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Assessing User Acceptance towards Virtual Museum: The Case in Kedah State Museum, Malaysia

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Abstract

This paper describes the testing analysis that has been done towards a prototype of virtual museum named ViSeum. The prototype was based on the real Kedah State Museum (KSM) at Northern Malaysia. This ViSeum was developed using non immersive virtual reality technique, whereas it focused to reduce cost development and maintenance, easy access and more interactive. The objective of this study is to present the result of the analysis based using Technology Acceptance Model on the survey. Perceived usefulness, perceive ease of use, and perceived enjoyment are the independent variables in testing intention to use by visitor.

Keywords: **Virtual museum, Technology Acceptance Model.**

1. Introduction

Museum has the potential to become a powerful tourism product because of the uniqueness of its arts and cultures. Museums are the most suitable institution for cultural promotion because of the culture, arts, history and artistic activities [16]. According to Datuk Dr. Mohamed Arif Nun, Chef Executive of Multimedia Development Centre (MDC) (1999), learning histories do is not just to remember dates and events but also to look at ourselves and what has happened to our grandparents [12].

However, 74.1% of museum visitors want to see interactive exhibitions, although there are still many museums using traditional techniques in their exhibition [16]. Virtual museum is an alternative to gives user experience interact with the virtual environment. The development of Kedah State Museum's (KSM) Virtual Museum (ViSeum) has been done and was tested using Technology Acceptance Model (TAM).

2. Problem Statement

As reviewed, until the present, there is a limited amount of research being done in virtual museum development and usability testing for the system, especially in Malaysia. As an example, a virtual tour of Sarawak focused on panoramic tours, where the virtual heritage of Malacca was based on a full-immersion environment. For this research, the researcher is trying to develop ViSeum non-immersive and three dimension (3D) walkthrough characteristics in the environment to study their potential.

Today, each prototype or system developed needs to test its usability to ensure that it is easy enough for users to interact with. This study focused on TAM since TAM has shown that it has successfully tested the usability of the systems [2], [3], [9], [11], [14], [19], [20], [30] [34] and was used by most of the researchers [10], [18], [28], [36]. This paper studies the acceptance and the intention to use from visitors using TAM.

3. Virtual Museum

Virtual museums were constructed with the most advanced technology of the day in an effort to reconstruct the past, disseminate ideas, or demonstrate new ideas in a way the observer would feel they are actually taking part in the real thing, or push the observer closer to the actual experience [21]. Virtual reality (VR) offers an exciting new cost-effective way to generate excitement for the museum and its

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exhibits, and increase guest participation. Additionally, guests could learn more about an exhibit than they have ever dreamed.

This research is trying to bring down some "walls" of fear of loss of control on the museum end, and has opened up some new ways of thinking of reaching new audiences, as well as increasing the knowledge base on art, not just from inside the museum, but also for scholars on the outside. The museum is allowing end users to walkthrough its images; to 'create' virtual exhibitions, and to enjoy works of art on their own time, and in their own places – named ViSeum.

Figure 1 ViSeum prototype

The creation of 3D museums is the next logical step in museum presentation. Referring to Jones and Christal [13] and Samah [27], "the next generation of 3D technology in museums is now possible and affordable". Users can easily access the cultural heritage stored in museums around the world and search and access virtual museums information as the contents of single federated museums [29]. Virtual museum can be used as a reference version and allows the access of fragile, closed, destroyed, stolen or remote sites [23]. To complement traditional museums, interactive 3D virtual museums offer museums the opportunity of presenting rich virtual exhibitions, which contain accurate or high fidelity 3D digital models of objects together with layers of information.

4. Technology Acceptance Model

TAM is an information systems theory that models how users come to accept and use a technology. TAM and SUMI are of special interest because they will be applied in the usability attribute reference model and preference test [15]. Awang, Yaakub and Othman [5], Dillon and Morris [8], and Sun and Zhang [28] stated that TAM is seen as a good parsimonious model to predict and measure user technology acceptance. From Sun and Zhang's [28] review it was found that TAM mainly focuses on individual perception at the level of individual actions even though prior research mainly focused on the mix of level of analysis. For these reasons, the researcher decided to test Virtual exhibition using the TAM model.

The TAM is one of the more widely accepted theoretical frameworks that has been used to measure system acceptance. Several researchers have consequently authenticated TAM using a number of diverse applications including primarily e-mail, voice mail, word processing, and spreadsheets [14]. TAM has been applied to give explanation about diffusion by means of user-perception measures as well as actual usage measures.

There are four common TAM variables will discussed in this paper, namely Perceived Usefulness (PU), Perceived Ease of Use (PEU) and Perceived Enjoyment (PE) and Behavioural Intention (BI) as a dependent variable as discuss below.

4.1 Behavioral Intention

Ajzen and Fishbein, [1] pointed out that for Behavioral Intention (BI) to be a predictor of use the measure of acceptance to use computer. Use of the new technology of ViSeum is basically to validate whether the system will be accepted or rejected by customers. However, questions should be raised as to whether behavioural intention is appropriate in the context of virtual environment applications. Using VR as a tool in conveying historical information is basically a transaction process between visiting real exhibitions to a new approach of visiting; a virtual exhibition where users have more chances to visit the museum without needing to go to the real exhibition. Users might also walk about and look at exhibitions. Research has consistently shown that BI is the strongest predictor of actual use [6], [10], [30], [32].

4.2 Perceived Usefulness

Perceived usefulness (PU) is defined as "the degree to which a person believes that using the particular system would enhance his or her job performance [5]." This follows from the definition of the word useful: capable of being used advantageously. TAM posits that PU is a

significant factor effecting acceptance of an information system.

Based on a review of acceptance and innovation studies, it emphasizes the relative importance of usefulness towards technology acceptance and usage [20], [26], [33], [35]. For PU, we notice that items fall into three main clusters. The first cluster relates to job effectiveness, the second to productivity and time savings, and the third to the importance of the system to one's job. And here, the main elements in the questionnaire that was developed are time saving, enhanced comprehension and interest. These elements were based on the TAM model that was developed by Davis [5].

4.3 Perceived Ease of Use

Perceived usefulness is defined here as "the degree to which a person believes that using a particular system would be free of effort [5]." This follows from the definition of the word useful: freedom from difficulty or great effort. Kwon and Chidambaram [17] used and tested the TAM model to examine patterns of cellular phone adoption and usage in an urban setting. The results of the study confirm that users' perceptions and especially perceived ease of use (PEU) are significantly associated with the motivation to use cellular phones. According to Ramayah and Ignatius [25] and Venkatesh [32] perceived ease of use has been generally recognised as a key factor increasing acceptance and utilisation of a technology.

4.4 Perceived Enjoyment

Igbaria *et al.* [11] define perceived enjoyment as the degree to which using the technology is fun or pleasant for an individual. Definitions of perceived fun and perceived playfulness are quite similar to the concept of PE [24]. Overall, they concluded that individuals accept technology because its use is beneficial and great. Most people cannot withstand boredom. Perceived enjoyment has a greater effect on intentions if perceived usefulness is high (and vice versa) [7].

5. Findings

The main interest of this study was to determine the effects of perceived usefulness, ease of use and enjoyment towards new technology usage. This study is classified as a correlational and regression study to identify the importance factors associates with the variables interest. In addition, hypotheses testing were undertaken to explain the variance in the dependent variable to predict technology usage.

The population for this study is visitors of KSM and the design used for this sampling is simple random sampling. Hence, 404 visitors are used as a real test and this is from a total of 456 visitors who answered the questionnaire.

5.1 Correlation Analysis

The correlation coefficient (r) indicates the strength of the association between two metric variables. Spearmen-product-moment correlation is used to describe this relationship.

Table 1 gives a summary frequency table of the correlation comprising the intention matrices for usefulness, ease of use and enjoyment. ViSeum usage correlated 0.70 for usefulness, 0.61 for ease of use and 0.67 for enjoyment. The overall usefulness-intention was significantly greater than the ease of use-intention and enjoyment-intention and has a positive relationship toward intention. All correlation variables indicated a positive relationship with each other and significant at a 0.01 level.

Table 1 Spearman Correlation Matrix

Variables	BI	PU	PEU	PE
BI	1.00			
PU	0.703**	1.00		
PEU	0.612**	0.573 **	1.00	
PE	0.670**	0.586**	0.604**	1.00

** Correlation is significant at the 0.01 level (1-tailed)

5.2 Regression Analysis

Regression analysis is used to support results of correlation as discussed before. It was applied to examine the effect of two factors that affect behavioural intention on user perceived. The main reason for employing this technique is to determine the minimum number of a set of variables which the most strongly related to the dependent variable explained by these variables.

Table 2 shows all of independent variables explain for almost 62% of the variance in the perceived factors. By analysing the magnitude of coefficient, the variable that has the largest value of standardised beta coefficient would posses the largest variation or effect on the dependent variable. As considered to the variables in table above, perceived usefulness is observed to have

the largest effect with a standardised beta of 0.4 as compared to the degree of perceived enjoyment and perceived ease of use with the standardised beta only at 0.3 and 0.2. Thus, H_1, H_2 and H_3 were significantly explained the variance is supported by the result.

The regression analysis shows that all of the variables had a positive relationship and were supported. This implies that customers accepted the ease of use, usefulness and enjoyment as factors to use ViSeum.

6. Discussion

Among the objectives of the research, customer acceptance of ViSeum was studied in the light of the TAM. This model was proposed that ViSeum acceptance could be modelled with the variables derived from the TAM.

From the descriptive statistics, this study demonstrates the main values of perceived usefulness, perceived ease of use and perceived enjoyment are 4.25, 3.98 and 4.24 respectively. Based on a 5-point Likert Scale, the readings are above the medium scale.

The results of the regression coefficient analysis conducted on the three factors indicated that PU was found to be the most influential factor in explaining the intention to use ViSeum by individual customers of the Museum. This was supported by several studies, Davis [5], Dolen and Ruyter [9], Karjaluoto and Pahnila [24], Ramayah and Jantan [26], and Venkatesh [32], who found that PU had a strong regression to intention to use. The outcome of the study seems to have fulfilled the objectives when it clearly identified the strongest relationship of perceived usefulness toward intention to use ViSeum.

PE was the second statistically significant determinant in this model. Other studies have found controversial findings of the role of enjoyment on acceptance. While Davies *et al.* [7], Igbaria *et al.* [11], Heijden [10] Pikkarainen *et al.* [24] and Teo, Lim and Lai [31] have noticed that PE significantly affects intention to use computers, Igbaria *et al.* [11] found that enjoyment has no statistically significant correlation with the acceptance of data processing systems. The positive relation between perceived enjoyment and intention to use ViSeum goes to show that users will only use ViSeum if they find it enjoyable to visit virtually.

7. Conclusion

This finding is in line with other TAM studies [5], [24] which found that PEU has less relationship with technology acceptance than PU. This suggests that BI impinges on acceptance through PU and PE.

For future work, more research regarding used of virtual reality in others public museums in Malaysia can be carried out.

Table 2 Regression coefficient between perceived factors and behavioural intention to use the system

Independent Variable	Unstandardised Coefficients	Standardised Coefficients			
	B	Std. Error	Beta	t	Sig.
(Constant)	-.381	.168		-2.275	.023
PU	.462	.046	.394	10.136	.000
PEU	.214	.044	.193	4.910	.000
PE	.387	.047	.327	8.231	.000
R2	0.617				
R2 adjusted	0.615				

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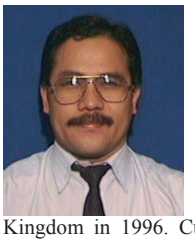

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