The Effects of Cognitive Functions of Smartphone Users on their Behavioral Intention

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Abstract. A IS literature review found that little empirical research on the cognitive functions of smartphone users has been documented. Specifically, there has been little understanding and evidence about the impact of the cognitive functions of smartphone users on their intention to use applications. The main research goal of this study is to empirically examine the relationship between the mental model of users and their intention to use applications. Structural Equation Modeling (SEM) was used to analyze the data collected by a survey. The results showed that there is an effect of the mental model of users on the dependent variable, intention to use applications.

Keywords: Mental, Model, Cognitive, Functions, Intention, Use.

1   Introduction

Although they are very versatile, smartphones still have less overall capabilities in general than their PC counterparts. Especially, smartphones have small display screens and low resolutions compared to PCs. These hardware limitations make applications difficult to have a usable interface. If the user interface of an application is less usable, then users may not think the application not only useful, but also easy to use. Thus, a usable user interface is critical to any application [9, 10] and plays an important role for users to create the mental model of applications. A mental model can be defined as a cognitive structure comprised of specific knowledge [8]. Their views imply that smartphone users are also able to not only understand, but also use their applications based upon their mental model of the applications which are created based on the user interface of the applications.

Over the past decade, TAM introduced by Davis [4] has been applied to understand the attitude IT users holds about the use of a variety of technologies, which is used to predict the adoption of numerous technologies [7, 13]. Perceived usefulness and ease of use are behavioral beliefs impacting on attitude which influences intention to use [5]. Researchers have validated and extended this model by not only providing a number of empirical tests and model variants, but testing in various information technology contexts [1, 6, 11, 12].

Based on these views, it seems possible to infer that the mental model of smartphone users has an impact on the variables in the. A comprehensive IS literature review, however, found that there has been little understanding and evidence about the impact of the mental model of users on their behavioral beliefs and attitude in a smartphone application context. Thus, the main research goal of this study is to empirically examine the relationship between the mental model of users and their intention to use applications. Hypotheses are proposed below.

H1: The mental model of users positively affects perceived usefulness in a smartphone application context.

H2: The mental model of users positively affects perceived ease of use in a smartphone application context.

H3: Perceived usefulness positively affects users' behavioural attitude toward using applications in a smartphone context.

H4: Perceived ease of use positively affects users' behavioural attitude toward using applications in a smartphone context.

H5: User attitude toward using applications positively affects users' behavioural intention to use the applications in a smartphone context.

2   Data Analysis and Results

The research aim of this study is to examine the effect of the mental model of smartphone users on their intention to use applications through the variables in the TAM, perceived usefulness, perceived ease of use, and attitude. A survey was conducted to collect data and a total of 236 students and practitioners participated in the survey. Of the respondents, 66.9% were undergraduates and 33.1% were practitioners. Fifty point four percent were male. Eighty point one percent were in their twenties. The students volunteered for the survey were majoring in various academic programs including business administration, economics, and computer science at three universities in Korea.

This study employed Structural Equation Modeling (SEM) with AMOS ver. 18 to test the proposed research model. First of all, the reliability of individual measurement items was examined to test the measurement model. All of the loadings for the measurement items in the model were greater than the recommended level of 0.6, suggesting adequate reliability [2, 3].

Next, in order to assess the convergent validity of the constructs in the model, two measurements, composite reliability (CR) and average variance extracted (AVE) of latent variables were examined. The results found that all constructs had the estimates of CR greater that the recommended tolerance of 0.7. In addition, the results also showed that the values of AVE for all constructs exceeded the recommended cutoff 0.5. Therefore, these results demonstrated convergent validity was satisfactory.

After that, the square root of the AVE of any latent variable was compared with the correlation between the particular latent variable and other variables in order to examine the discriminant validity of the constructs in the model. The results showed

that the square roots of the AVEs are higher than the construct correlations. These test results exhibit good disrciminant validity.

Following that, the goodness of fit for the model was checked using the x^2/df, GFI, AGFI, NFI, TLI, CFI, and RMSEA. The statistics are as follow: x^2/df = 2.984, GFI = .865, AGFI = .815, NFI = .908, TLI = .923, CFI = .936, and RMSEA = .092. The overall fit statistics suggested the hypothesized model has a fairly good fit.

Finally, the structural model was analyzed to examine the significance and strength of relationships hypothesized. The results showed that mental model positively influenced perceived usefulness (β = .650; p < 0.001) and perceived ease of use (β = .793; p < 0.001), which support H1 and H2 (see Table 5). Perceived usefulness (β = .719; p < 0.001) and ease of use (β = .124; p < 0.05) also positively influenced attitude respectively, supporting H3 and H4. In addition, attitude positively affected intention to use (β = .792; p < 0.001), supporting H5.

3   Discussion

This study empirically examined the relationships between the mental model of users and the variables in the Technology Acceptance Model including perceived usefulness and ease of use, attitude, and intention to use. The results showed strongly significant effects of the mental model of users on their beliefs. This means that if the mental models of users comply with the actual ways of using the applications, then the users perceive that the applications are not only useful, but also easy to use.

Furthermore, this study found that there were significant effects of the two beliefs on users' attitude toward using applications and users' attitude to their intention to use the applications. That means, once usefulness and ease of use are perceived, then the users show positive attitude toward using applications, which in turn lead to intention to use the applications. Therefore, the findings of this study mean that the mental model that users hold plays a critical role for user IT adoption in a smartphone application context. These results not only confirm and extend the Technology Acceptance Model [4, 5], but also can be used to predict user IT acceptance in a smartphone application context.

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