

# DEVELOPMENT OF MOBILE APPLICATION BASED ON CROWDSOURCING FOR CAR RENTAL MANAGEMENT BY USING SCRUM METHODOLOGY (CUSTOMER SIDE)

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**Abstract** – Indonesia has about 250 million people. Mostly, Indonesian people not facilitated by private car [1] so when they are traveling outside the city they usually use motorcycle. The other alternative is public transportation, but most of the public transportation in Indonesia uncomfortable based on a survey conducted in this research. Base on this condition, the car rental business become popular among Indonesia people to meet their needs of vehicle for travel even though out of the city. However, the dissemination of information regarding the rental car itself is still done through banners, brochures and newspaper ads that make the dissemination of information about car rental is not effective. In fact, Indonesia people mostly has a smartphone that certainly can be used to get information faster. Dissemination of information through printed media can be transferred through digital media so make it spread out more quickly, especially information regarding the car rental through the website or mobile application. In this research will be discussed on the development of mobile applications based on crowdsourcing for the management car rental. With this application, dissemination of information about car rental can be centralized in a single application. In addition, there is a feature to give some comments to certain car from rental. If the prospective renter still doubt to hire a car, prospective renter can see the review that given by other users to determine whether a rental has a good reputation or not.

**Keyword:** Car rental, crowdsourcing, e-commerce, mobile application, scrum methodology.

## I. INTRODUCTION

Mobile devices have become a mandatory for Indonesian people. Almost the whole society are now able to have a smartphone device. Number of android smartphone users in Indonesia is very high up to 43,

75% users from total smartphone users [2]. This certainly gives a lot of opportunities for the business developer in the field of e-commerce to expand its business. One method that can be used is crowdsourcing. In Indonesia there are plenty of e-commerce businesses that based on crowdsourcing i.e. tokobagus.com, jobstreet.com and sribu.com. In addition there are many more startup companies that developed the application with crowdsourcing method. The benefits of this method is the opportunity to disseminate information more widely and easily.

The application crowdsourcing itself is contains of many providers of services and also a lot of customers who are looking for goods or services so as to reconcile the provider or seller with the customer become easier because of the convergence of information from crowdsourcing application itself [3]. Centralized information can facilitate both service providers and service seekers. Seeing this opportunity, mobile applications based crowdsourcing is developed for the car rental. In this application not only provides car rental from one provider but many rental instead. The car rental mobile application users can make a reservation anytime and anywhere to any rental so as to provide non-stop service to the seekers of rental services. The targets of this research is to create a new trend for the Indonesian people in the hire or rent a car. The goal of this research will develop mobile applications based on crowdsourcing for car rental.

## II. MOBILE APPLICATION AND CROWDSOURCING

There are two types of mobile application. First, the mobile web based application that which can be run on various operating systems such as Android and iOS smartphones. The second is native mobile application which is an application that can only run on the operating system that is specified by the developer. In this study, will be developed native mobile application for android.

Android is an operating system designed for touch screen mobile devices such as smartphones and tablets. Android was originally developed by Android, Inc., with financial support from Google, which then bought by Google in 2005. The operating system was officially released in 2007, along with the establishment of the Open Handset Alliance, a consortium of companies' hardware, software, and telecommunications that aims to promote open standards mobile devices [4][5]. The first Android phone went on sale in October 2008. Android is the operating system with the concept of open source, and Google release the code under the Apache License. With the concept of open source code and licensing permissions on Android allows the software to be freely modified and distributed by device makers, wireless operators, and application developers. In addition, the Android developer community has a number of applications that extend the functionality of the device, generally written in the Java programming language version.

Android is also a choice for IT companies who want the operating system with a low cost, can be modified, and lightweight for high-tech devices without having to develop them from scratch. As a result, even though at first the operating system is designed specifically for smartphones and tablets, Android also be developed into additional applications in television, game consoles, digital cameras, and other electronic devices. Android is open source nature has prompted the emergence of a community of application developers to use open source code as the basis for the project of making the application, by adding new features for users [4].

Crowdsourcing is an action to perform a specific task performed by employees or outsourced workers with a new method that is open free calls to anyone, but in large groups. Crowdsourcing provides a means for a group of people to do a specific task that once

only done by a few people. Or can be explained also that this Crowdsourcing use the concept that has been used for the development of open source applications where the concept was adapted in the business world [3].

## III. METHODOLOGY

Research in the making of the application of mobile application for car rental is performed using Scrum method. This method was chosen because the possibility of a change request function in the application of the user or when performing benchmarking functions [6]. Here are the steps of developing mobile application for car rental:

- Problem identification, determine problem solution, define the purpose of the research, and define the scope of the problem of this research
- Benchmarking, designing product features, validating, review, evaluating and updating the product features
- Create a product roadmap, define backlog, and designing sprint plan
- Develop the application using Scrum method and prepare for the first release
- Preparing for second release and make the conclusion for the research hereafter.

The activities of Scrum are step of product backlog, sprint planning, sprint backlog, sprint execution in which it has the daily scrum, building products partially, sprint review, and sprint retrospective as shown in Figure 1.

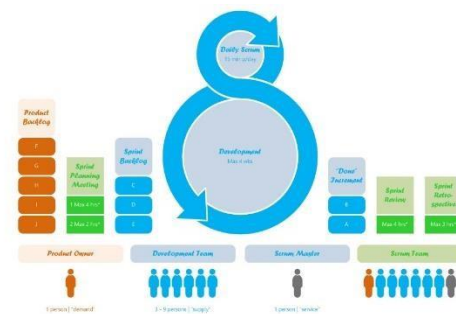


Figure 1. Scrum Activities

## IV. ANALYSIS AND DESIGN

Mobile applications in this research is applications for car rental based on crowdsourcing called nyewamobil.com. In this research, the discussion focused on the mobile applications. For

more information, there are also two other applications which are the customer side nyewamobil.com web application and rental side nyewamobil.com web application so that we called it a crowdsourcing application. Nyewamobil.com itself is an application which helps the customer to rent a car. In nyewamobil.com mobile applications, targeted user is the renter so the features is adapted to help the renter in the hire car.

#### A. APPLICATION FUNCTIONALITY

These are the main features of mobile application based on crowdsourcing for car rental:

- Find a car. As a main feature, the user can find this feature at homepage after they login to the application. By using this feature, user can get information about car rental that available in certain date and location.
- Make a reservation. After the user choose a car from search result, the detail about car rental information will appear. By this step, user can make a reservation for the car or turn back to search car for looking another car. If the user want to reserve, the can just click reserve button after choose car from search result and complete the reservation form.
- Confirm payment. The conventional method of car rental should pay and confirm payment by visiting the rental directly. By using this application, the user get confirm payment feature to make it easier to confirm their payment after book. The user will ask to complete the form of confirm payment and wit for the car rental admin to confirm they payment status.
- Rate and review car rental. One of the best feature in crowdsourcing application is rating and review for certain products or services. This research adapt that feature for this mobile application. The user can participate their thought by adding a rating to certain car and give some comments about their satisfaction.
- Explore the car catalog. The user can get the information about car by exploring the car catalog besides search car feature. In this feature there are three tabs that can be explored which are nearby, top rated and best price. Obviously, the best car in this system will appear at top of each tab.
- Explore the rental catalog. This feature provided for user that want to know the detail

of rental. User who has a car can make a partner with rental by propose their car to certain rental and earn some money from that. to User who already make a partner with rental can manage or see their revenue statistic through web based application of nyewamobil.com

- Propose car. As mentioned above, propose car feature is provided for user who has car and want to make a business partner with rental. User can propose their car using mobile application and monitor their revenue using web based application of nyewamobil.com.
- Parking. To avoid the renter get confused while park their car, this mobile application provide a feature to save the parking location. In case the user forgot their parking location, they can use this feature to track and navigate to their parking location using a map.
- Track your transaction. This feature will help the user to track their history transaction. In this feature will show the status of transaction. There are three status which are book, pending, and approve. Book status means the user has successful make a reservation and have to pay and confirm payment immediately. Pending status mean the user has successful confirm the payment and have to wait for confirmation from the rental admin. Approve status means the transaction has been completed and the user can bring the car from car rental.
- Notification. This feature for notify users to pay the reserved car and do confirm immediately
- Profile. In this feature, user can see their transaction history. Users can edit their profile in this feature.

#### B. APPLICATION ARCHITECTURE AND TECHNOLOGY

To ensure the flexibility of mobile applications rental car, the system architecture is made by utilizing a web service as a link between mobile applications with the server. For information, nyewamobil.com applications also developed in web-based application for the customer and the rental side. So we need an interface to communicate each other. The function of web service is to parsing data from server to the mobile applications and vice versa.

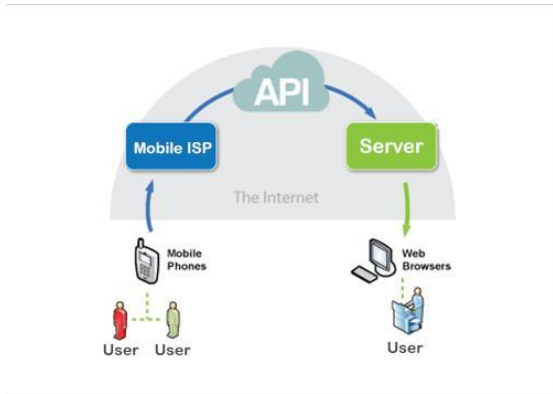


Figure 2. System Architecture

Mobile application itself can be built by using concept of Model-View-Controller (MVC). According to McArthur MVC is a design pattern that simplifies the development and maintenance of applications. This pattern separates an application into three components, namely model, view, and controller [7]. The API for this application developed by using Laravel version 4 framework, so mobile application can communicate with the web server through API.

C. RESULT OF APPLICATION

The UI of mobile application will be shown by the figures below. Only few of them will be shown and explained.

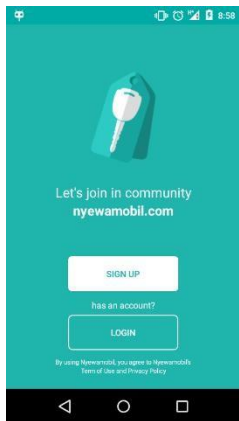


Figure 3. Landing page

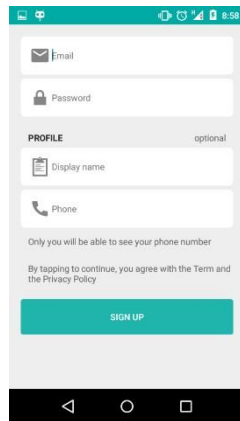


Figure 4. Registration page

In the figure 3, there are two buttons which are signup and login button. For users who do not have an account, then it must register by clicking on the register button. Then it will appear as the figure 4. On this page, users will asked to fill out some forms for new accounts registration.

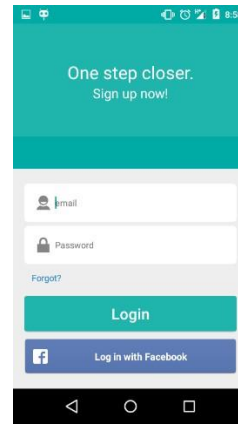


Figure 5. Login page

Once the user has an account, the user can login at the login page as shown at figure 5. They could login by using an account registration, the user can also login through connect with their Facebook account.

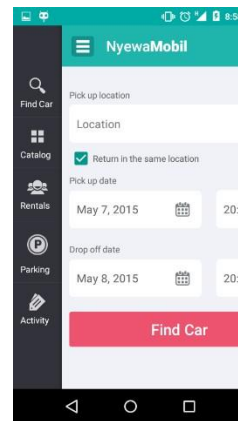


Figure 6. Find car page

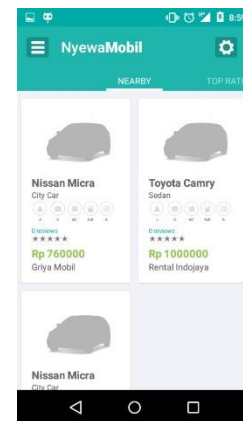


Figure 7. Car catalog page

After login, users will arrived at homepage as shown in figure 6. User can search by location, date and time. The search results will appear once find car button pressed. In figure 7, is car catalog page. There are three tabs which are nearby, top-rated and best price. Nearby tab will display nearby car from the nearest rental from users location. Top rated will shows cars from rental with a rating over than the average rating. Best price tab will display the cheapest car to the users.

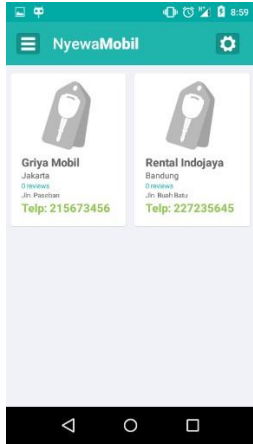


Figure 8. Rental catalog page



Figure 9. Parking page

Figure 8 is the rental catalog page. On this page available rentals will be displayed. This information is provided for users who want to propose car to the car rentals. Users can propose their car by clicking on the rental catalog gridview and fill out proposed car form. In figure 9, is parking feature page. This feature is used

to detect users parking location, if the user forgot the car park location, this feature will help users to navigate to their car park location. Before you can use this feature, the device must turn on the location feature and connected to the Internet.

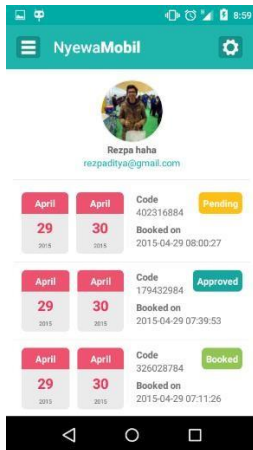


Figure 10. Activity page

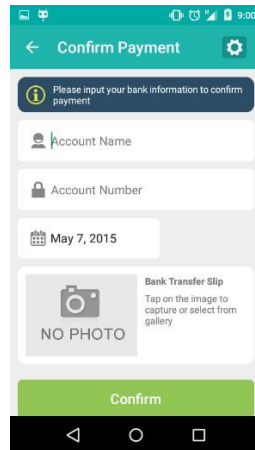


Figure 11. Confirm payment

In the figure 10, is an activity page. On these pages users can view their transaction histories and can see the details of their transactions. In the figure 11, is the confirmed payment page. This page can be accessed through the activity page by choosing a transaction which has booked status. On the details of the transaction confirm payment button will appear that leads to the page as shown in figure 11.

In the figure 12 below, the page shows some menu settings that can be selected by the user. There are edit profile menu, change email, change the password and logout.

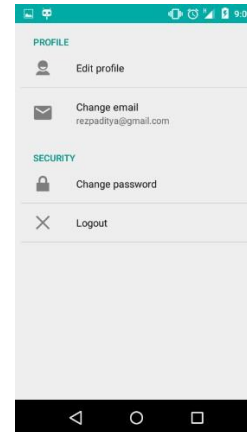


Figure 12. Setting page

V. TESTING

To ensure the application work properly, the application should be tested, the application must free from error; free from errors is a necessary testing to find errors that may occur as in the language errors, logic errors and error analysis program. Test performed on the mobile application included all features and performed in different screen size of device as well. The tests are known as white and black box testing. In order to test the functionality of this application, conducted in 11 scenarios. Android platforms used for testing are Jellybean, KitKat and Lollipop. From three of that platform, the result shown in table below.

TABLE 1. MOBILE APPLICATION CAR RENTAL TEST RESULT

Platform	Result (succeed / total)
Jellybean	11/11
KitKat	11/11
Lollipop	11/11

The scenario used is as follows.

TABLE 2. FUNCTIONALITY TESTING SCENARIO

No	Scenario	Expected Result
1.	Register	Create an account and directed into homepage
2.	Login	Enter the system and appropriate access

3.	Find car	Show the car rental if available or show message if car rental is not available
4.	Reserve car	Show the invoice of transaction complete with car and rent information
5.	Track transaction	Show appropriate status of transaction
6.	Confirm payment	Transaction status change into pending
7.	Rate & review car	Car rating successful message appear
8.	Edit Profile	Profile edited successful
9.	Explore car catalog	Show the car based on nearby location, top rated or best price
10.	Explore rental catalog	Show active rental and its detail information
11.	Propose car	Show successful message of acceptance

## VI. CONCLUSION AND SUGGESTION

Nyewamobil.com mobile application is an application that can help users to find car rental. In addition, users can also give review and rating to car rental, so another users will consider which rental will give them the best facility.

This application is developed on android platform by leveraging APIs from websites nyewamobil.com, Google Places and Google Maps API v2. This application can be run with Jellybean platform as minimum requirement. However, in order to use all the features perfectly users should use this application in Lollipop platform.

For further development, this application can be developed by adding monitoring features of the proposed car from users. So that each user who proposed the car can manage and monitor their income by using mobile applications.

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