Designing mobile application gamification for tourism village in Indonesia

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Abstract. Tourism in Indonesia is one of the contributing factors for income for the country, especially in the non-oil and gas sectors. Also, Indonesian tourism is expected to help the economy of the community, especially villages. Because of this reason, a tourist village was created. However, in its development, tourist villages are still experiencing some challenges. Among them is a stagnation in the development of attractiveness, weak tourist competitiveness, limited human resources, and lack of promotion. All of these challenges can be solved by using the gamification method. The purpose of this study is to propose a prototype of a mobile application for a tourist village using gamification. Gamification uses motivation in its application, and this method can have a beneficial effect on the tourism sector. These effects include raising brand awareness, loyalty/repeat visits, and enhancing tourism experiences. Therefore, in this study, a prototype mobile gamification application design will be made for tourism villages, especially in Indonesia. The design is performed based on the needs of a tourist village and based on the responses of several respondents.

1. Introduction

Tourism in Indonesia is one of the factors supporting income for the country, especially in the non-oil and gas sector. This condition is supported by the extraordinary potential of nature and diversity. Therefore, the types of tourism that can be offered are numerous, ranging from nature tourism, culinary tourism, cultural tourism, etc. However, to be able to keep up with the country's income and poverty alleviation, the government began to try to utilize natural and cultural resources from each village. From these problems, the term tourism village emerged. This type of tourism began to be developed in 2010 to 2014 through the National Community Empowerment Program (PNPM). The program aims to make local people the subject of tourism [1].

With the existence of tourist villages, local communities can also create their businesses so that they can contribute and get economic benefits from tourism [2]. According to Cores, to reduce poverty in some traditional community's tourism methods are considered effective. Indonesia today has many tourist villages [3]. According to data from the country's statistical agency (BPN), the number of tourist villages in 2018 reached 1,786, whereas villages have the potential to become tourist villages in 2016 as many as 1,902 villages [4]. There are still several tourist villages that are still in the development stage. Several problems can hinder the advancement of developing tourism villages. Some of these problems include stagnation in the development of attractiveness, weak tourist competitiveness, limited human resources [5], and lack of promotion. These problems can be resolved by gamification. Gamification in tourism can affect raising brand awareness, improving customer loyalty, improving

customer engagement [6], and reward system motivating user and manipulate behavioural change [7]. But to get this impact, the use of game design elements must be adapted to existing conditions. By looking at the benefits of gamification, it is highly probable that this method can be applied to improve or renew village tourism. This paper has the following structure: The next chapter discusses the literature review related to this paper. Section 3 discusses research methodologies and flowcharts that showcase the contribution of this paper. Design and Analytic of the methodology are discussed in chapter 4. Result and analysis are discussed in section 5. In section 6, conclusions and future work will be discussed.

2. Related work

Gamification means "the use of game design elements in the non-game context" [8]. Based on that understanding with the application of gamification, it is expected that the motivational potential in gameplay can be implemented into non-game environments by using game design elements. There are two ways to create motivational effects, namely, extrinsic and intrinsic motivation [9]. The game design elements in gamification are various types and use. Some examples of elements of game design are points, levels, leader board, prizes, badges, storylines, and feedback [10]. However, the use of game design elements must be following the existing context. Other than that, the impact of gamification can also be influenced by gender [11]. As an example, in Van Roy's research [12], the use of badges on gamification does not entirely affect the user, because this might not be relevant for some users.

The application of gamification in the non-game context is expected to affect the user. Impacts that can be felt by the use of gamification, in general, are motivation, productive learning experience, enjoyment [13], engagement [14], interest in course, etc. These effects arise due to the implementation and context of the problem. Some of the gamification impacts felt by tourism providers include sustainability [15], raises brand awareness, loyalty/repeat visits [6]. While the gamification impacts that can be felt by tourists include engagement, entertainment, environmental awareness, behavioural change [7], and enhanced tourism experiences [6]. In addition to the impact that can be felt by visitors and managers of tourist attractions, gamification can also affect the economic growth of surrounding communities [16].

Table 1 below can be seen in the summary of the benefit, elements, and implementation of gamification in the tourism sector. The application of gamification in the context of tourism can be made in various ways, starting from utilizing iOS mobile platforms [17], mobile Android [18], desktop platforms [19], and cross-platform [20]. Desktop platforms are more suitable for managing tourism places, both for employee management and management needs, while the mobile platform is more suitable for tourists.

Table 1. Gamification summary.

Ref.	Benefit	Element	Implementation
[6]	Increase brand awareness	Avatar	Augmented Reality
	Generate interest	Rewarding	Virtual Reality
	Engagement	Gifting	Geocaching
	Entertainment tool	Task/ mission	Location-based game
	Loyalty/ Repeat visit	Leaderboard	Desktop
[9]	Increased user engagement	Point	Website
	Improved customer loyalty	Badge	Mobile Apps
	Expanded brand awareness	Leaderboard	QR Code
[16]	Enhance destination experience	Result	Augmented Reality
	Tourist experience	Report	QR Code

It can be seen in Table 1 implementing gamification in tourism can be done in many ways. In general, gamification is applied using applications, both desktop [19], web, and mobile [21]. Augmented Reality (AR) is widely used in museums, to make it more attractive and educate visitors [22,23]. In addition to AR, gamification in tourism is also applied using the concept of Geocaching [16]. Geocaching itself is

a treasure hunt-based game [6]. Gamification in tourism can also be implemented with mobile applications, Virtual Reality (VR) [24], and cross-platform applications. After studying a few references, the gamification method proposed in this paper will use rewarding elements. This decision is because the existence of rewards can motivate users to be more involved and follow progress [25]. The purpose of social gamification is to provide tasks that are done together to get contributions to their team [26]. In this paper, the implementation of gamification will be more suitable by using a mobile phone and with additional features of Augmented reality.

3. Methodology

This section will discuss the research methodology of this paper. The research methodology carried out is divided into several stages. These stages include data collections, gamification design, mockup, and prototype design, prototype testing, and evaluate the test results. The following is an explanation of each stage.

Data collection is carried out in two phases, namely literature studies, and field studies. Literature studies are conducted by looking for literature that can support research. The kinds of literature sought in the form of international journals, proceedings, and thesis documents. **The gamification design** stage is to determine the elements that are consistent with the focus of this study. **In the mockup and prototype design** creation stage, there are several activities carried out, such as develop interface design, build prototype design, and evaluate prototype design. The next step is **prototype testing**. In this stage, the results of the prototype will be tested on several respondents. This was done to obtain feedback on the prototype. But, before this stage, the validity and reliability of the questions are examined. The last step is to **evaluate the results**. At this stage, the results of responses from respondents will be considered whether the prototype design like this is feasible or not.

4. Design and analytics

This section will discuss the results of data collection analysis and gamification design results.

4.1. Results of data collection analysis

The results of this analysis in the form of characteristics of tourist villages in Indonesia. The features of this tourism village are obtained from collecting data on tourism village activities/ services. There are two general events in each of the tourist villages studied, namely outbound activities and cultural activities such as handicrafts. Also, many tourist villages that provide lodging, for example, in one of the tourist villages studied, namely the Tembi tourism village. From these results, the application design that will be made has a function that highlights outbound activities, cultural tourism, and handicraft.

4.2. Gamification design analysis results

The results of the analysis of the design needs are based on the results of the characteristics of Indonesian tourism villages and literature search. Gamification elements used include rewarding tasks, levels, points, badges, and achievements.

4.3. Mockup design results and prototype making

In this section, mockups and prototypes are built. All kinds of functions and required gamification components are determined based on the analysis data that has been carried out at the first stage. Features and components are determined based on the type of tourism village.

5. Results and discussion

In this fifth section, the validity and reliability questionnaire, prototype results, and prototype evaluation test results will be discussed.

5.1. Results of validity and reliability questionnaire

Based on the results of the reliability, Cronbach's alpha results were 0.922%, which exceeds the standard limit of 0.7. Thus, the questions on the questionnaire are reliable. The results of the validity test are considered valid. Test results show all question scores are greater than 0.3610.

5.2. The results of the application prototype

The application design created has four main menus. The menu is home, play, reward, and augmented reality tour (AR Tour). Following is an explanation of the functions of these four main menus. The prototype image from these menus can be seen in Figure 1.

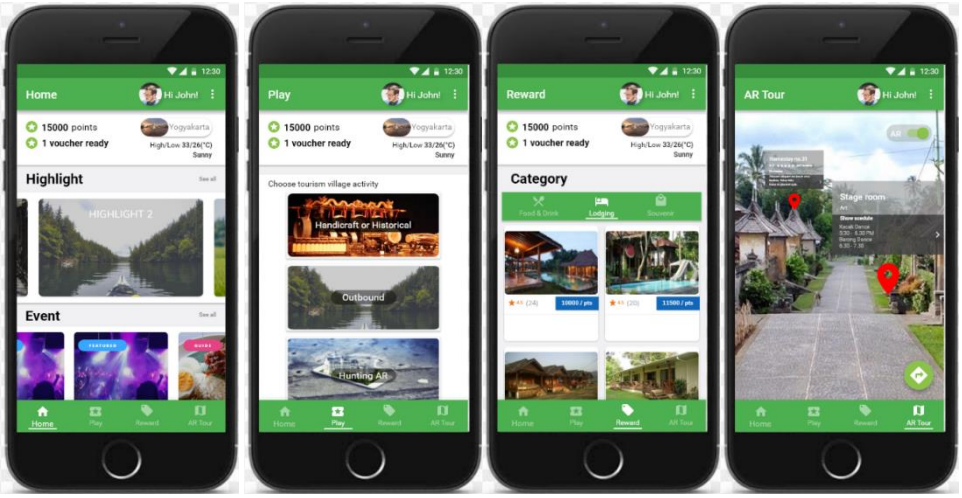

Figure 1. Application prototype.

In Figure 1, you can see the results of the prototype from four main menus layout. The home menu serves as the initial display and functions as an interface that provides info about the tourist village and its events. In the home and profile interface, there is the application of the gamification element. These elements include points, badges, and achievements. The other main menu is the play menu. In this menu, there are three types of games that can be done; there are crafts, outbound, and AR hunting games. In this play menu, users can get points by playing games. Furthermore, points can be exchanged for various prizes. The other main menu is the reward menu. This menu allows users to exchange points they have earned while playing in the play menu. The reward menu has three prize categories, which are food and beverage rewards, lodging vouchers, and souvenirs. The last main menu is the AR tour menu. This menu allows users to explore the tourist village area and learn about the tourist villages visited by using the help of map navigation and the Augmented reality feature. The AR feature allows users to be able to see virtual items that are implanted in the tourist village. The items are in the form of information related to the tourist village.

5.3. Prototype test result

The prototypes will then be tested on 31 respondents. The test is performed by asking a number of questions, such as the USE method. The questions posed have four categories. These categories are usefulness, ease of use, ease of learning, and satisfaction. Respondents from this study are aimed more at people who have visited tourist villages. Respondents will answer these questions by choosing points from the Likert scale, starting from point 1, which means strongly disagree and point 5, which means strongly agree. As a result, 78% of users who agree or strongly agree with the design of this application. The questionnaire result can be seen in Table 2.

Table 2. Questionnaire result.

Questions	Cat	1	2	3	4	5
It meets my needs	U	0	0	7	16	8
It is useful	U	0	0	4	15	12
It is simple to use	EU	0	1	5	14	11
It is user friendly	EU	0	0	7	14	10
It requires the fewest steps possible to accomplish what I want to do with it.	EU	0	0	11	13	7
I don't notice any inconsistencies as I use it.	EU	0	0	3	12	16
I learned to use it quickly	EL	0	2	3	17	9
It easy to learn to use it	EL	0	1	5	17	8
I am satisfied and engaging with this design.	S	0	1	8	13	9
It make village tourism activity more interesting	Custom	0	0	6	11	14
Total		0	5	59	**139**	**104**
Percentage		0	0.01	0.19	**0.45**	**0.33**
Result		**78% of respondents agreed**				

6. Conclusions

Tourism in Indonesia is indeed one of the producers of the country's revenue in the non-oil and gas sector. This situation makes the government look for other innovations in terms of travel. One of the innovations is the tourist village. But the tourist village experienced obstacles, one of which is the lack of tourism competitiveness. Therefore, this research was conducted. The results of the application design specifically designed for this tourist village managed to get 78% positive answers. It also proves that with the gamification method, the user will become more interested in doing/learning something, in this case, is a tour. With good results, the future work of this research is to apply this design to an Android mobile device.

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