

Designing Virtual Tourism Experience for an Ancient Temple: Yay or Nay?

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Abstract—As the oldest ancient temple in East Java Province, Indonesia, the Badut Temple have a dualism of function of space where as a building of religious rituals, cultural preservation as well as tourist destinations. Therefore, it is necessary to manage heritage tourist destinations that can maintain the sustainability of the site while satisfying the visitors of the destination. This research uses the Research and Development (R&D) method with a mixed method approach of observation, visual material and experimental surveys using the Multimedia Development Life Cycle (MDLC) model to design dan test the Badut Temple Web-Based Virtual Tourism (Web-VR). The content was subsequently confirmed using field experiments analyzed by GSCA involving Malang City tourists. The results of this study indicate that after visiting the Badut Temple Web-VR, a virtual experience of tourists consisting of immersiveness and telepresence results in a positive attitude to the virtual destination.

Keywords—virtual tourism, virtual experiences, immersiveness, telepresence, attitude, ancient temple

I. INTRODUCTION

The Dinoyo area located in the northwest of Malang City, East Java, Indonesia is well known in Europe because of the reading of the Dinoyo Inscription by F.D.K Bosch in 1916 published in "De Sanskrit - Inscriptive op den Steen Van Dinaya." Furthermore, Bosch argues that the Dinoyo Inscription also stated about the existence of the Badut Temple. The Badut Temple is the oldest Hindu worship temple in East Java, a relic of the Kanjuruhan Kingdom based in Dinoyo. The Badut Temple was founded in 760 AD which was built by King Gajayana of the Kanjuruhan Kingdom [1]. Kanjuruhan Kingdom itself is one of the oldest and pioneering kingdoms in Javanese Culture.

The local government has taken concrete steps to bring back the identity of urban space through the official coronation of Malang as a Heritage City. This identity was taken because of the many architectural heritages in Malang and the increasing number of tourists visiting Malang, especially for historical reasons. In line with this, the Culture and Tourism

Office of Malang City has prepared five heritage tourism corridors, one of which is the Kanjuruhan Corridor, which offers pathways for the Kanjuruhan Occupational heritage sites where one of its main destinations is the Badut Temple.

Geographically, the Badut Temple is located in East Java but is unique in having the architectural style (*langgam*) of the Central Java temple in the form of a tambun, the roof of the steps / stupa, facing east, the location of the temple in the middle of the yard, reliefs and naturalist statues and made of andesite stone [2]. This temple consists of three levels, namely, first, the foot of the temple, is the lowest part of the temple which symbolizes people who are still controlled by low passions such as greed, lies and everything related to lust. Second, the Temple Body, is a symbol of human effort to overcome worldly passions; and finally, the Roof of the Temple, is a symbol of human life that has reached the level of perfection [1].

The Badut Temple is a relic that contains information in the form of historical data about the beliefs of Hindus, social and technology associated with the era of its founding which in the end will provide the basis of historical and cultural literacy of the nation. The logical consequence of establishing the Badut Temple in the Kanjuruhan Corridor as a cultural heritage tourist destination is in addition to potentially supporting the identity and added value of the region as well as being vulnerable to excesses that could threaten the sustainability of the site.

Unfortunately, the Badut Temple has lost its true form. The damage factor is generally caused by site decay due to material age, human activity, high rainfall, population density and the amount of mosses. Furthermore, there is a dualism of spatial functions where, aside from being a cultural heritage site, a historical tourist destination, the Badut Temple is also often used as a Hindu ritual site. Therefore, popularity and mass tourism if not anticipated and managed properly can actually lead to over tourism and further disrupt the stability of the site.

Responding to this, efforts are needed to preserve cultural heritage sites, among others through the development of virtual world content based on virtual reality technology (VR) [3], or what is known as virtual tourism. Virtual tourism offers a realistic experience without taking risks and damaging the reserve site and allows visits to sites with sensitive environments that lack capacity to accommodate many visitors [4] by diverting the quantity of tourist visits directly through virtual visits on virtual tourism content so as to complement virtual visits [5], or used by tourists as an alternative to virtual visits [6,7].

The most important capacity for virtual tourism is the ability to provide virtual experiences that specifically only occur within the boundaries of computer-mediated environments, such as a sense of physical presence (immersion) and psychological presence (telepresence) [8]. Therefore, this research aims to develop the Badut Temple Web-Based Virtual Tourism (Web-VR) and at the same time evaluate tourist attitudes about the immersiveness and telepresence experienced by visitors while visiting virtual environments on the Badut Temple Web-VR.

In this study, researchers will examine the effect of immersiveness [9,10] and telepresence [9-11] perceived by virtual visitors on the Badut Temple Web-VR on visitor attitudes. Even so, in Indonesia not yet found research on creating virtual tourism content from the perspective of tourists. Therefore, it is hoped that this research can fill the research gap.

II. RELATED WORK

A. Virtual Tourism

Virtual tourism is associated with contemporary internet use and consumption of tourist space in a digital way in relation to internet tourists or e-tourists [7]. Furthermore, [8] stated that virtual tour is a technology that places the user in the image and allows the user to increase situational awareness and significantly increase the ability to see, capture and analyze virtual data. Basically, a virtual tour is a location simulation that consists of a series of still images that are combined to produce a 360° panoramic photo.

B. Web-Based Virtual Tourism

Web-Based Virtual Tourism (WebVR) is a JavaScript API for creating immersive virtual reality experiences within the browser. Panoramic photo shooting uses a spherical type that allows you to look up and down (horizontally) as well as left and right (vertical) or 360°. The spherical panoramic photos are then put together in the form of a gallery image, allowing users to visit various locations in one web view and feel as if they have taken an immersive "tour".

C. Technology Acceptance Model

The Technology Acceptance Model (TAM) is a model for analyzing the factors that influence the acceptance of the use of

computer technology. This study adopts a variable in TAM, namely attitude which can be influenced by several stimuli, especially those used in this study are external perspective stimuli, namely, user experience [12].

D. Virtual Experience

Li et al defined virtual reality experiences as clear, engaged, active, and affective psychological states that occur in individuals who interact with computer simulations [13]. Virtual experience can be explained by its capacity to provide physical immersion (immersion) and psychological presence (tele-presence) [11].

E. Immersion

According to Slater and Wilbur [14] the term immersion refers to the level of objectivity regarding the sensor accuracy provided by the virtual reality system. Immersion is also defined as a state of feeling entering and interacting with a virtual environment that provides continuous stimulation, a real illusion of reality to the senses [10].

F. Telepresence

Slater and Wilbur [14] stated that the term presence refers to the user's subjective psychological response to virtual reality systems. Consequently, a sign of high telepresence is when people behave in a virtual environment in a way that is close to the way they would behave in real life situations [8].

G. Attitude of Visitors

Attitude is an evaluative assessment of an object in relation to some level of goodness or dislike [15]. In this study, the attitude of the visitor is the attitude of visitors to virtual destinations, namely WebVR Badut Temple.

Much literature has confirmed the effect of immersive and telepresence virtual experiences in influencing virtual visitor attitudes such as Spielmann et al [9], Fonseca [10], Tussyadiah et al [11]. In Spielmann et al [9] a study was conducted which showed that telepresence and immersivity had a significant effect in shaping the attitude of virtual tour visitors. Furthermore, a study Fonseca [10] with 64 vegetarian respondents showed that immersiveness and presence had a significant effect on attitudes to care for the environment in the group with 360 IV video exposure with high immersivity and the group with video exposure using tablets with low immersivity. In addition, Tussyadiah et al [11] with total respondents of 202 virtual tourism destination visitors in Japan and Portugal found that spatial presence (telepresence) positively affects post-VR attitude changes towards tourist destinations, which shows a convincing VR capability. Therefore, this study builds the following hypothesis:

H1: Immersion on the WebVR of Badut Temple has a significant effect on visitor attitudes

H2: Telepresence on the WebVR of Badut Temple has a significant effect on visitor attitudes

III. METHODOLOGY

This type of research is Research and Development with a mixed method approach of observation, visual material and experimental surveys using the Multimedia Development Life Cycle (MDLC) model. The MDLC method has 6 stages, namely concept, design, material collecting, assembly, testing and distribution [16].

A. Sample and Data Collection

The total sample involved in this research experiment consisted of 30 tourists who were visiting Malang, aged ≥ 17 years and had never visited the Badut Temple before. Sampling was done purposively in Malang.

B. Data Collection Methods

The observation instrument in the form of a field note / log book lists the types of activities that are likely to occur or have been observed. Second, check the documentation list which lists the things that will be collected and adjusted for photo spheres related to the Badut Temple. Then, this study uses the data collection method with a survey method using a questionnaire through pre-experimental research in the form of one shot case study, which is an experiment which is carried out only once and without a comparison group and without a pre-test [17].

C. Analysis Procedures

To analyze the results of observations and documentation in the form of text and photo spheres this study uses content analysis. Furthermore, this research uses Generalized Structured Component Analysis (GSCA). Hypothesis testing is done by bootstrapping where the significance is seen from the value of the Critical Ratio (CR).

D. Measurement

The treatment variable in this study is to provide treatment in the form of a virtual experience of the Badut Temple WebVR consisting of immersiveness and telepresence. While the observation variable in this study is the attitude of visitors to the virtual destination of the Badut Temple which will be observed after being treated. To measure Immersion (IM) the researcher uses dimensions and indicators Ermi and Mayra [18], Slater [19] consists of Challenge Based Immersion (CI), System Immersion (SI) and Imagining Immersion (IMA). Furthermore, this study measures Telepresence (TL), using MEC Spatial Presence Questionnaire (MEC-SPQ) [20] which consists of Self Location (SL) and Possible Action (PA). In addition, for Attitude (AT) was measured using previous studies [21].

E. Experimental Procedure

For the experimental group, the experiment begins when tourists use web-based virtual tourism from the Badut Temple. Tourists can access the virtual version of the temple through a link that has been developed. Travelers are equipped with tools

such as Gear VR and Android smartphones to explore the virtual destinations of the Badut Temple on the link interactively and immersively. Then, tourists are instructed to fill out questionnaires to confirm the possibility of a virtual experience that is felt while visiting WebVR the Badut Temple.

F. Test Validity and Reliability

This study examines the validity of the instrument using convergent validity. While the instrument reliability test is measured through composite reliability. The results of the validity and reliability test show that the instrument meets the standard values and can be used at a later stage. In addition, an experimental validity test was also carried out. This research experiment has gained internal validity and external validity through several experimental treatment controls.

IV. RESULTS AND DISCUSSION

A. Web-VR Development Results

Virtual tourism content for the Badut Temple was developed based on WebVR. WebVR used in this study is A-Frame. The results of observations and audio-visual material at the concept, design and material collecting stages are carried out directly at the Badut Temple using the Camera 360 application to obtain spherical images. While the assembly stage is carried out to combine the spherical series of images into the gallery image on the A-Frame and form the Badut Temple Web-VR content as can be accessed on the link <http://badut.glitch.me> (Figure 1).



Fig. 1. The Badut Temple Web-VR.

B. Hypothesis Testing Results

Testing the hypothesis in this study using α at the 5% level. Table 1 shows the results of hypothesis testing using GSCA bootstrapping iteration. These results indicate H1 and H2 are accepted because each relationship between the variables in the hypothesis has a significant influence based on the CR value and the direction of the positive relationship based on the path coefficient.

TABLE I. HYPOTHESIS TESTING RESULTS

H	Path coefficient	CR	Rule of Thumb	Information
1	0.712	9.35*	> 1.96	Significant (+)
2	0.706	9.21*	> 1.96	Significant (+)

Hypothesis 1 can be accepted and in line with the results of the study Spielmann et al [9] and Fonseca [10]. This shows that the virtual environment on the Badut Temple Web-VR has been able to provide a challenge based immersion in the form of encouragement to continue the visit until it reaches its destination; provide an immersion system that has peruni like the ability to look around freely; and building imaginative immersion from the theme of heritage tourism as if they were in a virtual environment.

Therefore, immersiveness is able to create changes in visitor attitudes such as feeling like, feeling enjoying, feeling interested and feeling memorable towards virtual destinations. The positive direction of the relationship between the influence of immersion and attitude shows that the better the immersion presented at the virtual destination will further enhance the positive attitude of the visitor.

In addition, hypothesis 2 shows the accepted results and the results of this study are in line with the results of the research Spielmann et al [9], Fonseca [10], Tussyadiah et al [11]. These results indicate that the virtual environment in the virtual destination has been able to create a feeling of self-location that is feeling to move location to a virtual environment and able to provide the ability for possible action such as feeling able to move actively freely.

Therefore, the telepresence is considered capable of creating changes in visitor attitudes such as feeling like, feeling enjoying, feeling interested, feeling and feeling memorable towards virtual tourist destinations. The positive direction of the relationship between the influence of telepresence and attitude shows that the better the telepresence presented at the virtual destination, the more positive the attitude of visitors will be.

V. CONCLUSION AND FUTURE SCOPE

The results of this study indicate that the Web-VR content of the Badut Temple is considered capable of providing a virtual experience in the form of a sense of physical presence (immersion) and a feeling of psychological presence (telepresence) so that the virtual experience that visitors experience while in the virtual environment is able to influence the positive attitude of virtual visitor's virtual destination.

Therefore, in the future visitors can rely on the Badut Temple Web-VR to complete the actual visit or substitute for the actual visit so as to maintain the sustainability of the Badut Temple as a cultural heritage tourist destination. Because virtual tourism is still rarely used in tourist destinations in Indonesia, future research is expected to develop virtual tourism content not only in the form of Web-VR image gallery but also in the form of spherical video or 3D virtual tour.

REFERENCES

- [1] R.D. Oktavianto, "Kajian Historis Tentang Candi Badut Di Kabupaten Malang," 2013.
- [2] S. Handyaningsih, *Menyelusuri Jejak si Anak Candi*. Jakarta: Jakarta: Badan Pengembangan dan Pembinaan Bahasa, Kementerian Pendidikan dan Kebudayaan.
- [3] A. Cirulis, L.T. De Paolis, and M. Tutberidze, "Virtualization of digitalized cultural heritage and use case scenario modeling for sustainability promotion of national identity," *Procedia Comput. Sci.*, vol. 77, pp. 199–206, 2015.
- [4] D.A. Guttentag, "Virtual reality: Applications and implications for tourism," *Tour. Manag.*, vol. 31, no. 5, pp. 637–651, 2010.
- [5] Z. Hu, Z. Cao, and J. Shi, "Research of interactive product design for virtual tourism," in *Advances in Electronic Engineering, Communication and Management Vol. 2*, Springer, 2012, pp. 411–416.
- [6] L. Kaelber, "A memorial as virtual traumascap: darkest tourism in 3D and cyber-space to the gas chambers of Auschwitz," *Ertr, e Rev. Tour. Res.*, vol. 5, no. 2, pp. 24–33, 2007.
- [7] A. Stepaniuk, Krzysztof; Bałakier, Urszula; Januszewska, "Economics and Management," vol. 1, pp. 333–346, 2014.
- [8] M. Gutierrez, F. Vexo, and D. Thalmann, *Stepping into virtual reality*. Springer Science & Business Media, 2008.
- [9] N. Spielmann, A. Mantonakis, B.J. Babin, and A. Manthiou, "The telepresence effect: changing attitudes via virtual tours in marketing communications," *ACR North Am. Adv.*, 2016.
- [10] D. Fonseca and M. Kraus, "A comparison of head-mounted and hand-held displays for 360 videos with focus on attitude and behavior change," in *Proceedings of the 20th International Academic Mindtrek Conference*, 2016, pp. 287–296.
- [11] I.P. Tussyadiah, D. Wang, and C.H. Jia, "Virtual reality and attitudes toward tourism destinations," in *Information and communication technologies in tourism 2017*, Springer, 2017, pp. 229–239.
- [12] V. Venkatesh and F.D. Davis, "A theoretical extension of the technology acceptance model: Four longitudinal field studies," *Manage. Sci.*, vol. 46, no. 2, pp. 186–204, 2000.
- [13] H. Li, T. Daugherty, and F. Biocca, "Characteristics of virtual experience in electronic commerce: A protocol analysis," *J. Interact. Mark.*, vol. 15, no. 3, pp. 13–30, 2001.
- [14] M. Slater and S. Wilbur, "A framework for immersive virtual environments (FIVE): Speculations on the role of presence in virtual environments," *Presence Teleoperators Virtual Environ.*, vol. 6, no. 6, pp. 603–616, 1997.
- [15] R. Doran, D. Hanss, and S. Larsen, "Attitudes, efficacy beliefs, and willingness to pay for environmental protection when travelling," *Tour. Hosp. Res.*, vol. 15, no. 4, pp. 281–292, 2015.
- [16] A.C. Luther, *Authoring interactive multimedia*. Academic Press Professional, Inc., 1994.
- [17] A. Suharsimi, "Manajemen penelitian," Jakarta: Rineka Cipta, 2005.
- [18] L. Ermi and F. Mäyrä, "Fundamental components of the gameplay experience: Analysing immersion," *Worlds Play Int. Perspect. Digit. games Res.*, vol. 37, no. 2, pp. 37–53, 2005.
- [19] M. Slater, "A note on presence terminology," *Presence Connect*, vol. 3, no. 3, pp. 1–5, 2003.
- [20] P. Vorderer, C. Klimmt, and U. Ritterfeld, "Enjoyment: At the heart of media entertainment," *Commun. theory*, vol. 14, no. 4, pp. 388–408, 2004.
- [21] I.K.W. Lai, V.W.L. Tong, and D.C.F. Lai, "Trust factors influencing the adoption of internet-based interorganizational systems," *Electron. Commer. Res. Appl.*, vol. 10, no. 1, pp. 85–93, 2011.