah et al., 2003a, 2003b; Ramayah & Aafaqi, 2005)

To test H_4, we used the procedure suggested by Baron and Kenny (1986) to test the mediating effect. As can be seen from Figure 2, when perceived ease of use was regressed against usage it was significant at the 0.01 level with a beta value of 0.247. When perceived usefulness was added to the regression the beta value for perceived ease of use was still significant but the value reduced to 0.191 with the inclusion of perceived usefulness. This is consistent with the partial mediation effect as suggested by Baron and Kenny (1986). Full mediation is present when the beta value of perceived ease of use becomes insignificant with the inclusion of the mediator variable. Thus H_4 is also supported.

Note: The dotted lines show the beta coefficients when perceived ease of use was regressed on SMS usage

Figure 2. Results of the regression analysis

5. Conclusion

The results indicate that PU and PEU positively influence the usage of SMS. Perceived usefulness was more influential in predicting usage indicating the importance of utility of the technology in ensuring acceptance. It was also further shown that perceived usefulness partially mediated the relationship between perceived ease of use and usage which goes to show the important role of usefulness in technology adoption.

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