

## Design Mobile App for Increase the Visitor Museum using Gamification Method

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### Abstract

*The museum's tourism object currently has a low visitor level compared to other tourism objects, even though the museum's function is very important as an enhancer of people's cultural knowledge. Judging from the small level of visitors, it cannot be separated from the effects of the promotion carried out by the museum. From the surveys that have been conducted, museum promotion uses social media more directly to the public, banners, radio, television, blogs and internet social media. In this study, an application that serves to promote museums using gamification methods was designed, this method was chosen because of the many existing promotional techniques, there is still little promotion using game content, therefore the gamification method is expected to encourage the motivation of users to visit the museum. This application will provide convenience to the museum management to promote the museum with media game content without having to spend large development and maintenance costs.*

**Keywords:** gamification, museum, promotion

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### 1. Introduction

As a place that is used to preserve various historical objects and works of art, the museum has an important role in contributing to the improvement of people's cultural knowledge. But in reality the number of museum visitors is less compared to the number of other tourist visitors [1], this is quite a concern because history and works of art are inheritances that cannot be forgotten by the community [2]. If viewed from the side of promotion, promotion can be a way to help museum managers in introducing museums to the wider community, so that their hopes can have an impact on increasing the motivation of the community to visit the museum.

Promotion and information become an important part for the community to increase their knowledge in the purpose of visiting every tourist attraction, the use of information technology can encourage promotion to be better [3]. Therefore, in this study a survey of several museums in Indonesia was conducted on any promotional measures that have been carried out, the results of the promotion were carried out in several ways, namely through social media directly to the public, banners, radio, television, blogs and social media.

With the development of the digital era today, promotional media can be carried out in various unique ways with the support of the internet and smartphone devices [4, 5] so that it can provide additional motivational value to the community, based on the results of a survey that has been done that the promotion techniques that use the internet and SmartPone are still limited to social media and blogs, therefore the promotion of promotion can still be done in other ways. Promotion of using media games in the tourism industry has the potential to provide good marketing opportunities [6], smartphone technology such as GPS, camera, internet and others can be used to develop the use of games in promoting.

In this study a mobile application will be designed to offer ways of promotion by utilizing technology that can be applied by all museums in Indonesia. This method is done by gamification method. The hope of this research is to design a mobile application to help the museum in promoting with media game content.

### 2. Literature Review

According to theory, there are two types of motivation, namely extrinsic and intrinsic motivation. Extrinsic motivation is related to motivation triggered by gifts, while intrinsic

motivation is motivation that arises because of self-interest. Both of these motivations need attention to improve superior competitiveness [7].

Gamification is a game concept in various fields that aims to increase extrinsic motivation of people in carrying out an activity, with the existence of this gamification has made several tourist places experience renewal in promoting their excellence through technology [5]. When gamification is applied to the fields of education, entertainment and other learning environments, it will be called 'serious game' [8], this applies in this study with the implementation of a quiz.

Serious games are an alternative education method in various fields because they have the potential to improve the quality of the learning experience and provide ease in gaining knowledge and understanding of content. Besides that, entertainment-driven learning will be easier to provide motivation [9].

Learning that combines cyberspace and the real world is able to produce a higher level of activity, emotional positive, attitudes to appreciate the knowledge that must be learned, and success in learning better [10]. In a study conducted the application of gamification for academic information system as a supporter of students who are lazy in taking care of academic activities, by applying the mechanism of level, badges, leaderboards, reward points, and social connections can increase student interest in accessing academic information system [11]. If this concept is applied to visitors to the museum, it will generate benefits for visitors in studying the contents of the museum they visit.

Gamification can be applied to the non-game context [12] as in this study gamification lies in the serious game that provides a reward when the game is successfully completed. Some elements also played an important role in the success of gamification applications, such as points, levels, leaderboards, challenges and badges [13].

As seen in Table 1 shows that gamification has many elements that each element has a different motivation, ability and entertainment enhancement. From the encouragement it was summarized and concluded that the point element had a high motivation, ability and entertainment boost. The table below shows the order of gamification elements of the highest one [14].

Table 1. Element of Gamification

No	Element Group	Name	No	Element Group	Name
1		Points	10		Percentage of competency
2	Achievement	Scoring system	11	Status	Progress Bar
3		Stars	12		Stage
4	Virtual gifts	Badge	13	Real-time	Level
5	Reward schedules	Top 10	14		Countdown
6		Leaderboard	15		Information
7		Result	16	Profiles	Pictures
8	Status	Report	17		Avatars
9		Dashboard			

Element gamification refers to the procedure and rules of the game, about how the game can be completed and how the prize is given. Gamification elements commonly used are badge, point, level, and leaderboard [15]. One application that applies gamification technique is Foursquare, in that application utilizes GPS technology to share the location where the user is located, most users are motivated to do this because Foursquare gives badges to users who do that game [12].

Utilization of GPS can provide a way to find locations quickly, effectively, interactively and interestingly [16]. In addition to GPS technology, the use of points now has been widely applied in several applications as a way to maintain the number of users of their applications, Gojek is one application that gives points to its users so that users are motivated to always place orders with their applications.

In an intensive program in the form of points, it can increase the motivation of users to frequently upload in the forum, but intensive programs have disadvantages, namely increasing fraudulent activities. [17]. Recommendation systems using location-based services make users get information easily and efficiently, locations can be obtained easily and faster to reach locations [18].

Loc-auth is an authentication that can work by reading location variables, with this authenticity the level of security will be layered but does not make users become inconvenient like entering a username and password [19]. In this study loc-auth will be used as one of the prevention of fraud.

QR code technology can be used as a shortcut to access information more quickly but it can also be used as a medium to open digital information gateways that have certain access rights [20]. To improve security, layered with QR code technology will also be used as a way to minimize fraud.

Promotions using smartphones have increased in recent years, a good promotion is to promote consumers who are close to the area of the object being promoted, because users do not need to suffer losses due to travel costs [21], with the use of GPS on a mobile phone this approach will be easy to do. location-based mobile promotion (LMP) is a new promotional technique that can reach users anytime and anywhere, this technique makes a promising long-term promotion method [22].

### **3. Research Method**

As an application designed to promote the museum, the design process has the following steps [23]:

#### **3.1. Project Preparation**

Make a list of goals and choose the goals to be prioritized, the objectives in the project must be explained whether the gamification method is suitable to be applied in the project. In this phase also determined about the budget needed, the duration of work, the needs of the team and others. Gamification identification must focus on needs and motivation, not business-focused [24].

#### **3.2. Context Analysis & User Analysis**

Identify the target user to find out his needs, then translate those needs to motivate users. The information obtained will influence the design to be more attractive. Context analysis focuses on analyzing context requirements such as platforms, libraries, architecture, technology and others. User Analysis focuses on analyzing user needs, then identifying user motivation. To determine motivation needs can be identified through age, gender, activity, occupation and others from the target user that is sought [24].

#### **3.3. Ideation**

Information that was obtained in the previous stage will provide a basis for listing the ideas to be prioritized. This idea will help in creating the concept of gamification. In this phase, the appropriate elements are set according to the results of user analysis so that the game is made attractive and motivates the user [24].

#### **3.4. Design**

Ideas that have been developed are then processed into the concept design phase, in the concept design a prototype will be evaluated from the game process flow itself until it gets feedback that matches the goal. The design process aims to make the application built in accordance with the objectives, so that it will minimize errors that occur when the application development process is complete [25]. To produce a maximum design, the design stage has the following sequence [26]:

- a. Mechanics, explains the specific components of the game, at the level of data representation and algorithms.
- b. Dynamics, describes the run-time behavior of the mechanics acting on the player's input and output to each other continuously.
- c. Aesthetics, describes an emotional response that is expected to motivate players to interact with the game.

#### **3.5. Implementation**

Implementation is a continuation of prototype or design, the implementation process can be carried out by an internal team or carried out by an external team [24].

### 3.6. Release Project and Monitoring

Projects that have passed the testing process are then released to the user in general. However, monitoring of the project still has to be done with the aim of handling when there is an error and development for the future.

## 4. Results and Analysis

In this study gamification focused on providing a new way for museums to do promotions so that it would encourage the community to be motivated in visiting the museum, as the basis of this study interviewed on the stairs 13-14 June 2018 with telephone media to some museums that were sampled, samples selected evenly in large cities in Indonesia, with each city a museum chosen that has a high level of activity in its promotion. The results of the interview show that the use of game content in museum promotion only occurs in a few places, most of them think that to promote with game content there is a great need for funding because each museum must build its own game, in addition to maintenance and development.

The target users in this application are teenagers and above, where most of the targets are already using smartphones and they are currently active to explore the surrounding environment. The formation of the gamification idea is based on the analysis that has been done before. The idea that is generated is to utilize gamification as a tool to conduct museum promotion. This idea was chosen because promotion techniques using game content are still small while this method can provide high motivation to users to visit the museum.

The concept of gamification that is applied in this study can be seen in Figure 1 that is utilizing group achievement elements, virtual gifts, status and profiles. Gamification process flow begins with a user looking for a museum according to their location, this location features will encourage users to find and study the existing museum detailed information about them. Furthermore, users will be encouraged to look at the challenges presented through the game in any museum, will be informed of the challenges that were able to complete the game will get a point and reward. These points and rewards will motivate users to complete these challenges. But the challenge game in the museum can not be resolved just like that, because the application is also designed to use the loc-auth authentication and QR Code, so that fraud can be dinimalkan. Flow authentication process begins when the user will play the game, the application will check the variable geolocation users whether in accordance with geolocation museum intended, after pengecetakan geolocation successful authentication the next is scan the QR Code contained in the location of the museum, the scan results will be adjusted if it matches the id museum.

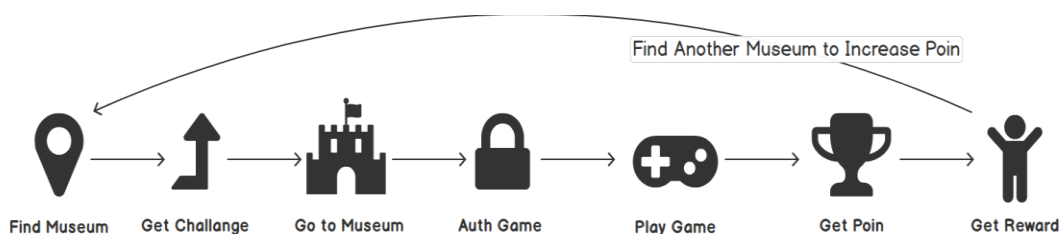


Figure 1. Gamification ideation

The architecture of this application consists of mobile applications for tourists, web applications for museum managers and web applications for superadmins. Of the three applications have an architecture that is connected to one server, the web application is connected to the server directly because it has the ability to access the database server while the mobile application is connected to the server through the web service API because the mobile application is client so that security must be properly limited.

The design of the three applications is described through a flowchart so that the understanding of the process flow can be easily done, the flowchart can be seen in the figure below.

**4.1. Registration Museum**

As depicted in Figure 4 (A) the management of the museum is carried out by each museum manager through a web application, one museum has only one account that is held by its admission. So that the museum can enter into the application database the board must register it with valid data and be accompanied by a letter of recommendation from the head of the management. After all the data is filled in completely, the museum management is just waiting for the results of verification carried out by the superadmin, if the verification fails the museum manager must complete the requested data until it passes verification and can proceed to the complete museum data input and quiz input stage. Data that must be filled in when registering a museum can be seen in Figure 2 (A).

After the registration has been successfully carried out, the administrator will receive the results of data verification conducted by the superadmin. If the verification is received the next process will only fill in the complete data about the museum. Furthermore, the board can make their own game according to the contents of the museum, the data that is filled in the game is in the form of questions with the contents of text, images and videos, then the choice of answers can be made as needed. Besides having to fill in the questions and answer list, the management can also make a description of assistance as shown in Figure 2 (B) whose function can be used by users when users experience difficulties in answering questions, the game also needs verification from superadmin before publishing.

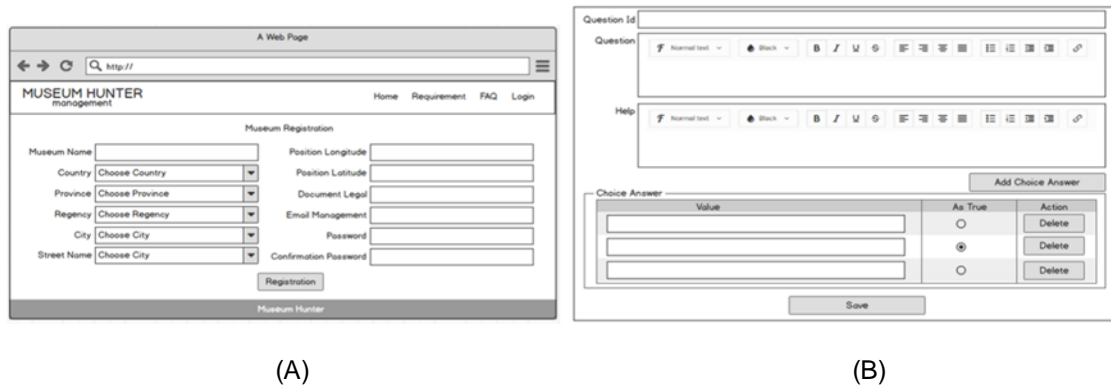


Figure 1. Management museum page

**4.2. Process Verification Game Content**

The superadmin section is as a bridge to connect the museum with the user, Quiz verification page can be seen in Figure 3 with the process flow according to Figure 4 (B), superadmin also gives the number of points in each verified quiz. The number of points will be directly proportional to the attractiveness of the published game.

Museum Name	Quiz Date Update	Status	Action
Monumen Jogja Kembali	12-04-2018 13.56	Verify	Detail
Museum Dirgantara	04-05-2018 11.14	Not Verify	Detail Verify
Museum Benteng Vredeburg	05-05-2018 14.23	Not Verify	Detail Verify
Museum Affandi	05-05-2018 15.31	Not Verify	Detail Verify

Figure 2. Quiz Verification Page

The specifications of the quiz that can be received are quizzes that contain the content of motivation and encouragement so that users can do quizzes while circling the museum, sometimes superadmins need to communicate with the museum management to explain the flow of quiz work.

**4.3. Start Game**

The application actor can access the application using a smartphone that already has GPS and camera, this is necessary because the security is validated with variables received via GPS and QR code scanner, this section will explain the flowchart in Figure 4 (C).

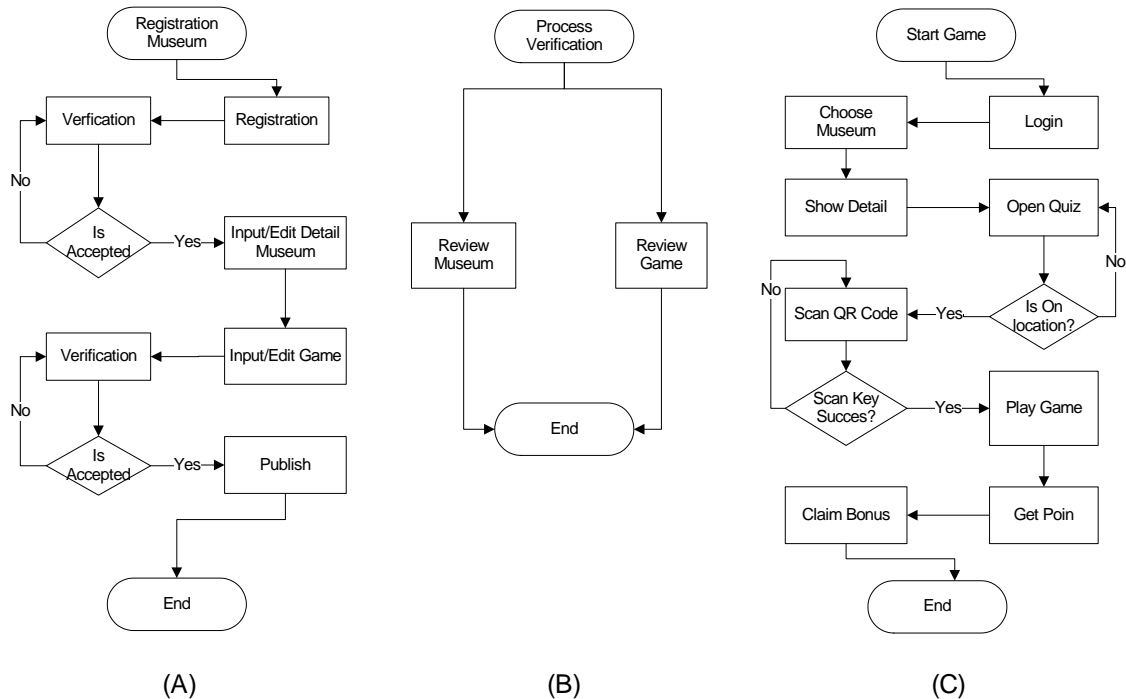


Figure 3. Flowcart

In Figure 5 (A) displays a menu that can be accessed quickly, the header section has a column to find the location of the museum with the appropriate keywords, underneath there is a slideshow that displays museum images whose appearance is displayed randomly, in category groups there are 2 shortcuts for displays museums according to nearby categories with locations obtained through GPS and the favorite category with the highest number of visits each week. In the profile group there are 5 shortcuts, namely the first shortcut to view and edit personal profiles, the second shortcut to see the detail points that have been obtained, the third shortcut to see museum records that have been visited and played by the game, the fourth shortcut to see museum records who have visited but have not finished playing the game, the fifth shortcut sees the reward notes that have been ordered or are in the process of ordering.

In Figure 5 (B) shows the nearest museum page, this page also represents the most popular search pages and pages, because the difference between the three pages only in the query section. Figure 5 (C) displays news from users who have been followed. The news is about the activities of users who have visited the museum. Figure 5 (D) displays prize data that can be exchanged with coins that are already owned by the user, the prize will be sent by the application manager through courier services. Prizes available in the application in the form of prizes provided by the internal application then can also be supported by the sponsor.

In Figure 5 (E) displays the details of the selected museum, in which there is a description of the museum's description, location of the museum map, museum photographs

and information on points to be obtained if completing the quiz. In Figure 5 (F) shows an example of a quiz question in a museum, the quiz is answered by selecting the appropriate answer, when having difficulty working on it the user can use the button refer to the instructions that will direct where the answer to the question will be found.



Figure 4. Design application mobile

## 5. Discussion

In research [5] they apply the gamification application to one of the museums only, from the results of the analysis the users are very receptive to the existence of the application because it is able to provide new innovations, more fun and provide convenience in absorbing existing learning. But because the application is only designed for one museum only, so this is quite inconvenient when it will be applied to other museums, in contrast to the research we made where the application was designed to be able to be used by various museums in Indonesia and each museum can configure independent without having to depend on IT specialists.

Based on [6] that is, in the decision-making process to visit tourist attractions, the tourist actors start with the aim of information retrieval on a basic basis, with the application of the game, there are many challenges and achievements that grow towards the tourist attractions. From there there will be instrumental motivation from game play and prizes. This research conducted an application design which one of the lines was the same as the conclusion stated by [6].

## 6. Conclusion

The gamification method in this study was designed as a promotional medium to encourage user interest to visit the museum with motivational impulses formed from the application. The gamification process starts in the process when the user searches for the nearest museum as GPS coordinates to get points and redeem points for prizes provided by the application. Introducing the way of promotion with game content is the goal of this study, so that the museum management can easily promote the museum and reach more visitors than the previous promotion. The method of promotion with classic content games is still too expensive to do so the hope is that this research can facilitate promotion using game content gamification.

This research is only carried out until the design stage, it is hoped that for the future the application can be implemented and continue to be monitored for its development. For the development of gamification can be added with other elements that have a high motivation drive.

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