The Design of Android-Based Application for Museum Guide Information System using Beacon Technology

Dhiani Tresna Absari, M.Kom , Daniel Hary Prasetyo, M.Sc, Faris Adinata

Program Kekhususan Sistem Informasi - Universitas Surabaya

dhiani@staff.ubaya.ac.id, daniel@staff.ubaya.ac.id, s16075059@student.ubaya.ac.id

Abstract. Surabaya is the second largest city in Indonesia after state capital of Indonesia DKI Jakarta. Surabaya as the capital city of east java province is also known as city of heroes to recalling many heroic events during national revolution of Indonesia. In order to memorize many monumental and historical event, Surabaya's government has built several museums. Museum Surabaya in one of museum in Surabaya that has historical objects collection of Surabaya's development. This museum is inaugurated by Tri Risma Harini, as Mayor of Surabaya, in May 2015. So far, Museum Surabaya has many visitors. But unfortunately, they just came to look around the object of the museum while taking pictures of themselves without being interested more to discover stories behind the objects. Management of the museum has only prepared some boards of information for every object being displayed that not interested enough for the visitors to read. Besides, the differences time arrival of the visitors caused the management difficulties in providing official museum guide to depict stories behind every historical object to the visitors. This has become a common problem for many museums. Regard to the manner of today's people, as they become familiar with the use of smartphone technology, the design of android based application using beacon technology can be developed as an information system that assists interactively museum visitors. Visitors have to install this application on their smartphone to get some features like pop-up information of the object being displayed when they approach those object's area at Museum Surabaya. To attract the attention of the visitor, this pop-up information displayed in the form of text, image and also video. For future opportunities to museum management, this application makes possible for the visitor to make a reservation of their individual or group visit regard to the level of occupancy that provided by the application, on the day they will plan to visit. This information may also describe as graphical report that will be useful to museum management in order to make some managerial decisions. This application also provides information about incoming museum's events for the visitor, so it may attract the visitor to come to the museum again.

1. Introduction

Surabaya is the second largest city in Indonesia after state capital of Indonesia DKI Jakarta. Surabaya as the capital city of east java province is also known as city of heroes to recalling many heroic events during national revolution of Indonesia. In order to memorize many monumental and historical event, Surabaya's government has built several museums. Government Regulation of Republic Indonesia No. 19/1995 states that the museum is an institution, a place of storage, maintenance, security and

utilization of material evidence as results of human culture and nature and its environment in order to support protection and preservation the wealth of national culture.

Museum Surabaya in one of museum in Surabaya that has historical objects collection of Surabaya's development. This museum is inaugurated by Tri Risma Harini, as Mayor of Surabaya, in May 2015.

So far, Museum Surabaya has many visitors. Literally, they came to discover Surabaya's historical objects. But since management of Museum Surabaya has only prepared some boards of information for every object being displayed, it seems that some visitors did not interest enough to read the information, especially the visitors which classified as millennial generations. The results of a study conducted by the Boston Consulting Group (BCG) with the University of Berkley in 2011 in the United States about millennial generation USA state that the interest in conventional reading has now declined due to Millennial Generation prefers to read through their smartphone. This cause some visitors are just coming to look around the object of the museum while taking pictures of themselves without being interested more to discover stories behind the objects. The differences time arrival of the visitors also becomes a reason for the management difficulties in providing official museum guide to depict stories behind every historical object. Actually, this condition has become a common problem for many museums.

Based on data compiled by the Ministry of Communication and Information of the Republic of Indonesia (2015), the level of internet users in Indonesia almost 50% in 2018. This condition is supported by the improvement of the internet infrastructure built by the Indonesian Government. According to the data presented in OkeZoneFinance (2018), Indonesian has occupied the 4th level in terms of smartphone users. Meanwhile according to the Ministry of Women's Empowerment and Child Protection (2018) as written in their book entitled Thematic Gender Statistics: Profile of Millennial Generations of Indonesia states that 91.62% of millennial generation both in urban and rural areas have used cellphones and 56.42% of them have familiar in accessing the Internet including mobile application as part of smartphone technology.

Regard to the manner of today's people especially the millennial generation as one of its target market, as they become familiar with the use of smartphone technology, the design of Android-based application using beacon technology can be developed as an information system that assists interactively museum visitors.

2. Research Method

This research is classified as Applied Research since it offers a practical solution for the research object. The institution that takes part as the research object is Management of Museum Surabaya. Besides, the museum visitors especially those from the millennial generation also get involved as the object research. The research is aimed to develop a design for Android-based application using beacon technology which implemented as an information system that assists interactively museum visitors. According to the software development life cycle, to produce a proper system design, this research must be preceded by the analysis step. Analysis step attempt to discover users requirements. Dalam penelitian ini analisis dilaksanakan dengan melakukan observasi pada museum surabaya yang disertai dengan wawancara terhadap pihak manajemen museum surabaya serta beberapa tamu museum surabaya. System design is then developed regards to user requirement produced by the previous step. The system design consists of a database design modeled by ER Diagram, process design modeled by use case diagram, and user interface design.

3. Experimental Research

According to software development life cycle steps, analysis and design phase need to be done to yield a good software system. This following analysis and design result would be a basis for developing the system in the subsequent research.

A. System Anlysis

Museum Surabaya collects many historical objects that are generally owned by the city of Surabaya from the 1800s to the present. The Surabaya Museum is managed by the Surabaya City Government and was inaugurated in May 2015 ago. At this time, museum Surabaya runs its business processes conventionally like any other conventional museum. To get information the object that is being displayed, visitors have to read board of information near the object that has been prepared by Museum Surabaya management. On the entrance to the Museum Surabaya, there is a guest book and the visitors are expected to write any criticism, suggestions, and opinions about Museum Surabaya. In any certain times, Museum Surabaya may organize several kinds of events. Visitors can get these events information by reading promotional posters on the Museum Surabaya billboard. At this time, Museum Surabaya does not charge any entrance fee to the visitor. Thus, Museum Surabaya management cannot figure out the statistical visit data. This statistical data actually might be used to take various managerial decisions of Museum Surabaya.

Currently, numbers and distribution of millennials generation are quite dominating. Based on data compiled by the Ministry of Communication and Information of the Republic of Indonesia (2015), this millennials generation that is defined as citizens in the age range of 20 to 40 years old reaching around 88 million people or about 33,75% of Indonesian population. This proportion is even greater than Generation X and Baby Boomer as the previous generation or Post Millennial Generation as shown in Figure 1.
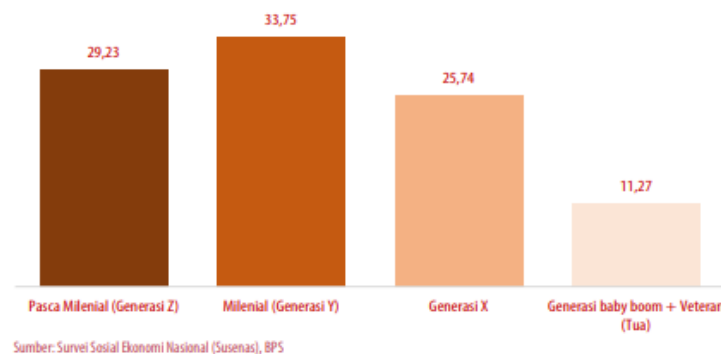

Figure 1. Distribution of Indonesian Generation

Regard to this condition, Museum Surabaya should consider this millennial generation as their initial target market. So that the millennial generation needs must be well-provided during their visit. One of initial characteristics of this millennials is their trend to retrieve information using the smartphone compared to reading the information conventionally. This fact certainly not in line with current facilities in the Museum Surabaya, where information is displayed in text or asking the Surabaya Museum staff. At this moment, information text potentially become a problem because of the text size and position that is less convenience to access. Meanwhile, museum staff unable to guide every visitors during their visit because of the limited number of museum staff. So that an Android-based museum information system application is expected to facilitate the needs of visitors. This system can also be used as a guide when visiting the Museum Surabaya. Visitors have to install this application on their smartphone to get some features like pop-up information of the object being displayed when they approach those object's area at Museum Surabaya. To attract the attention of the visitor, this pop-up information displayed in the form of text, image and also video. For future opportunities to museum management, this application makes possible for the visitor to make a reservation of their individual or group visit regard to the level of occupancy that provided by the application, on the day they will plan to visit. This information may also describe as graphical reports that will be useful to museum management in order to make some managerial decisions. This application also provides information about incoming museum's events for the visitor, so it may attract the visitor to come to the museum again.

B. System Design

System Design is described in several ways that are process design using Use Case Diagram, data design using Entity-Relationship (ER) Notation and user interface design.

Application is designed for two user roles: admin and visitor. Admin has several rights such as to create/update/delete Objects of Museum and Events, and to verify payment and to update ticket status. The visitor has the right to purchase tickets, to see data visit graph and events, to see historical object's information and to submit any testimonies like suggestions or critics. Use case diagram of this system's role describes in Figure 2.
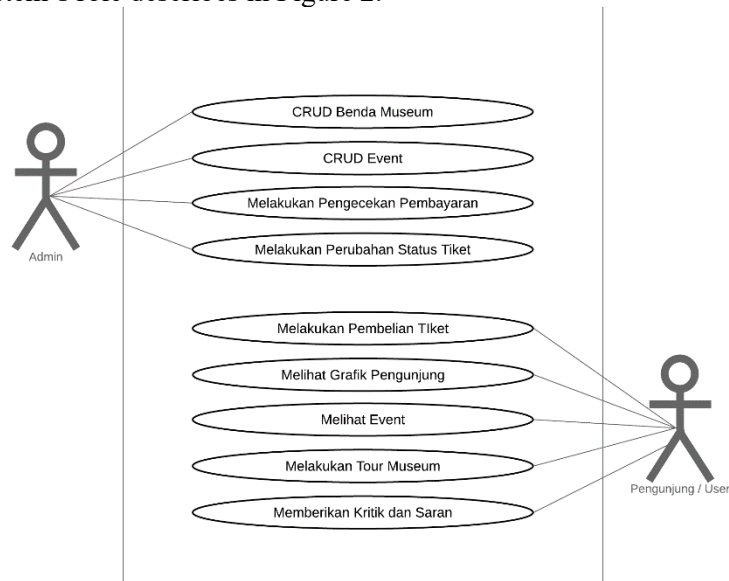
This application consists of 8 main entities, each of which has a primary key attribute named ID. These entities are barangs, cubeacons, events, category_barangs, critic_sarans, notas, visitorss, status_tiket, tikets, and users. Figure 3 describes the Entity Relationship Diagram of the system.
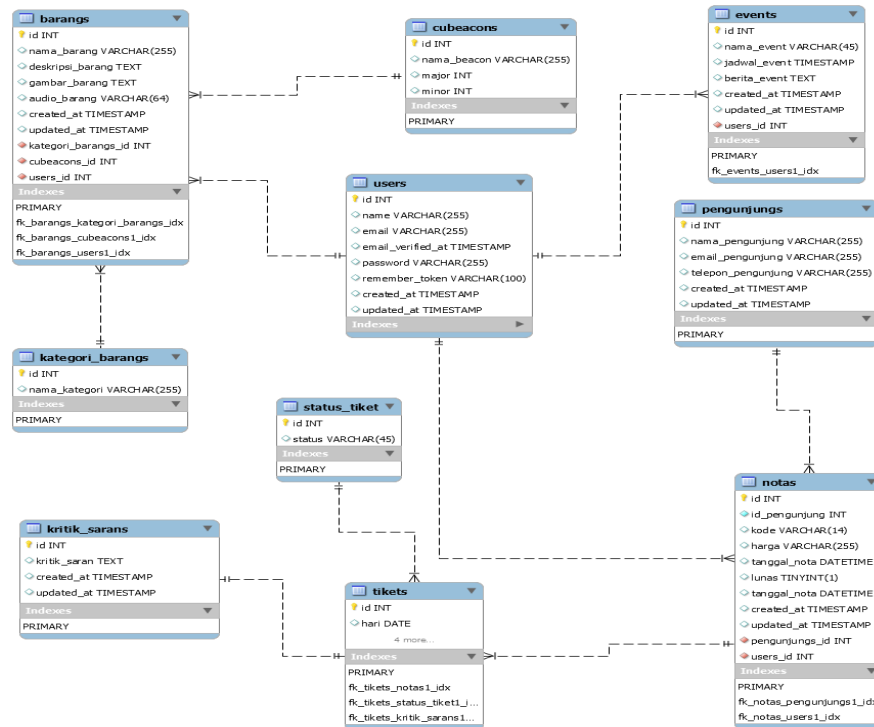
Figure 3(a) and (b) illustrate the historical object information from the user perspective. First, visitors have to activate Bluetooth on their smartphone so that the smartphone will connect with the beacon. Once after the connection is established, visitors will accept pop-up notifications about various historical objects within about 3 m radius around him, according to the position of the visitor. Figure 3(b) is a display design when a visitor chooses one of the objects listed on the previous page as describes at Figure 3(a). Here visitors are provided with objects description in text, several objects pictures, and video accompanied by the objects descriptions in sound that can be heard through the visitor's android device.
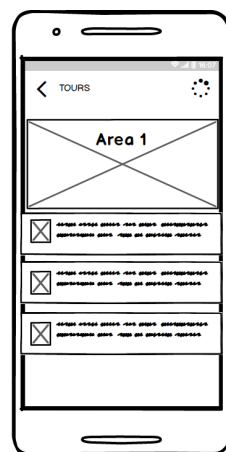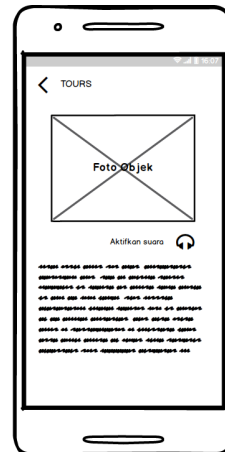

Figure 3(a).

Figure 3(b).

4. Conclusion

From the results of the analysis and design of this application, will be expected as the basis for application development. With this application, visitors are provided with some information about museum objects museum and also other information about museum

activities and events interactively through their smartphones. This application is expected to facilitate visitor needs, especially the millennial generation. In terms of museum management, besides some critics and suggestions information from visitors, the visit data also can be recorded so that it can help managerial decision making.

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