Validating the Extended Technology Acceptance Model: Perceived Playfulness in the Context of Information-searching Websites

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ABSTRACT

Prior research that has used the Technology Acceptance Model (TAM) to predict Internet usage has focused on perceived ease of use and perceived usefulness of websites. More recently, in an extension of TAM to include an intrinsic motivator, perceived playfulness was found to be another important factor in user acceptance of websites (Moon and Kim, 2001). Since then, no other research found has validated the significance of perceived playfulness. The purpose of this study is therefore to validate Moon and Kim's extended TAM by exploring the importance of the intrinsic factor "perceived playfulness", in the context of information-searching sites on the Internet.

Keywords:

Technology Acceptance Model, Perceived Playfulness, Information Searching, Intrinsic Motivation

INTRODUCTION

Since its introduction by Fred Davis in 1986, many researchers have used the Technology Acceptance Model (TAM) to predict the acceptance and use of information technologies (Venkatesh et al. 1996). User acceptance of the Internet is no exception (e.g. Moon and Kim, 2001 ; Teo et al., 1999 ; Liaw, 2002). Usage of the Internet is growing at an astonishing rate and has been used in a wide variety of application (Teo et al., 1999; Jiang et al., 2000). It is therefore important to conduct research into user acceptance of Internet websites. As the Internet increases in popularity, website designers will want to ensure that their particular site encourages maximum user acceptance.

Research using the original TAM tends to focus on extrinsic motivators of user acceptance, that is perceived ease of use and perceived usefulness (Lederer et al., 2000; Chen et al., 2002; Liaw, 2002; O'Cass and Fenech, 2003). However, other works contend that in the context of the Internet, intrinsic motivating factors are equally important (Hoffman and Novak, 1996; Teo et al., 1999). An intrinsic motivator that could affect user acceptance of the Internet is Flow (Hoffman and Novak, 1996).

Moon and Kim (2001) subsequently extended TAM by including an intrinsic motivation factor, Perceived Playfulness, based on the concept of Flow. The authors found that Perceived Playfulness was a significant factor in user acceptance of websites. Although Moon and Kim (2001) extended TAM by introducing Perceived Playfulness, no other research found has validated their findings. Of interest is finding out whether Perceived Playfulness contributes to user acceptance of information-searching websites.

The purpose of this study is therefore to validate Moon and Kim's (2001) extended TAM by exploring the intrinsic factor "Perceived Playfulness" in the context of information-searching sites on the Internet. Due to the unrestrained nature of the Internet and its size, most users would need to navigate through the various options via an information-searching site in order to locate the right information (Earle 1999). Research into user acceptance of information-searching sites would therefore be helpful to website designers wanting to gain more

user traffic through better user acceptance of these sites. User acceptance of information-searching sites would also encourage better access to other information from the Internet.

In the next section, the paper introduces Moon and Kim's (2001) extensions to the original TAM in the context of the Internet and the study's research model. This is followed by a discussion of the methodology. The results are then presented followed by a discussion and the conclusion ensues.

TECHNOLOGY ACCEPTANCE MODEL

The TAM was developed from the Theory of Reasoned Action (TRA) created by Fishbein and Ajzen (1975). The TRA has been proven successful in predicting and explaining a variety of human behaviours (Davis et al. 1989). It describes how beliefs and attitudes towards using an 'object' lead to behavioural intention, which ultimately leads to actual behaviour (Karahanna et al. 1999).

The TAM is tailored towards the information systems environment and its goal is to, "provide an explanation of general determinants of computer acceptance" (Pijpers et al., 2001, pg 960). Jiang et al. (2000) stated that the TAM has become one of the most prominent theoretical models in this area. Many researchers have validated TAM in their studies. This shows the model is robust and is replicable. The two key constructs of the TAM are perceived ease of use and perceived usefulness. Davis (1989) concluded that these constructs were important determinants of computer usage.

TAM studies focused on the Internet

Although several researchers have attempted to extend and adapt the TAM for different systems and situations, including the Internet (Lederer et al., 2000 ; Jiang et al., 2000; Liaw, 2002; O'Cass and Fenech, 2003), its weakness lies in the fact that it is largely extrinsically motivated. For example, perceived usefulness and perceived ease of use are considered extrinsic motivators (Davis 1993). Teo et al. (1999, pg 26) defined extrinsic motivation as: "The performance of an activity because it is perceived to be instrumental in achieving valued outcomes that are distinct from the activity itself."

Davis (1989) stated that future technology acceptance research models should address how other variables affect user acceptance, apart from the extrinsic variables already included in the model, as new technologies may be developed in new situations and for different purposes. The Internet is one such new technology, which can be used for both leisure and work. Intrinsic motives may therefore play an important part in computer usage (Malone 1981). People may use the Internet not just because they are rewarded for doing so, but because they genuinely enjoy it.

Intrinsic Motivation

According to Teo et al., 1999, intrinsic factors play an important part in determining usage of the Internet, and should therefore be included in the TAM model. People may use the Internet because they genuinely enjoy it. Intrinsic motivation can be defined, per Teo et al. (1999) as: "the performance of an activity for no apparent reinforcement other than the process of performing the activity per se." . They also defined extrinsic motivation as, "the performance of an activity because it is perceived to be instrumental in achieving valued outcomes that are distinct from the activity itself."

One variable that could affect user acceptance is an intrinsic motivator, Flow, which can be described as a process of "optimal experience" or the most enjoyable experience possible (Csikszentmihalyi, 1990). Hoffman and Novak (1996) suggested that a user will become engaged in a website if they experience the effects of Flow. If not, they will experience anxiety and boredom.

Moon and Kim extended TAM by including an intrinsic motivation factor, Perceived Playfulness, based on the concept of Flow. Chen et al. (2002) stated that playfulness is an important factor to motivate users to utilise a system. Moon and Kim defined Perceived Playfulness as: "The extent to which the individual Perceives that his or her attention is focused on the interaction with the World Wide Web; Is curious during the interaction; and Finds the interaction intrinsically enjoyable or interesting." In their study, they found that Perceived Playfulness had a significant positive relationship with Attitude toward Using. They concluded that it is important for developers to include intrinsic and extrinsic motivational factors in user interface design, thus helping to improve usability.

While Moon and Kim's study found evidence supporting an additional construct, Perceived Playfulness, as part of the TAM, no attempt was made to further validate their findings. This study therefore attempts to validate Moon and Kim's (2001) results.

Information-Searching Context

Many studies that have used TAM to predict Internet usage, focused on the Internet very generally (e.g. Teo et al., 1999; Liaw 2002). These asked very broad questions in their surveys. Focusing on the Internet generally has the drawback that the Internet covers a very wide variety of activities. A respondent could relate any one of these to their answers in the questionnaire. This means that the outcome may not be specific enough to study anything in detail. Churchill (1979) recommended that focusing on a particular site would help to define a unit of analysis and therefore encourage a more accurate response with greater validity. A few studies have looked at one specific part of the Internet, focusing on using it for retail purposes (e.g., Chen et al., 2002; O'Cass and Fenech, 2003) or work purposes. No studies focused on any other specific task (for example, using the Internet for information searching). Therefore, the focus of this paper is to validate the extended TAM in the context of the Internet for information-searching purposes.

Research Model and Hypotheses

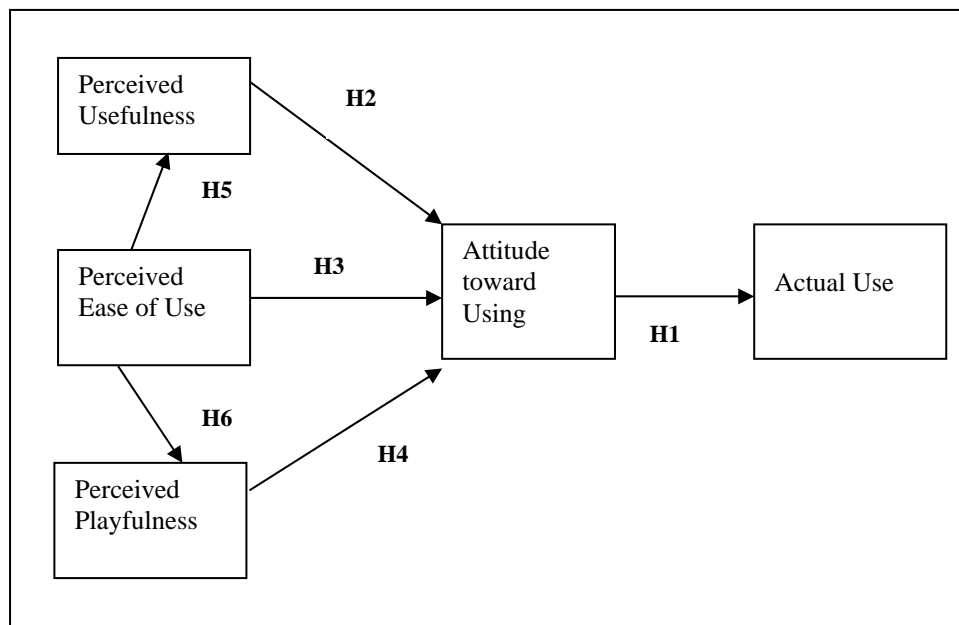Fig 1 presents the research model and the hypotheses tested.

Figure 1: Research Model

Positive relationships between the variables identified in the hypotheses above have been identified in the existing literature (e.g. Davis, 1993 ; Moon and Kim, 2001 ; Venkatesh and Davis, 2000). Previous research has found that if a user perceives that the system is easy to use, useful and playful, they will therefore have a positive attitude towards using it. This in turn will encourage actual use. For instance, studies have found that Perceived Ease of Use has a positive effect on Perceived Usefulness (e.g. (Moon et al. 2001); (Davis 1993)) and Perceived Playfulness (Moon et al. 2001). Perceived Playfulness is based on the concept of Flow – ie. most enjoyable experience (Csikszentmihalyi, 1990). Chen et al. (2002) state that playfulness is an important factor to motivate users to utilise a system. Prior research also supports the view that perceived ease of use influences system use indirectly via perceived enjoyment (or playfulness) as systems "that are difficult to use are less likely to be considered enjoyable" (Moon and Kim, 2001 p. 220). The aim of this research is to test the extended TAM (Moon and Kim, 2001) in the context of using the Internet for information searching purposes.

METHODOLOGY

Sampling

The sample consisted of students attending Information Systems courses at a university in New Zealand. Only students attending the classes were given a chance to participate in the study. The sample comprised of students attending five undergraduate classes and one postgraduate class. The method for selection of this sample was by convenience. Hence, the sample was not generalisable to the population (Cavana et al. 2001). University

students were chosen as the target sample due to (1) the fact that all Information Systems students are likely to be computer literate, because of the nature of the degree and (2) most students would have experience using the Internet on a regular basis. Participants' familiarity with using the Internet permits attitudes and beliefs to be measured based on direct behavioural experience (Davis, 1993).

Research Design

A questionnaire was used to collect data for this study. The questionnaire contained scales to measure the various constructs of the model. The scales for Perceived Ease of Use and Perceived Usefulness were based on the original scales validated by Davis (1989) and Davis (1993). Six scales were used for each construct, on a 7-point Likert measure. The scales used to measure Perceived Playfulness were based on those validated by Moon and Kim (2001) with six scales being chosen to maintain consistency with the other two constructs. The Attitude toward Using and Actual Use measures were based on scales used by Davis (1993).

The questionnaire was pre-tested. Two university lecturers and eight students participated in the pre-test. These respondents resembled the target sample expected to be surveyed (Cavana et al. 2001). The pre-test instructed respondents to fill out the questionnaire and report back any feedback they had on it. Respondents stated that they had no problems completing the questionnaire within the 10 minutes allowed. Other feedback given was used to modify the questionnaire slightly.

The questionnaire was handed out to students as they entered their lecture rooms, and were collected immediately after they were completed. The advantage of this method was that the cost and time was low, as the sample was not geographically-dispersed (Cavana et al. 2001). The questionnaire focused on the task of Information Searching on the Internet, as this has not been the subject of any TAM research. The respondents were asked to state a specific information-searching site they had used recently to answer the questionnaire. This was to ensure that the respondent answered the questions based on their recent experience with a specific site in mind, enabling greater accuracy in answers given (Churchill 1979). The questionnaire was pilot tested in order to assess whether independent respondents could understand items in the questionnaire.

RESULTS

In total, 292 questionnaires were handed out. 185 questionnaires were returned, and of these, 154 were deemed to be complete for statistical analysis purposes. This is a response rate of 63% in total. A response rate of over 51% is adequate in the social sciences research area (Pinsonneault et al. 1993). Table 1 gives a summary of the backgrounds of the 154 respondents:

Variable	Frequency (n= 154)	Percentage
Age		
Under 20	32	21%
20-29	113	**73%**
Over 30	9	6%
Gender		
Male	105	**68%**
Female	49	32%
Highest Education		
High School	91	**59%**
Undergraduate	52	34%
Postgraduate	11	7%
Ethnicity		
Asian	80	**52%**
European	38	25%
Indian	10	6%
Other	26	17%

Table 1: Respondent Demographic Information

Respondents were asked to specify a website they had recently used for information searching purposes. 52% of respondents answered the questionnaire based on the site www.google.com, while 23% used www.yahoo.com. The other 25% used a wide range of other websites.

Multiple item scales were used to measure the constructs in the TAM theoretical model. To test the validity of the scales, factor analysis was performed. The number of factors to be retained for analysis was chosen by using the Latent root criterion, where variables with eigenvalues greater than 1 were deemed significant. As a result, five factors were be extracted. Table 2 shows the five factors extracted with eigenvalues greater than 1:

Total Variance Explained

Component	Initial Eigenvalues		
	Total	% of Variance	Cumulative %
1	9.301	37.204	37.204
2	3.105	12.421	49.625
3	2.680	10.719	60.344
4	1.346	5.386	65.730
5	1.222	4.887	70.617

Extraction Method: Principal Component Analysis.

Table 2: Eigenvalues greater than 1

To confirm which variables loaded on which factors, an oblique factor analysis using PROMAX was carried out. Table 3 demonstrates how each variable was loaded on a factor:

Variable	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
PU1	.773				
PU2	.912				
PU3	.811				
PU4	.644				
PU5	.940				
PU6	.857				
PEOU1		.884			
PEOU2		.658			
PEOU3		.778			
PEOU4		.926			
PEOU5		.905			
PEOU6		.797			
PP1			.809		
PP2			.702		
PP3			.698		
PP4			.861		
PP5			.795		
PP6			.619		
ATT1				.857	
ATT2				.822	
ATT3				.754	
ATT4				.722	
ATT5				.806	
ActualUse1					.694
ActualUse2					.882

Table 3: Factor Loadings

Almost all variables loaded on the predicted factors with loadings greater than the cut-off of 0.45. Cronbach's alpha was calculated for each of the factors to determine reliability of the factors. All factors had an alpha coefficient of greater than 0.80 demonstrating reliability. Actual Use was not included as it only has 2 items making alpha not so meaningful (Lederer et al., (2000).

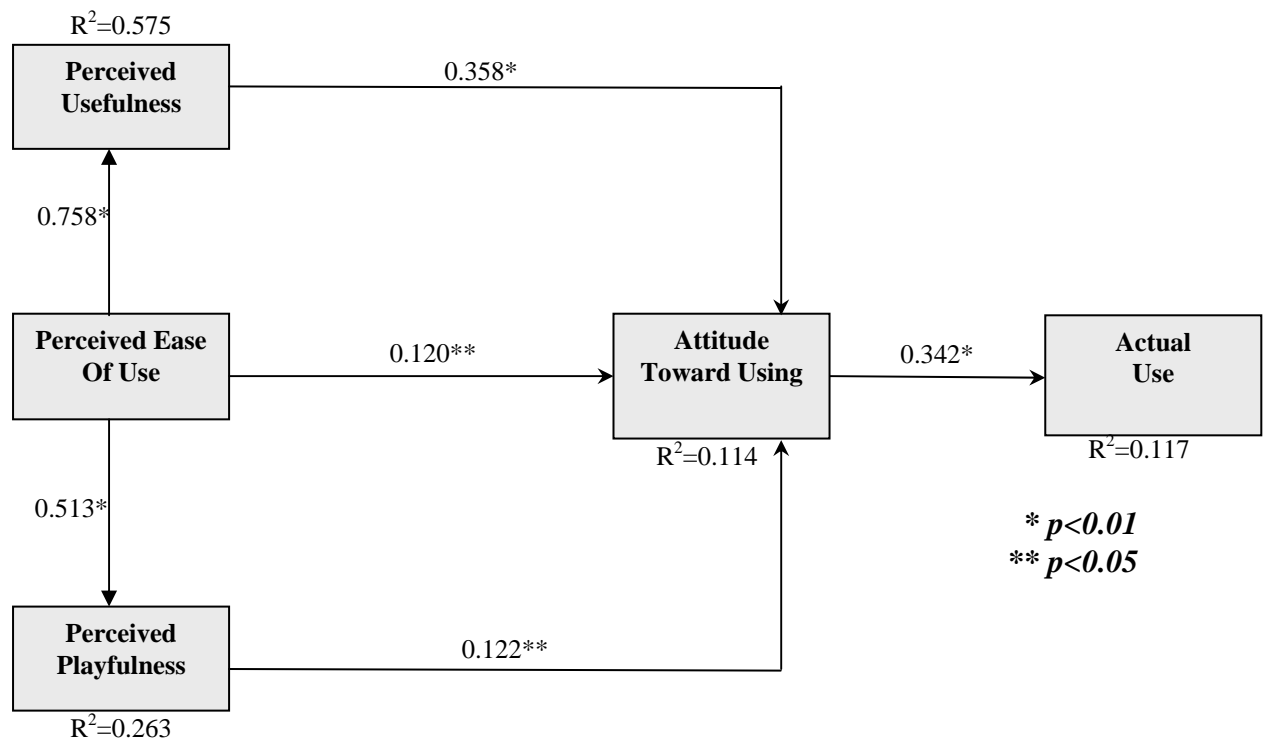Data was analyzed using partial least square technique. Figure 2 presents the structural model.

Figure 2: Results of PLS Analysis

As the model suggests, all path coefficients are statistically significant at the level of $p<0.01$ and $p<0.05$. These support the notion that if users perceive the information-searching website is useful (H2), easy to use (H3) and playful (H4), they will therefore have a positive attitude towards its use. This in turn will encourage actual use (H1). The results also suggest that Perceived Ease of Use has a positive effect on Perceived Usefulness (H5) and Perceived Playfulness (H6).

DISCUSSION

The overall findings from this study suggest that Moon and Kim's (2001) extended Technology Acceptance Model could be validated in the context of using the Internet for information searching purposes. However, aspects of the results need to be interpreted cautiously. For instance, a significant positive relationship was found between the Attitude toward Using and Actual Use. Consequently, Hypothesis 1 was supported. However, Attitude toward Using only explained 11.7% of Actual Use (compared to 37.8% reported by Moon & Kim). The low explanation of Actual Use by the variable Attitude toward Using may indicate that there are other variables, not included in this study, which may contribute to explaining more of Actual Use of the Internet for information searching purposes. Compeau and Higgins (1995) found that Self-Efficacy was an important determinant of Actual Use in their cross-sectional study. They defined Self-Efficacy as, "an individual's perceptions of his or her ability to use computers in the accomplishment of a task" (pg 190). The authors found that Self-Efficacy was positively related to Actual Use of a system, demonstrating that if an individual thinks they have the ability to perform a task, they are more likely to use the system. These findings were further validated by Compeau et al. (1999) – this time in a longitudinal study. The inclusion of the variable Self-Efficacy to help explain Actual Use of the Internet for information searching purposes should be investigated in future studies.

Hypotheses 2 and 3 were based on the original TAM relationships, and both were substantiated. These supported previous validations of TAM (e.g. Davis, (1993); Moon and Kim (2001)) demonstrating the robustness and generalisability of the model to information-searching context. The findings also showed that Perceived Usefulness had a stronger effect on Attitude toward Using than Perceived Ease of Use. A significant positive relationship was also found between Perceived Playfulness and Attitude toward Using (Hypothesis 4). This validates Moon and Kim's (2001) extended TAM in the context information-searching. However, the effect was reported to be weaker than Perceived Usefulness. Moon and Kim found that Perceived Usefulness had a more significant effect than Perceived Playfulness when the Internet was used for work-related purposes. We contend that information-searching is more likely a goal-directed than an experiential task like web

browsing (Ghani and Deshpande, 1994; (Novak et al. 2003)). This may help explain the stronger effect of Perceived Usefulness on Attitude toward Using.

Nonetheless, the results reported a significant positive relationship between Perceived Playfulness and Attitude toward Using. While research has been carried out on constructs very similar to Perceived Playfulness (i.e. Flow, Engagement and Cognitive Absorption) these have not been in relation to the Technology Acceptance Model. Very little research has been done on the significance of Perceived Playfulness in the TAM context. As mentioned earlier, Moon and Kim (2001) was the only study found which included Perceived Playfulness as a predictor of Attitude toward Using, along with the original constructs Perceived Ease of Use and Perceived Usefulness. The finding that Perceived Playfulness has a positive effect on Attitude toward Using within the TAM context demonstrates that intrinsic motivation is important when predicting user acceptance of the Internet for information searching purposes. This is a significant contribution to the TAM literature, and supports Moon and Kim's (2001) findings in their study. Future research should examine Perceived Playfulness more thoroughly and explore the antecedent factors that can impact on this variable.

The results also found that the relationship between Perceived Ease of Use and Perceived Usefulness to be significantly positive (Hypothesis 5). Also, there was a significant positive relationship between Perceived Ease of Use and Perceived Playfulness (Hypothesis 6). These results support Moon and Kim's (2001) findings. However, caution is needed in interpreting Hypothesis 6. Perceived Ease of Use was found to only explain 26.3% of Perceived Playfulness (Moon and Kim reported only 14.3%). This may indicate that other variables are also needed to help predict Perceived Playfulness – for example, challenge (Hoffman et al. 1996), experimentation (Webster et al. 1993) and computer self-efficacy (Koufaris 2002).

Finally, there are a number of limitations in our study. Firstly, the sample was taken on a convenience basis. It allowed information to be collected quickly and effectively. The results therefore must be interpreted with some caution as they cannot be generalised. A more diverse population should be considered in future research. Secondly, data was collected at the same point in time which suggests the possibility of a common method variance in the research design. This can be avoided in future research by either obtaining measures from different sources, or separating the measures (Podsakoff et al., 2003).

CONCLUSION

This study contributed to existing research by validating the extended Technology Acceptance Model and confirming the importance of perceived playfulness in a different context – the use of the Internet for information searching purposes. The significance of perceived playfulness indicates that intrinsic motivation plays an important role in this context. The study has provided evidence of the robustness of Moon and Kim's (2001) extended TAM and indicated the generalisability of the model.

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