User Acceptance of Immersive Virtual Reality (IVR) on Information Dissemination for Nature Tourism in Malaysia

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Abstract Immersive Virtual Reality (IVR) has the potential to alter the way people connect radically. This research aims to analyze user perspective on information dissemination of IVR displays for nature tourism and determine the significance of user acceptance of IVR applications in nature tourism applications. TAM model was used to evaluate user acceptance of IVR. Four constructs were used, which are Perceived Ease of Use (PEOU), Perceived Enjoyment (PENJ), Perceived Usefulness (PU), and Intention (I). The data was collected using a validated questionnaire and distributed through social media and face-to-face interaction.

Keywords: Virtual reality, nature tourism, user acceptance, technology acceptance model and information management

1 Introduction

Prospective tourists must be persuaded to visit a destination and its attractions from afar, which has always been difficult for tourism destinations worldwide. Immersive Virtual Reality (IVR) is one such technology that has the potential to alter the way people interact with one another drastically. Some industries attempt to incorporate and proportionately add value to this emerging technology. By stimulating the senses with computer-generated images, it enables people to immerse their minds in experiencing VR or AR as another real version of reality. These simulations can represent any tourist attractions or locations as 3D imageries, managed by powerful computers, resulting in a complete Virtual Environment (VE). The interface between the real-world consumer and the VE is called the system (Nayyar et al., 2018). Users can use a virtual reality headset's hardware and software devices to experience and explore local destinations in real-time and space. Various companies provide software with various services, as well as different interfaces and applications. Using VR travel apps was simple and convenient (Fang et al.,

2019). According to (Oyelude, 2018), libraries can access using AR and VR and some apps are free. While in the agricultural (Jain et al., 2016), education (Hodgson et al., 2019) and medical field, according to Marques et al. (2010), the first step in the planning of nature-based tourism is the analysis of tourism demand. It involves looking at the park tourism market as a communication tool and disseminating conservation values. It was discovered that IVR has a lot of potential in nature tourism for providing both information and entertainment and that it has a lot of applications in tourism

2 Problem Statement

The tourism industry, which had always relied on tourist expectations for novelty and first-hand experiences, responded to the crisis in various ways. Museums, heritage sites, and tourist attractions have been hesitant to allow visitors to fully explore their collections, features, or environments online until recently due to a fear that digital imitators would dilute the experience or, worse, compete with the actual sites and steal potential visitors away (El-Said et al., 2021; Sarkady, 2021). Although virtual reality (VR) has the potential to be a new marketing channel, its acceptance in the tourism industry is almost unexplored. In Malaysia, there are only research on non-IVR for Museum Melaka (Samah et al., 2020) and fewer studies on IVR in other fields.

3 Research Objectives

The objective is developed to achieve the best possible outcomes based on the problem statement. The research objectives are:

3.1. To analyze user perspective on information dissemination using IVR displays for nature tourism.

3.2. To determine the significance of user acceptance of IVR applications nature tourism context.

4 Research Hypotheses

For this study, there are five (5) research hypotheses were created to identify the components that influence when testing a hypothesis:

H1: Perceived Ease of Use (PEOU) positively influences intention (I) to use IVR technology for nature tourism.

H2: Perceived Ease of Use (PEOU) positively influences Perceived Enjoyment (PENJ) using IVR technology for nature tourism.

H3: Perceived Ease of Use (PEOU) positive influences Perceived Usefulness (PU) IVR technology for nature tourism

H4: Perceived Usefulness (PU) positively influences intention (I) to use IVR technology for nature tourism

H5: Perceived Enjoyment (PENJ) positively influences (I) Intention to Use IVR technology for nature tourism.

5 Literature Review

5.1. Immersive reality (IR) technologies

Immersive Reality (IR) technology is the sensation of becoming physically present in a non-physical environment (Sekhar et al., 2018). Hence the technology is called "immersive". IR technologies build a human-centric virtual world that allows humans and machines to interact naturally. Issue the integration of vision, sound, and tactile feedback to create an environment for otherwise virtual items (Govindarajan et al., 2018).

5.2. Virtual Reality (VR)

Thanks to IVR technologies, tourists can live and feel experiences through their five senses by immersing themselves in a virtual parallel world at a tourist site. These IVR tourism products and services are becoming increasingly popular as a viable technique for involving institutions, suppliers, and local communities in creating entertainment while also maintaining and safeguarding wild or cultural areas (González-Rodríguez et al., 2020).

5.3. Technology Acceptance Model (TAM)

The TAM theorizes that two elements influence the inclination to utilize a prospective system: perceived usefulness and perceived ease of use. The TAM is based on the Theory of Reasoned Action (TRA), which states that the intention to execute a behavior is a direct antecedent to that behavior. Here are the ideas and models established to examine user acceptability and adoption of new technologies. These theories have evolved and are the outcome of each other's extension (Hwang et al., 2016 & Momani et al., 2017).

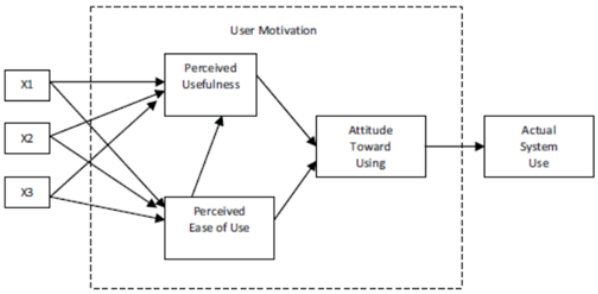

Figure 1: Original Technology Acceptance Model
source: Davis, 1986

Fred Davis introduced TAM for his doctoral proposal in 1986, as seen in Figure 1. TAM is a modified version of the Theory of Reasonable Action designed to describe consumers' adoption of information systems or technologies. In addition, TAM has proven to be a theoretical model for explaining and predicting information technology users' behavior (Lai, 2017; Disztinger et al., 2017; Park, 2009).

5.4. Nature Tourism

Tourism's macroeconomic statistics highlight its global influence and serve to understand why it has become a focus of international policy. In 2014, the World Travel and Tourism Council (WTTC) reported that travel and tourism supplied 277 million employment and 9.8% of global GDP directly and indirectly to the global economy. An industry that facilitates individual needs for travel, subsistence, and pleasure is essential to the movement of hundreds of millions of people and the development of the economic repercussions reflected by these data (Holden, 2016 & Chen et al., 2017).

5.5. Information Dissemination

ICTs can support information dissemination and the reduction of communication costs. Facebook, Twitter, blogs, and other social media platforms have become the focal point for rapid information dissemination. The most useful ICT tool for information dissemination (Bhoi, 2017). The intelligent spread model's sense of immersion, fun, degree of recognition, memory intensity, and artistic conversion probability are all higher than the traditional technique of information dissemination applied in the past. Traditional art dissemination methods supplemented by intelligent technologies are generally

coupled with diverse audio-visual art forms such as visuals, music, and animation to better interact with visitors. It combines the popular cultural economy with more immersive, engaging, and innovative ways (Chen, 2018).

6 Research Methodology

The approach that will be used for this research is the quantitative method. The goal of research design is to guide the organization of settings for data collection and analysis in a way that is relevant to the research objectives (Terre et al., 2006 & Gorard, 2013). The research design should provide a plan to answer a research question.

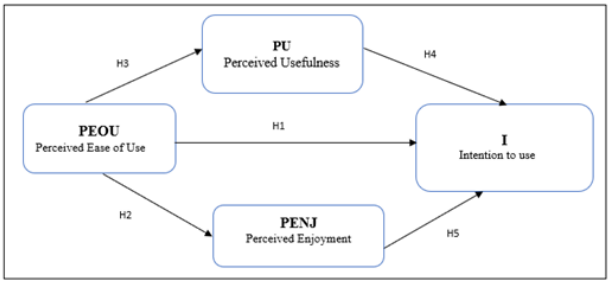

Figure 2: Technology Acceptance Model (TAM)
(Adopted from Davis et al. (1996) and Van der Heijden, 2004)

Figure 2 shows the Technology Acceptance Model (TAM) adapted from Davis et al. (1992) and Van der Heijden (2004) is one of the most widely used models for assessing user acceptance because of its simplicity and context independence. This research is to find the acceptance of IVR technology constructs used in TAM. Arrows represent trigger relationships. The arrows between constructs and indicators represent measurement validity.

6.1. Research Instrument

A research instrument is a tool for how data for research can be collected. The research will b use online surveys and face-to-face questionnaires using Google form resultant URL and QR code survey will be distributed to respondents through various social media platforms such as Facebook Messenger, WhatsApp and email and face-to-face in an open area. Contents of the questionnaire were adopted and modified from the English version already developed by authors Davis (1989).

6.2. Sampling size

The target population at Damansara, Petaling, the state capital of Selangor as the participants with poa population 516,666 based on information at https://statsgeo.mycensus.gov.my/ and the number of completed responses 186 is the simple size on population in Damansara based on calculation RAOSOFT calculator with a margin of error by (7.5%), (95%) of confidence level. The research group agreed on the margin of error after a consensual debate; a margin error of 0.075 (7.5%) was accepted and used in previous studies (Conroy, 2018 & Hentzen et al., 2021).

6.3. Conduct Analysis

The data will use two (2) methods: descriptive analysis and correlation analysis. Descriptive analysis is to see if there was any bias in the intervention and control groups (Thyrian, et al., 2016) and only summarize the characteristics of a data set. A correlation is a relationship between events or things or between mathematical or statistical variables that tends to vary, be related, or occur together in ways that are not predicted by chance alone (Schober et al., 2018;). Correlation tests are one of the most widely used statistical

processes, and they're employed in various applications, including exploratory data analysis, structural modelling, and data engineering. The purpose is to be small, simple, and

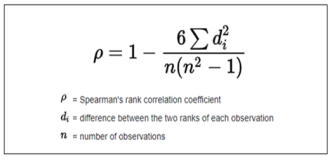

Figure 3: Formula for a Spearman Correlation

A Descriptive analysis and Correlation analysis were calculated to predict Usefulness (PU), Ease of Use (PEOU), Enjoyment (PENJ) and Intention to use (1) based on presence. The data export in SPSS Statistics version 23 and the programming system will be used to analyze data collected and linear regression to see the relationship between respondents and IVR technology.

7 Results and Finding

RO1: To analyze user perspective on information dissemination using IVR for nature tourism. The first objective of this research was to analyze user perspectives on information dissemination of IVR displays for nature tourism in Malaysia using descriptive analysis from a survey questionnaire to explain the user perspective of a total of 186 people. The main properties of the data in this study are described using descriptive statistics. The descriptive analysis utilized in this study provides a concise overview of the samples and measurements used in a given study. They are used in practically all quantitative data analyses that focus on a single variable and look at the distribution. An higher percentage score represents replies that imply higher attributions of the information dissemination of IVR and vice versa since the questionnaire scale varied from 1 (Strongly Very Disagree) to 7 (Strongly Very Agree).

For construct Perceived Usefulness, the highest percentage is participants who agree with the percentage PU1=49.5, PU2=39.2% and PU3=39.8%. The lowest is disagree with usefulness IVR using on nature tourism with percentage PU1= 1.6% and for PU2 and PU3 respectively 1.1%. These questionnaires only use a Likert scale of 3 to 7 as per the result below in Table 6. For the second construct, Perceived Ease of Use, participants' opinions on level easy it is to use IVRs in nature tourism. There are several responses from the participant. PEOU1 and PEOU2 show the highest agreement percentage, with 36.6% and 44.1%. The lowest is strongly very disagree and strongly disagree for PEOU1 and PEOU2 with a percentage of 0% for both. For PEOU3, participants disagree with the highest percentage with 33.3% and the confusing participants to support or not. Based on pilot testing, the questionnaire PEOU3 show low reliability.

Although showing low results, when the results from real data show are applicable. Table 6 shows the result of the descriptive analysis. The third construct, Perceived Enjoyment, has four (4) questionnaires, and participants can use their opinions on the enjoyment IVRs. Table 6 shows the result, and the highest strongly agree with PENJ1=33.9%, PENJ2=29.6%, PENJ3=24.2% and PENJ=28.0%. The lowest percentage from the table shows that participants have several answers for participants. The scale used is semantic differentials in this construct. The perceived intention is the last construct and the opinions of the participants on intention using IVR on nature tourism. The result from Table 6 shows the participants agree it has the greatest number of 44.1% and the lowest 0, which strongly disagrees and strongly disagree, where no participants answered.

Table 6: Descriptive Statistics (n = 186)

Questionnaire Item	Strongly Very Disagree	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Strongly Very Agree
PU1: Using this technology would make travel more comfortable.	0%	0%	1.6%	14.5%	49.5%	29.6%	4.8%
PU2: I find the system useful for travel.	0%	0%	1.1%	13.4%	39.2%	23.1%	23.1%
PU3: This technology would support me in my future travels.	0%	0%	1.1%	10.2%	39.8%	23.1%	25.8%
PEOU1: Learning to operate the system was easy for me	0.5%	0%	4.3%	19.9%	36.6%	23.1%	15.6%
PEOU2: Overall, I find the system easy to use	0%	0%	0.5%	17.2%	44.1%	20.4%	17.7%
PEOU3: I think this technology is complicated to use	4.8%	7.5%	33.3%	31.2%	11.3%	5.9%	5.9%
PENJ 1: Fun	2.7%	0%	0%	11.8%	24.7%	33.9%	26.9%
PENJ 2: Exciting	2.7%	5.9%	5.9%	11.3%	19.9%	29.6%	24.7%
PENJ 3: Easy	3.2%	4.8%	6.5%	19.9%	21.5%	24.2%	19.9%
PENJ 4: Interesting	6.5%	3.8%	4.8%	22.0%	4.8%	28.0%	25.3%

I1: I intend to keep using this technology	0%	0%	1.1%	15.1%	44.1%	21.0%	18.8%

Overall, the results show that the respondents mostly agree with IVR display in nature tourism. Users see this idea can attract visitors to nature tourism, where nature tourism only displays the atmosphere of nature. In addition, users can also know and learn new technologies that are being used. Also, the use of IVR display is so easy to use. Conclusions that can be made for RO1 show that the positive results of the respondents in the recipients of the use of IVR for nature tourism and the study of RO1 have been achieved as a result of the results of the descriptive analysis made.

RO2: To determine user acceptance's significance on IVR applications in a nature tourism context. The second objective is determining the significance of user acceptance of IVR applications in nature tourism. Malaysia is to determine the relationship between user acceptance and IVR application in the context of nature tourism in Malaysia. The analysis used is Correlation analysis. Correlation analysis is a statistical technique for determining how strongly two variables are correlated. Correlation analysis primarily establishes the relationship between five (5) hypotheses. As shown in Table 4.8, the coefficient range indicates the strength of each variable's link between the range –1 and +1. The parametric test is used to look at the strength of the relationship between different variables. Spearman correlation (ρ) is a non-parametric equivalent. Regarding the data distribution, non-parametric tests are also known as distribution-free tests.

Table 7: Results of hypothesis testing

Hypothesis	Relationships	Coefficient Confidence	p-Value	Supported	Result
H1	PEOU + I	0.462	0.000	Moderate relationship	Supported
H2	PEOU + PENJ	0.146	0.047	Weak relationship	Supported
H3	PEOU + PU	0.513	0.000	Moderate relationship	Supported
H4	PU + I	0.734	0.000	Strong relationship	Supported
H5	PENJ+ I	0.368	0.000	Weak relationship	Supported

Table 7 shows that the p-value for all of the study's variables is less than 0.05, indicating that the variables were not normally distributed as necessary for parametric testing using Pearson's Product Moment Correlation. As a result, the link between variables is examined using the non-parametric Spearman's rank-order correlation test. Furthermore, the Shapiro-Wilk normality test was used to assess if the study variables were normally distributed in the population.

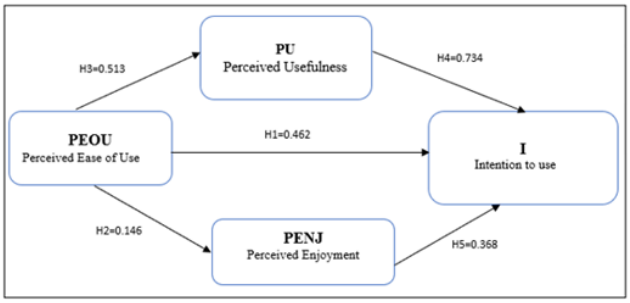

Figure 4: Result Correlation analysis using Spearman's

Figure 4 represents the correlation analysis using Spearman's rank-order correlation. The results and a summary of the proposed hypotheses are presented. The proposed hypotheses are supported in H1 to H5. As shown, there had two (2) weak positive relationship between H2, PEOU between PENJ (rho = 0.146, p-value = 0.000 < 0.05) and H5, PENJ between I (rho = 0.368, p-value = 0.000 < 0.05) respectively. Next, there have two (2) moderate positive relationship between H3, PEOU between PU (rho = 0.513, p-value = 0.000 < 0.05). Furthermore, there is a moderate positive relationship between H1, PEOU and I (rho = 0.462, p-value = 0.000 < 0.05). However, there is only one (1) strong positive relationship between H4, PU between I (rho=0.734, p-value=0.000 < 0.05). The link between the two was shown to be significant using Spearman's rho correlation test. Based on the results study, the significant values between PU and I are very high. Therefore, the intention of respondents to use IVR in nature tourism was strongly positive. This study provides insight into the significance of user acceptance on IVR applications using TAM framework. In conclusion, the objective of this study was achieved. As a result of the correlation coefficient findings, all of the hypotheses are supported, and the result suggests that all variables, including Perceived Ease of Use (PEOU), Perceived Enjoyment (PENJ), Perceived Usefulness (PU) and Intention (I) to use, had a positive and significant relationship with IVR applications in the context of nature tourism.

8 Conclusion

The application of TAM in user acceptance of nature tourism was investigated in this study. The results indicate user acceptance of strong positive Intentions to use IVR technology in Malaysia for nature tourism. This study aimed to analyze the perspective on information dissemination of IVR displays on nature tourism in Malaysia. The second objective of this study was to determine the significance of user acceptance of IVR applications nature tourism context in Malaysia.

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