E-BUSINESS IN THE ANDROID APPLICATION BASED ON E-PARKING BOOKING SYSTEM

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Abstract

This research aims to solve parking problems with a new product innovation by developing a smart parking system using applications on smartphones. This study used qualitative methods with a purposive sample of 30 respondents conducted to males and females. The result of this research showed that 80% of the respondents agree with this application according to their needs. The application is more effective and efficient to find a parking space. The application provides information on the availability for booking a parking space, payment using electronic money (e-money), and top-up the balance.

Keywords: Android, Booking system, E-Parking.

1. Introduction

Parking is a crucial issue in the cities where the increased development of shopping centers and offices make parking spaces diminish. Providing safe and comfortable parking facilities and sufficient parking space will give such a huge impact on visitor loyalty [1, 2]. Multi-level parking spaces would have a problem when the vehicle enters the parking lot and the parking spaces are not available. If the management fails to manage the parking space, the vehicles will be piled up and it lead to a dissatisfaction from the visitor. They need to look for a vacant spot around the parking lot when they need to find a parking space [3].

In addressing the issue of parking management and innovation, the innovation may be needed to achieve the goals and solve the problem of the parking system [4]. The parking system can be an electronic business where the system can use the internet to improve business performance [5]. Therefore, technological innovation needs to disentangle the problem such as making it easier to get a parking space, and using a smart card for e-money payment [6]. To find a parking location, detecting the location of parking with a camera is required to make it appear on the monitor operators [7]. Chatzigiannakis et al. [8] developed a smart parking system with the use of the application where the information of availability is listed, however the payment is still manual. Isa [9] also developed the parking system using the QR code that is able to open a doorstop and show the duration of parking on the application. Kokolaki et al. [10] advanced a smart parking system using mobile and web technologies. Idris et al. [11] introduced a new approach of parking system by using a wireless sensor network technology equipped with an ultrasonic system. The system also implemented the shortest part algorithm to calculate the shortest distance from the parking berth to the nearest preferred entrance. Soegoto [12] reported radio frequency identification smart card on parking system to solve the particle problem.

This research aims to solve parking problems with product innovation by developing a smart parking system using an application on smartphones. The application are providing information on the availability of parking spaces, booking parking spaces, payment using e-money, and top up the balance. The benefits of this application are to make it easier to find a parking space, reduce paper use, and facilitate payment by using e-money. This is because smartphone is one of the most used equipment that is not only used to communicate but also to access other media [13-15]. E-parking system is very useful for daily life since it supports business activities in many ways. The e-parking system is more effective and efficient to process the transaction to provide maximum service for the customer [10]. This study used purposive sampling as a method where the author took a sample from 30 respondents by determining the specific characteristic.

2. Method

The data needed is qualitative data using a purposive sampling technique where the researcher took a sample of 30 respondents by determining a specific characteristic according to the needs of the study [16], to understand the response of the respondents who have been selected. This mobile e-parking application is an online-based parking system application where users of this application can book a parking space and make payments using electronic money. In an instant, this system uses an Android studio device to create Android applications and uses MySQL for

basic storage data. Respondents who filled out the questionnaire of this study were respondents with special characteristics. This questionnaire was submitted to 30 respondents where the selected respondents were those who visited the mall in Bandung. To discover the characteristics of respondents divided into two characteristics, namely based on gender and age.

Previous research has used survey and interview methods to the mall visitors in Bandung. The system will work after the user booked a parking space so the user will get a barcode as an input to open the bar and the status to be booked is yellow in the application display. The time calculation starts after the booking is successful. If the user cancels the order, the balance will be charged with the amount showed in the application and automatically the booked status becomes available. In the checkout system diagram, the user will be given information on the number of parking fees and the barcode display as an input to open the door. The following user application activity diagram with a parking e-booking system to order parking locations and activity diagrams for application users who will finish parking.

Figure 1 explains how to book a parking space through an e-parking application. Firstly, the user needs to open the application, if the user already has an account, they can log in to the application. On the other hand, if the user does not have an account, they need to register, fill the data user and log in. After signing up has been successfully done, the user can choose and book the location to park their vehicle. After that, they will receive the barcode after the application counted their payment. Whereas, the booking process will be succeeded.

Figure 2 shows check out diagram activity for the process of parking payment. The information of the parking payment will be shown when the user is going to check out. The system will count the parking fee and the user need to pay according to the total fee shown in the information of parking payment. The system will decrease the balance and the status will be available once the transaction succeeded. Afterward, the user will receive the proof of payment.
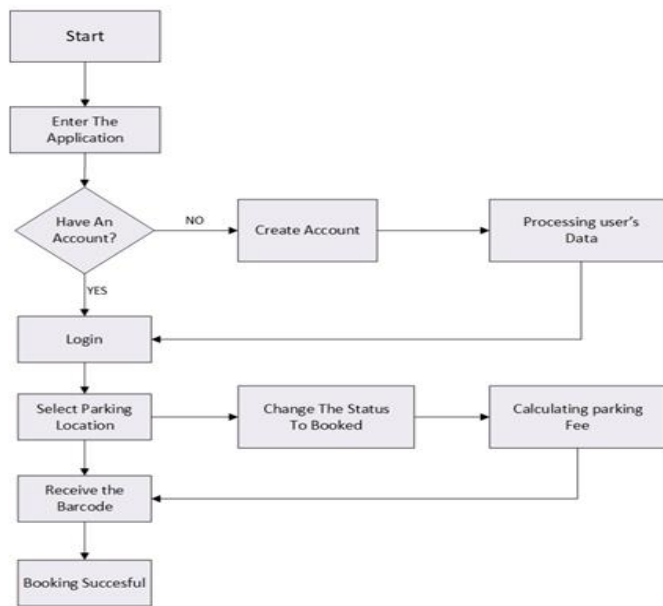

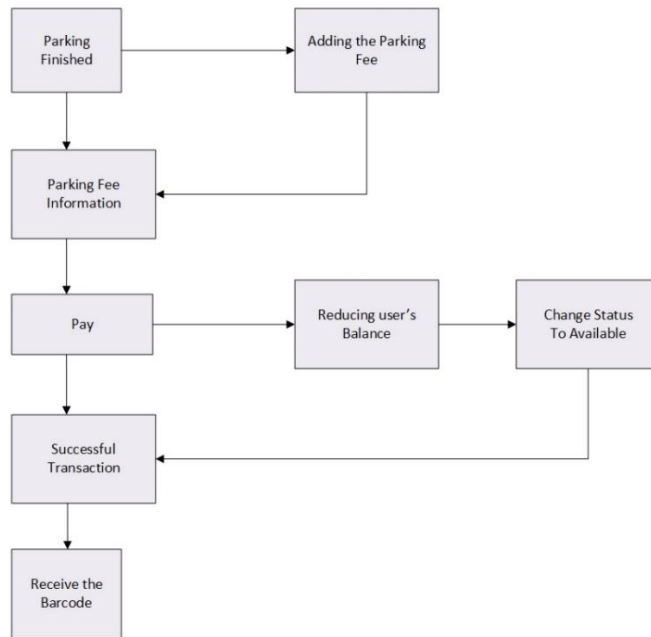**Fig. 1. Diagram booking activity.**

Fig. 2. Check out diagram activity.

3. Data analysis and discussion

3.1. Result based on respondents' characteristics

Characteristics based on gender aims to find out the percentage of male and female users who need the e-booking parking application. Table 1 shows the results of a survey conducted to males and females. There were 30 respondents, 16 of them are males and the rest are females. The result showed that males need e-parking mobile more than females, corresponding to 53 and 47%, respectively.

Table 1. Characteristic respondents based on gender.

Number	Gender	Quantity	Percentage
1	Males	16	53%
2	Females	14	47%
Total		30	100%

Table 2 shows the results of respondents who need this application based on age. It shows that the highest percentage is 47% with a total of 14 respondents at the age of 20-30 years. However, the lowest percentage is 10% with a total of 3 respondents at the age of 50-60 years. The data also shows at the age of 30-40 and 40-50 years have a percentage of 23 with a total of 7 and 20% with a total of 6 respondents, respectively.

Table 2. Characteristics of respondents by ages.

Age	Total	Percentage
20 – 30	14	47%
30 – 40	7	23%
40 – 50	6	20%
50 – 60	3	10%
Total	30	100%

3.2. Testing the application

Testing the application on the parking space booking system is shown in Fig. 3. If the booking succeeded, the display will be changed as shown in Fig. 3(a). If the user succeed in ordering the selected parking space, it will appear as shown in Fig. 3(b). Booking success is shown in Fig. 4.

The display of the application after the vehicle being parked will appear as shown in Figs. 4(a) and (b). To top-up the balance using a voucher, the user needs to enter the code listed on the voucher as shown in Fig. 4(c).

The electronic booking parking system, in this research, comprised the idea of using a mobile application connected to the Android system. This android-based parking system provides the real-time basis information of parking space as soon as the user booked it. In terms of the mobile application, technology plays a significant role as an interface for users to interact with the mobile application. The application is developed through MySQL as a programming language. The purpose of using MySQL is to provide the whole of an online store and comprehensive information about the available products coming from a single record of information. The mobile application is connected with the server through a secured channel. The objective of this e-booking parking is to provide information concerning the availability of a parking space and enabling the user to book a parking space accordingly [8].

There are several steps to use e-parking booking systems: Step 1: the e-parking booking application should be installed in the mobile phone user. Step 2: Searching around the parking area using the application. Step 3: Select an available parking space in the intended parking area. Step 4: Select the time length (in hours) to book a parking space Step 5: Select the payment menu by using e-wallet or credit card. Step 6: User should confirm their occupancy when they have successfully parked their car in the intended space. The confirmation needed to give information that the space cannot be occupied within certain times. Besides, a certain time should be determined (for example 60 minutes after occupancy) for alarming if confirmation does not conduct. This will give a sign to the parking area management that the car has occupied the wrong space or notice that the intended space is still empty. However, the user can stop the alarm anytime by confirming the system when the space is occupied or when the user cancels the booking. The cancelation will be charged to the user. Step. 7: Once a driver finished using the parking space and the car is moved out from the parking space, the total cost will be displayed and the driver should confirm that the parking space now is vacant to get the parking bill. The information concerning the vacant space will be updated to the android application.

The parking reservation system integrated into an android application will contribute to more efficient time and avoid the traffic jam because many cars are waiting in line for parking without knowing exactly the availability of the parking space [17]. An android application is created using Android studio. The Android system installs each Android application with the unique user and group ID. The android system enables to give fast information and response toward parking demand so that the vacant parking spaces can be efficiently used [18]. Besides, with the auto reservation, this system has a similar urgency with the traffic signs in terms of time efficiency.
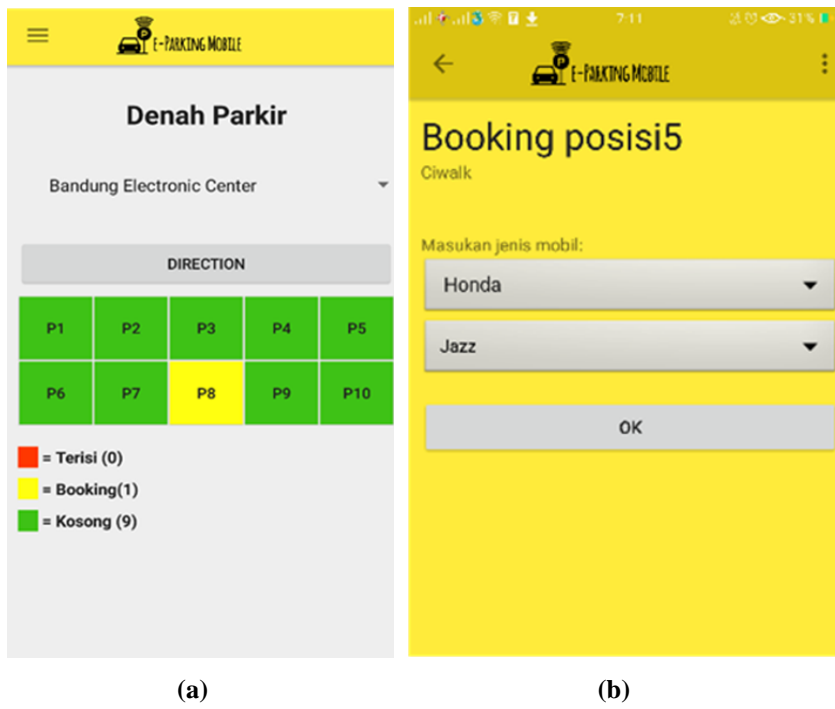
(a)   (b)

Fig. 3. Display of parking plan application.

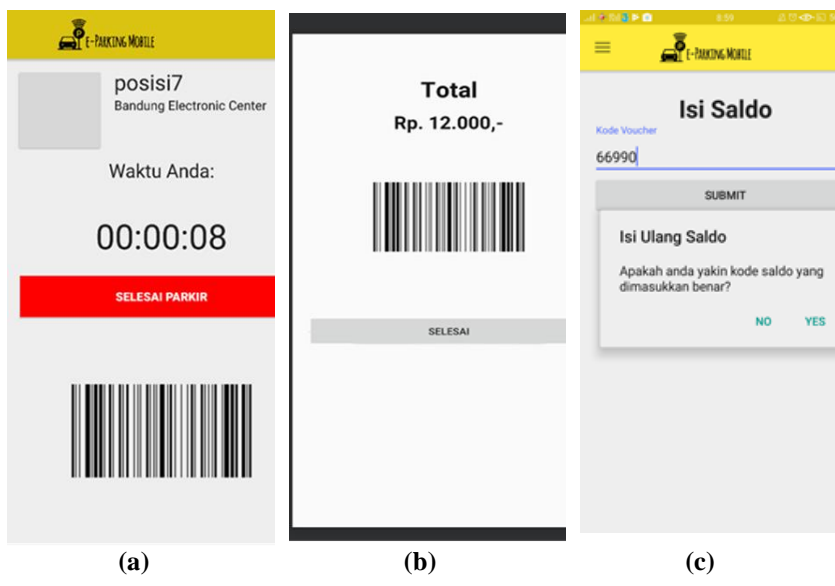(a)   (b)   (c)

Fig. 4. Booking success.

In this research, the e-parking reservation system should overcome two issues such as: First, The system must be able to guarantee parking reservations as the main feature in the android application. The system has to be programmed to give

the updated and real-time information when a user has occupied a parking space to another user to guarantee that this parking space will not be taken by other cars. In this paper, we focused on the special parking area. This system might work better in a certain parking area in the building, shopping center, office, and mall. The parking space has a clear limit. The ID checking is more possible to be performed in the parking area gate. However, for the street parking lot, further researches should be performed on how to integrate the system into the android system in an accurate way. For example, the previous researches have formulated to depict the reservation by ultrasonic sensors to overcome parking in the street area [12]. They conducted in the Boston University garage, which contains 27 parking spaces. The researcher installed an ultrasonic sensor for identifying the occupancy of a parking space. The ultrasonic sensor motes together with the light indicator are attached to the ceiling above each parking space. The ultrasonic beam faces down to the center of the spot to detect a car.

4. Conclusion

Based on the application that has been developed and testing the application through the respondent, the application menu works successfully according to its function. Respondents agreed that this application would make it easier to find a parking space.

Acknowledgments

We would like to thank all parties involved in developing and testing this system.

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