

Mobile Based Augmented Reality for Experiential Design in Indonesia Village Based Tourism Innovation

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Abstract—Village tourism, which involves the local community as the perpetrators of tourism activities in managing it, is called a tourism village. This type of tourism village has high popularity both by local and foreign tourists. The primary goal of this study was to examine how Augmented Reality in Experiential design systems can increase tourist attraction. This study uses an experimental method, an qualitative research design, which includes participant observation tactics and open tourist interviews; structured interviews with the head of the village tourism; photo documentation of the Experiential Design system, Wayfinding, and Experiential graphics—using a mixed-method approach allowed for triangulation of the analysis in data collected. Data used and analyzed to understand and describe the practices within Experiential graphic design systems applied to Village Tourism. The overall average score of AR elements in the application the highest average score is animation, which is about 3.68. The following graphic and interactive elements are approximately 3.6275 and 3.625, respectively. The lowest average score for text elements is graphics (3.53). Based on the test results, it can be concluded that respondents are generally satisfied with multimedia elements in the Innovation Augmented Reality application of Village-based tourism objects.

Keywords—innovation, tourism, augmented reality

I. INTRODUCTION

Tourism as a sector is considered capable of improving the community's welfare at the regional economic level because of the nature of tourism, which can cause an overall multiplier effect in other sectors. In addition, tourism which in its management process involves local communities as actors in tourism activities, is called a tourism village. The emergence of this tourist village has spread in Malang Regency. Malang Regency itself, according to the Tourism and Culture Office (Disparbud), Malang Regency and Malang City is 106 tourist village areas that are ready to be socialized and promoted nationally for the International [1]. The rapid development of technology also encourages rural communities to form tourist villages even though they do not have the certainty of the concept. The challenges that are often faced in developing this

tourist village are the social situation, innovation (related to design), and security. The existing technology or facilities have not matched the high interest of tourists in the tourist area. Tourists still encounter many obstacles or difficulties when visiting tourist areas in Malang Regency. One of the obstacles that arise is because of the many tourist sites in Malang Regency. There are still many tourist villages whose tourist visits are uneven. Tourism Villages need to be supported by management, with strong, flexible, simple, and dynamic institutions. Therefore, it is necessary to hold an experience chart in each tourist village to become a sustainable tourism village.

Experiential graphic activity related to graphic information communication in the built environment is anything built by human intention, be it a single building, such as a hotel or stadium; a collection of buildings, such as a city or campus; planned open spaces, such as parks or historical sites; or transportation networks, such as subway or rail systems. The Environmental Graphic Design System exists on the broader design universe and is, in fact, a supreme hybrid—or, if you are less generous. Experiential graphics is a major multidisciplinary discipline, where graphic design, architecture, industrial design, interior design, landscape architecture, urban planning, and urban design all meet. Including Experiential Graphic Design is the design process, also known as design thinking. In the previous research, experiential design in nature situate determining the failure and success of installations and environments is done in practice, and there can be a number of influential factors which may not be known in advance [2].

Augmented Reality (AR) is a technology that significantly facilitates the execution of complex operations. AR combines virtual and actual reality by complementing the accurate world view by adding computer-generated sensory input in graphics, video, sound, and location data from GPS (Global Positioning Systems), to improve user perception. AR provides users with new tools to ensure efficiency in knowledge transfer across multiple processes, from multiple sources, and across multiple environments [3]. Today most AR applications are focused on

entertainment, marketing, and retail. However, as the technology matures, it is likely to be more readily adopted for Tourism. In the previous research Augmented Reality Based Technology enables the provision of variety information such as pictures and location of buildings in the navigation field [4].

In this experiment, we propose a Mobile based Augmented reality for experiential design in village-based tourism capable of increasing tourist attraction. By using augmented reality mobile applications as an innovation for tourist villages to offer something new shows to tourists. Besides providing new entertainment for tourists, augmented reality mobile apps also do not require high costs for their long-term needs.

II. MATERIALS AND METHODS

A. Materials

In this experiment, the components used to build a Mobile APPS Augmented Reality for Experimental design in village-based tourism are a Mobile phone as the main component for running Application, GPS module functions to provide information about the location coordinates, Tracker This Tracker is in the form of a marker or a marker like a striker similar to a QR Code that can be affixed/installed on real objects. The computer functions as a processing tool so that AR programs can run.

AR Mobile application is built using Unity and Vuforia software. This Application is constructed using Bootstrap, PHP, JavaScript.

B. Research Procedure

In the development research procedure, Mardika [5] uses a development model that refers to the Borg and Gall [6] development research model, Luther's product development model [7], which includes six stages, namely needs analysis, multimedia learning design, expert validation, revision, and product testing. The multimedia development model was developed by Mardika [5]. Flowchart research method and augmented system can be seen in Figure 1.

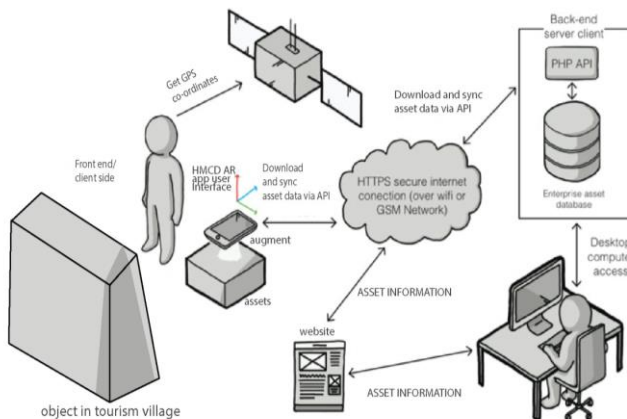


Fig. 1. Flowchart research method and augmented system.

The explanation for each of these steps is as follows:

1) *Analysis stage*: At this stage, the needs analysis is the first stage that forms the basis for the next software development process. The smoothness of the overall software development process and the completeness of the resulting software features are highly dependent on the results of this needs analysis. To obtain information about the need for making this interactive learning media, the authors conducted an exploratory study and literature study.

2) *Design stage*: This stage includes determining the elements that need to be included in the learning media that will be developed based on the learning design or often referred to as the ID model (instructional design). The results of this stage include a storyboard, which is how this multimedia is displayed (interfacing). How to present material, 3D models for learning, animation, evaluation, and more.

C. System Design

System design is intended to provide an overview of the system built to the user / user. The system design is made using UML (Unified Modeling Language) and can be seen in Figure 2.

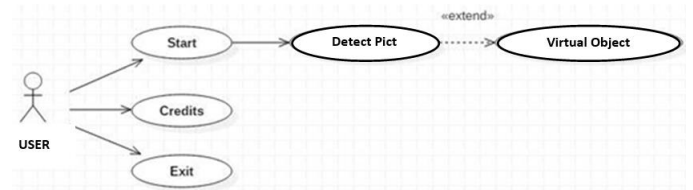


Fig. 2. Use case diagram.

D. Activity Diagram

Activity diagrams or activity diagrams describe the work flow (workflow) or activities of a system or menu that is in the software (Figure 3).

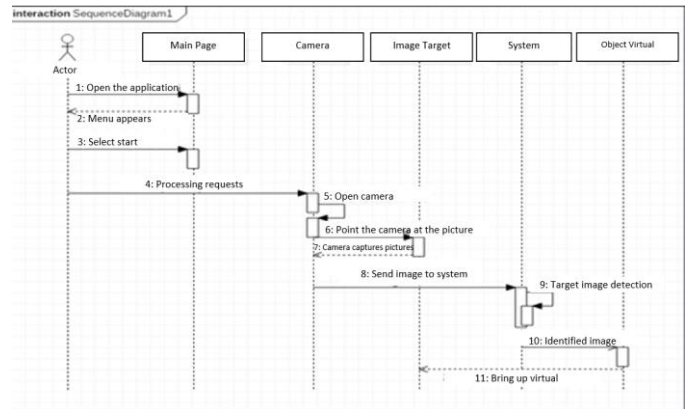


Fig. 3. Activity diagram start when read virtual object.

III. RESULTS AND DISCUSSION

A. Data Collection

Test on user acceptance (beta test) conducted by questionnaire, once they finish testing the application Table 1 contains the questionnaire data used for beta testing.

TABLE I. THE QUESTIONNAIRE DATA USED FOR BETA TESTING

| No. | Aspect | Rating | | | |
|-----|---|----------------|-------|----------|-------------------|
| | | Strongly Agree | Agree | Disagree | Strongly Disagree |
| 1. | Display of AR is attractive and interactive | | | | |
| 2. | Text is clear and easy to understand. | | | | |
| 3. | Application is easy and appropriate to use | | | | |
| 4. | The content on application can support the tourism object | | | | |

B. Mobile Augmented Reality for Tourism Object

The application of innovation on Tourism objects using Augmented Reality construct through several stages. The first stage is to pick any of the object media in the tourism village who can interact with tourists. The second stage is a determination of the object to combine with virtual graphics and decide to mark the object as an Augmented Marker in Application. The Last Stage is to upload the content to be displayed on the marker as AR innovation, to improve the experience of the tourist. At this stage of development, the implementation of the Augmented Reality Application supplied additional services such a geotagging location-based services (Figure 5). The augmented reality application can be seen in Figure 4.



Fig. 4. Augmented reality application.



Fig. 5. AR with geo tag location.

The interface of the App for the android platform is used to perform object or marker detection in the tourism object then display interactive games and visuals, animation, and etc., to improve the tourist experience.

TABLE II. MEAN SCORE FOR ELEMENT OF TEXT USED IN AUGMENTED REALITY

| No. | Aspect | Mean |
|-----|-----------------------------------|------|
| 1. | Easy to Read Text | 3.25 |
| 2. | Font are suitable | 3.72 |
| 3. | Clear text Layout | 3.50 |
| 4. | Information Position standardized | 3.63 |
| 5. | Easy to understand explanation | 3.55 |

Based on the results of testing against the text of the element in Table 2, it can be concluded that respondents almost agreed with the Easy to read (question 1), typeface (question 2), the text layout (question 3), the position of the text in the application (question 4), and were able to understand easily (question 5). This is evidenced by the mean value greater than 3.00 of the maximum value of 4 for all aspects of assessment. It means that the result for text used in the application is good.

TABLE III. MEAN SCORE FOR ELEMENT OF GRAPHICAL IMAGE USED

| No. | Aspect | Mean |
|-----|-----------------------|------|
| 1. | Colour used | 3.4 |
| 2. | Graphic are clear | 3.77 |
| 3. | Graphic is suitable | 3.6 |
| 4. | Graphic is attractive | 3.73 |

Table 3 illustrates the response results of the graphic images of the elements in the application. According to this table, it can be seen that in question 1, the respondents almost agreed to use color. Then in questions 2 and 3, respondents generally strongly agree that the graphics are clear and appropriate. In addition, the response of the easy-to-understand application in Question 4 to the graphics and annotations is attractive almost strongly agreed.

TABLE IV. MEAN SCORE FOR ELEMENT OF ANIMATION IN AR

| No. | Aspect | Mean |
|-----|-------------------------------------|------|
| 1. | The animation is easy to understand | 3.75 |
| 2. | The animation suitable with object | 3.55 |
| 3. | The animation are attractive | 3.65 |
| 4. | The animation help with information | 3.77 |

According to Table 4, the results of response animation use are shown. In general, from the results, the interviewee agrees with this evaluation. It can be seen from Questions 1 to 3 that the interviewees almost agreed to use animation to understand travel objects. Animations are used according to the objects, and the animations used are very interesting. In addition, in Question 4, the interviews almost strongly agree that animation can also help information for an average value of 3.77.

TABLE V. MEAN SCORE FOR ELEMENT OF INTERACTIVITY IN AR

| No. | Aspect | Mean |
|-----|---------------------------------|------|
| 1. | Interactivity tool is necessary | 3.5 |
| 2. | Interactivity easy to use | 3.68 |
| 3. | The process is clear | 3.63 |
| 4. | Buttons is work | 3.7 |

The results of the interactive response are shown in Table 5. Overall, the results are almost very consistent. In question 1, the interviewee agreed with the way the user interacts with the application. Next, users can easily navigate the application (question 2), they can use links (question 3), and they can use standard-compliant buttons (question 4), which is almost very agreeable.

The user's satisfaction evaluation result for each multimedia element shows that, compared with the average value of other multimedia elements, the average value of text elements is the highest, while the average value of interactive elements is the lowest. Figure 6 shows a chart of the average value of each multimedia element in Augmented Reality as an innovation in Village based tourism.

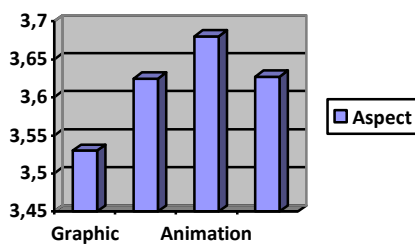


Fig. 6. The overall average score of AR elements in the application.

According to Figure 6, the highest average score is animation, which is about 3.68. The following graphic and interactive elements are approximately 3.6275 and 3.625, respectively. The lowest average score for text elements is graphics (3.53). In the previous research, user experience has a lot of influence at user satisfaction in digital [8]. Therefore, according to this result, the graphic elements need to be improved in the Innovation of Village-based tourism using Augmented Reality.

IV. CONCLUSION

The evaluation results of user satisfaction with the four multimedia elements show that the average text usage in the application is 3.53, the average graphic is 3.625, the average animation is 3.68, and the average interactivity is 3.6275. Based on the test results, it can be concluded that respondents are generally satisfied with the use of multimedia elements in the Innovation Augmented Reality application of Village-based tourism objects. It will be interesting if the Augmented Reality Innovation is combined with games and Education Tools for Family segmentation for future work..

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REFERENCES

- [1] B.T. Asmoro, and M.M. Da'Awi, "Revitalisasi Kelompok Sadar Wisata (Pokdarwis) Desa Sukodono, Kecamatan Dampit, Kabupaten Malang Dalam Pengelolaan Obyek Wisata Coban Pandawa," *JPM (Jurnal Pemberdayaan Masyarakat)*, vol. 5, pp. 373-379, 2020.
- [2] P. Dalsgaard, *Experiential Design: Findings from Designing Engaging Interactive Environments*, 2008, p. 85-106.
- [3] G. Kipper and J. Rampolla, *Augmented Reality: an emerging technologies guide to AR*. Elsevier, 2012.
- [4] L. Xiao and S. Dasgupta, "Measurement of User Satisfaction with Web-Base Information Systems: An Empirical Study," *Eighth Americas Conference on Information Systems*, 2002.
- [5] I.N. Mardika, *Pengembangan Multimedia Dalam Pembelajaran Kosakata Bahasa Inggris di SD*. Yogyakarta: Universitas Negeri Yogyakarta, 2008.
- [6] W.R. Borg and M.D. Gall, *Educational research: an introduction (7th ed.)*. New York: Longman, Inc., 2003.
- [7] A.H. Sutopo, *Multimedia interaktif dengan flash*. Yogyakarta: Graha Ilmu, 2003.
- [8] Z. Zahidi, Y.P. Lim, and P.C. Woods, "Understanding the user experience (UX) factors that influence user satisfaction in digital culture heritage online collections for non-expert users," *In IEEE 2014 Science and Information Conference*, pp. 57-63, 2014.