

# *Influence of Panoramic Vr Software on Tourists' on-Site Travel Intention: an Integrated Model Based on Tam and Idt*

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**Keywords:** Panoramic vr, On-site travel intention, Consumer innovativeness, Technology acceptance models, Innovation diffusion theory

**Abstract:** Using the panoramic VR Palace Museum section of the digital Palace Museum mini program of the Palace Museum, this paper explored the influence of the use of panoramic VR scenic tour software on tourists' on-site travel intention by integrating technology acceptance models and innovation diffusion theory, and introducing variables such as perceived playfulness and subjective norms. The findings of this study were as follows. Perceived usefulness and perceived playfulness are key factors influencing tourists' behavioral intention for on-site travel. Perceived ease of use and consumer innovativeness had a significant positive influence on the perceived usefulness. Consumer innovativeness and subjective norms had a significant positive influence on the perceived ease of use and perceived playfulness. Finally, the paper concluded with recommendations based on the conclusions, with a view to informing tourism enterprises in their digital transformation.

## **1. Introduction**

Under the background of the normalization of prevention and control of COVID-19, the transformation speed of tourism is accelerating, and information technology is reshaping the industry[1]. Tourism enterprises are actively exploring ways to integrate with technology. On the one hand, enterprises use AR, VR and blockchain technology to develop online tourism products and promote cutting-edge consumption patterns such as cloud tourism, cloud exhibition viewing and cloud live streaming, thereby providing tourists with a novel tourism experience and achieving diversified value creation. On the other hand, enterprises actively explore the application of the internet, big data and other technologies in contemporary tourism management. Virtual Reality (VR) is a technology developed in this context and its basic realization is to give people a sense of environmental immersion by simulating the virtual environment with a computer. Many enterprises are beginning to use panoramic VR technology to present scenic spots via the internet. In view of this, there is an urgent need for tourism enterprises to master the factors that really influence tourists' use of new technologies and products, as well as tourists' attitudes and willingness to use them[2].

All along, the Technology Acceptance Model has been widely used by academics to explain

individuals' acceptance and use of information technology. In the field of tourism, scholars also use this model to validate individual travel willingness and behaviors, which includes not only explaining tourists' travel willingness and behaviors caused by new technology, such as smart tourist attractions systems[3]<sup>1</sup>, mobile short-form video[4], tour guide[5], AR technology<sup>[2]</sup>, but also explaining tourists' willingness and behaviors towards a new form of tourism, such as Yacht tourism[6]. Current research on VR technology in the field of tourism pays attention to its role in the tourism industry, but the research on how VR technology attracts tourists, inspires tourists' desire to travel, and puts it into practice is slightly insufficient. Therefore, this paper takes the digital Palace Museum mini program as the object of study, based on the TAM model, and introduces IDT theory to explore the influence of panoramic VR software use on tourists' on-site travel intention, with a view to enriching research in related fields and providing suggestions for the digital development of tourism enterprises.

## 2. Theoretical Basis and Research Hypothesis

Technology acceptance model (TAM) is a theoretical model proposed by Davis based on Rational Behavior Theory and Planned Behavior Theory, which aims to study the behavior of individuals in accepting and using a new technology, product[7]. Innovation diffusion theory (IDT) emphasizes the process by which innovative technologies or products are adopted by individuals or organizations through some communication channels[8]. TAM focuses on the relationship between technology, products and consumer behavior, while IDT focuses more on innovative technology and social communication behavior. Dishaw believes that the combination of TAM and IDT theories can better explain users' behavior towards technology acceptance. Therefore, based on the traditional TAM model, this paper introduced IDT theory and combined the innovative and entertaining features of the panoramic VR software to construct a model of the influence of panoramic VR software use on tourists' on-site travel intention. The model includes six core research variables: consumer innovativeness, subjective norms, perceived ease of use, perceived usefulness, perceived playfulness and on-site travel intention.

Perceived usefulness and perceived ease of use are the two core concepts of TAM. Perceived usefulness refers to the extent to which tourists use panoramic VR software to help them obtain effective travel information and improve their travel efficiency. Perceived ease of use refers to how easy it is for tourists to master the panoramic VR software. According to previous studies, perceived ease of use has a positive effect on perceived usefulness, and perceived usefulness positively affects tourists' on-site travel intention. In addition, scholars have provided statistics in the review to demonstrate that there is a significant and stable correlation between perceived ease of use and perceived usefulness, i.e. perceived ease of use indirectly affects tourists' on-site travel intention through perceived usefulness[9]. Therefore, this paper proposes the hypothesis, shows in Fig.1:

H1: Perceived ease of use positively affects perceived usefulness

H2: Perceived usefulness positively affects tourists' on-site travel intention

Perceptual playfulness means that apart from purchasing behavior, a system itself can bring users a pleasant emotional experience and the level of pleasure perceived by users by its fun, which in turn attracts the user to continue to use the system[10]. Moon and Kim introduced perceived playfulness into the TAM model and verified that perceived playfulness positively influences users' willingness and attitude to use the World Wide Web[11]. Scholars have also proved that in the Web 2.0 era the playfulness perceived by users using the platform has a significant impact on their intention to continue using it[12]. Perceived ease of use and perceived usefulness focus on the more objective and rational aspects of new products and technologies use, while perceived playfulness compensates for the subjective aspects of consumers' decision-making process in choosing products.

The pleasure of playfulness perceived from the panoramic VR software will positively influence tourists' on-site travel intentions. Therefore, this paper proposes the hypothesis:

H3: Perceived playfulness positively affects tourists' on-site travel intention

Innovation diffusion theory (IDT) emphasizes the process that new things, ideas and products expand their application scope with time and space changes<sup>[8]</sup>. Consumer innovativeness is the tendency to independently adopt new ideas or products based on one's own experience rather than the influence of others. Early masses with strong consumer innovativeness and communication initiative are often more likely to be influenced by corporate marketing, resulting in consumption behavior. Yang's and Xiang's research have both verified that individual innovation has a positive impact on perceived ease of use and perceived usefulness<sup>[13][14]</sup>. Subin argues that innovative consumers can get sensory and mental stimulation in the process of exploring new products or services<sup>[15]</sup>. Consumers who are more innovative have a tendency to experience new things and pursue excitement. The higher their innovative characteristics, the stronger their sense of entertainment perceived from new things. Therefore, this paper proposes the hypothesis:

H4: Consumer innovativeness positively affects perceived ease of use

H5: Consumer innovativeness positively affects perceived usefulness

H6: Consumer innovativeness positively affects perceived playfulness

Subjective norms refer to whether an individual anticipates someone important to him believes or expects him to do something<sup>[16][17]</sup>. The sources of subjective norms are mainly family and friends with whom the individual has strong ties and who can influence the individual over time. According to planned behavior theory, the incentive or social pressure formed by subjective norms will affect the individual's behavioral intentions and decisions. Previous studies have proved the effect of subjective norms on technology use behavior. And Teo verified the effect of subjective norms on pre-service teachers' perceived usefulness and perceived ease of computers<sup>[18]</sup>. So this study holds that when a tourist perceives that someone important to him thinks he should use panoramic VR software, the tourist will tend to use the software and show positive attitudes towards it, enhancing its perceived ease of use, perceived usefulness and perceived playfulness. Therefore, this paper proposes the hypothesis:

H7: Subjective norms positively affect perceived ease of use

H8: Subjective norms positively affect perceived usefulness

H9: Subjective norms positively affect perceived playfulness

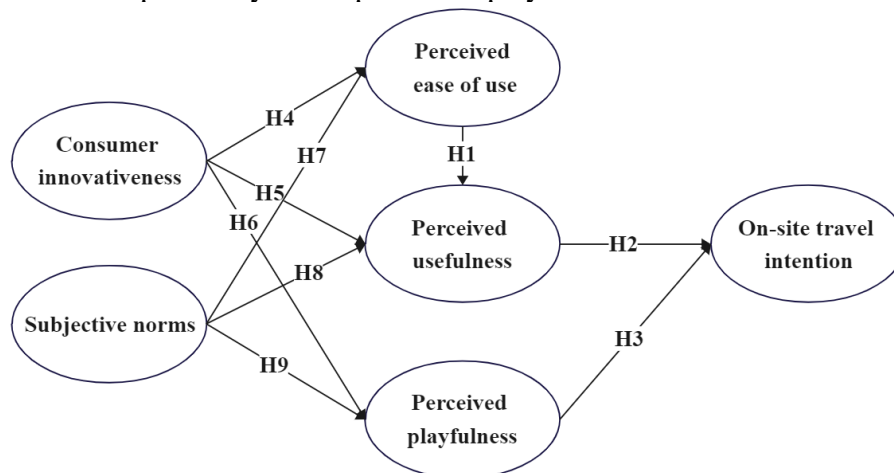


Figure 1: Conceptual Model

The Palace Museum is a representative example of a scenic spot in China that has been an early adopter of technologies such as AR and VR and used them in the online mini program, creating a

virtual travel experience for users and greatly stimulating tourists travel intentions. Therefore, this paper takes the digital Palace Museum mini program as the object of study to analyze the influence of panoramic VR software use on tourists' on-site travel intentions.

Literature analysis is used to determine the research variables, which are divided into observed variables of six core latent variables and demographic items, with a total of 28 items. The experimental procedure required the subjects were asked to watch the panoramic Palace Museum section in the digital Palace Museum mini program before filling in the questionnaire.

This study adopted the questionnaire survey method, the distribution and recovery of questionnaires through the Internet, completed in July 2022, a total of 324 valid questionnaires were collected. the descriptive statistics of the sample are as follows: males accounted for 40.74%; subjects' age was mainly concentrated in 18-24 years old (63.58%), 30.86% of subjects aged 25-50 years old; The subjects' education level was mainly undergraduate (63.89%) and postgraduate (16.98%); their status was mainly school students (64.81%), with civil servants, business managers, general employees and professionals each having a certain share.

The study used SPSS to measure the consistency, reliability and validity of the questionnaire. AMOS software was used to conduct confirmatory factor analysis on the sample data, and SEM and maximum likelihood estimation method were used to test the theoretical model and research hypotheses.

### 3. Data Analysis and Testing

#### 3.1 Test on Reliability and Validity

The overall reliability of the questionnaire in this study was 0.918, indicating a high degree of internal consistency in the items of this scale. The test results showed that the overall KMO value of the questionnaire was 0.913, which is higher than the minimum standard value of 0.5, indicating that the questionnaire is suitable for factor analysis.

Then, the factor loading, the average variance extracted (AVE) and the composite reliability (CR) were used to reflect the convergence validity. The test results showed that the factor loadings of the significant variables were all greater than 0.5, indicating that the scale had good convergent validity. The CR values of all latent variables in this study were greater than 0.7 and the AVE values were greater than 0.5, indicating that the internal consistency of the study model was good.

#### 3.2 Model Fit and Hypothesis Testing

Hypothesis path	Direct effects	S.E.	C.R.	Hypothesis results
H1: Perceived ease of use→Perceived usefulness	0.596***	0.106	5.620	Support
H2: Perceived usefulness→On-site travel intention	0.179***	0.048	3.724	Support
H3: Perceived playfulness→On-site travel intention	0.368***	0.065	5.637	Support
H4: Consumer innovativeness→Perceived ease of use	0.532***	0.064	8.358	Support
H5: Consumer innovativeness→Perceived usefulness	0.517***	0.094	5.518	Support
H6: Consumer innovativeness→Perceived playfulness	0.615***	0.069	8.858	Support
H7: Subjective norms→Perceived ease of use	0.187***	0.045	4.193	Support
H8: Subjective norms→Perceived usefulness	-0.091	0.057	-1.062	Nonsupport
H9: Subjective norms→Perceived playfulness	0.142**	0.047	3.041	Support

Figure 2: Path Check List

On the basis of the reliability and validity analysis, the model fit was comprehensively tested by selecting  $\chi^2/df$ , CFI, IFI, RMR, RMSEA, PNFI, and PGFI. The data results showed:  $\chi^2/df=1.940$ ,

CFI=0.942, FI=0.942, AGFI=0.865, RMR=0.056, RMSEA=0.054, PNFI=0.778, PGFI=0.719. which all met the requirements, therefore, the hypothesis model proposed in this paper fits well with the sample data.

According to the hypothesis test, eight of the nine hypotheses proposed in this paper were supported by data, as shown in Fig.2.

#### A.5. Conclusions, Suggestions and Prospects

### 3.3 Conclusions

Virtual reality technology has given new impetus to the digital development of the tourism industry today. This paper constructs a model of the influence of panoramic VR software use on tourists' on-site travel intention by incorporating IDT theory, perceived playfulness, and subjective norms variables to modify the technology acceptance model, and verifies the relationship between consumers' attitude towards using panoramic VR software and their on-site travel intention from the aspect of technology acceptance and innovation diffusion. Eight of the nine hypotheses proposed in the study were supported. The only hypothesis that was not supported in the study was the positive effect of subjective norms on perceived usefulness, so further research is needed to analyze it.

### 3.4 Suggestions

Based on the above conclusions, this study provides suggestions for tourism enterprises to adopt high-tech for digital construction and product promotion.

*1) Emphasis on user-friendliness in technology use, highlighting product functionality and practicality*

Tourism enterprises should focus on user-friendliness, providing more effective digital information for tourists and potential consumers, dig deeper into the use of VR technology, and improve the fluency, clarity and convenience of the VR scenic spot guide interface. Achieving simplified functions and easy-to-understand operations while capturing higher-definition scenic spots for application. In addition, tourism enterprises should also pay attention to the practical functions of tourism products and ensure the operability of the application interfaces to enhance the perceived ease of use of potential tourists when expanding the application of other technologies. Secondly, functional text information is the main medium for information exchange, so attention should be paid to tapping into the core values of the destination to create in-depth and differentiated cultural content. Enterprises should also make big data calculations on users, analyze their characteristics, and actively push the content of interest to them to achieve accurate recommendations and enhance the perceived usefulness of potential visitors.

*2) Focusing on playfulness and providing diversified services for potential users*

Tourism enterprises should also highlight the playfulness of their products when applying information technology to develop tourism products, introduce interactive modes, and flexibly use video, text and sound to enrich the presentation of their products, creating easy and interesting, humorous and novel tourism product content. For this study, the panoramic VR software can present scenic spots through the introduction of diverse digital means such as user-personalized images, blind boxes and adventure parkour to strengthen the interaction between potential tourists and scenic spots, so that online users can be brought into the role of tourists, gain pleasure and generate consumption willingness.

*3) Differentiated consumer targeting for precise service and marketing*

Tourism enterprises should consider the needs of users with strong innovative qualities, differentiate consumers, provide them with more diversified technical services, and improve the flexibility of the tourism product portfolio to provide customized tourism consumption experiences

for different consumers. At the same time, marketing channels should be expanded to attract tourists or potential consumers to spontaneously use, share and spread the content through high-quality content, promote the products to the general public.

### 3.5 Prospects

There are still some limitations in this study. (1) The majority of subjects in this study were school students, and the generalizability of the results is not high, therefore the scope of the subjects should be expanded in future studies in order to achieve re-validation of the results. (2) The digital Palace Museum mini program was chosen for this study. Although the mini program was developed earlier and is representative, the study did not consider the existing impressions of the famous scenic spot of the Palace Museum among the subjects, and the generalizability of the findings needs to be verified, so other scenic spots could be selected for future re-validation of the results. (3) In considering the influence mechanism in this study, the antecedent variables incorporate consumer innovativeness and subjective norms, but ignore factors such as individual motivation, knowledge and experience value, so future research on VR technology and tourists' on-site travel intention could consider more variables.

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