DEVELOPING WEB APPLICATION BASED ON CROWDSOURCING FOR CAR RENTAL MANAGEMENT BY USING SCRUM METHODOLOGY (RENTAL SIDE)

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Abstract— Car rental business in Indonesia was highly developed, as seen from the number of rental cars more and more especially in big cities in Indonesia, one of them are the rental in SMEs scale. On the other hand, technological development has been very fast, especially internet technology. With its consistent growth, car rental business should utilize the technology to improve business development. With the use of technology, the rental business will be expanding and getting larger and increasingly professional rental management. One that can develop is to apply the concept of crowdsourcing. With crowdsourcing, rental owner will be able to easily manage the marketing of rental and can easily increase the number of cars without having to own a car. Because the owner of the car that will participate rent the car, can directly contact the relevant rental. Application development is done with the scrum method. This method was chosen with the expectation generated application can be in accordance with the wishes of the user. This application will be equipped with SMS Gateway technology in terms of the notification. Also the development of this application using Laravel Framework whose capabilities is proven.

Keyword—Car Rental, business, technology, scrum, framework, laravel, crowdsourcing, SMS Gateway

Abstrak— *Bisnis penyewaan mobil di Indonesia sangat berkembang, seperti yang terlihat dari jumlah mobil rental yang semakin banyak terutama di kota-kota besar di Indonesia, salah satunya adalah rental dengan skala UKM. Di sisi yang bersamaan, perkembangan teknologi sangat cepat, terutama teknologi internet. Dengan perkembangan yang sama-sama konsisten, bisnis rental mobil dapat memanfaatkan teknologi untuk meningkatkan pengembangan usaha. Dengan penggunaan teknologi, bisnis rental akan memperluas dan mendapatkan penyewaan yang lebih besar dan semakin professional didalam pengelolaan rentalnya. Salah satu yang dapat dikembangkan dari sisi penyewaan adalah dengan menerapkan konsep crowdsourcing. Dengan crowdsourcing, pemilik rental akan dapat dengan mudah mengelola pemasaran dan dapat dengan mudah menambah jumlah mobil tanpa harus memiliki mobil. Karena pemilik mobil yang akan berpartisipasi menyewa mobil, bisa langsung menghubungi rental yang bersangkutan. Adapun pengembangan aplikasi dilakukan dengan metode scrum. Metode ini dipilih dengan harapan aplikasi yang dihasilkan dapat sesuai dengan keinginan pengguna. Aplikasi ini akan dilengkapi dengan teknologi SMS Gateway dalam hal notifikasi. Juga pengembangan aplikasi ini menggunakan framework Laravel yang kehandalannya sudah teruji.*

Kata kunci—*Rental, bisnis, teknologi, scrum, framework, laravel, crowdsourcing, SMS Gateway*

I. INTRODUCTION

Transportation in Indonesia is something that is very important in the life of today's society seen from the function that transportation is as a tool to ease the burden on a person in performing activities of traveling from one place to another. It can be seen from the increasing number of motorists in each year. The total number of vehicles in Indonesia reached an increase of about 12%, from 85,601,351 vehicles in 2011 to 94,229,229 vehicles in 2012 [1]. From the resulting data indicated that demand for motor vehicles is a lot, especially with the level of mobility and activity increasingly diverse society.

One type of vehicle that is growing in Indonesia, particularly in terms of sales is Car. This is evident from the statistical data by the Ministry of Industry car sales in the month of July 2012 reached 103 219 units, which can beat the previous highest sales in June 2012, a total of 101 743 units. Powered by a data survey conducted by Nielsen Global Survey of Automotive Demand stating that Indonesia with a total percentage of 78% is a country ranked 3rd most during the next 2 years in the purchase of a car based on the uses and benefits of the car. Indonesia is second only to South Korea with a number of countries the percentage of 86% and Slovenia with 81% the percentage amount.

Still on the terms of a survey conducted by the Nielsen Global Survey of Automotive Demand for car ownership,

there is an interesting fact that shows that 42% of households Indonesia does not have a car and 46% of households Indonesia only has one car unit [2]. Then, based on the results of a questionnaire survey conducted on 90 respondents of the public randomly that showed in figure 1 indicates a high level of intensity in the community hiring a car in a period of 3 months.

According to data obtained from sindonews.com, is currently estimated that there are approximately 1.5 million operational vehicles used by enterprises in Indonesia. Of that amount, approximately 400 thousand units of a vehicle rented from a car rental company provider. It indicates that about 26% of operational car is a rental car [3]. Facts that show growing car rental business in Indonesia. During its development, the car rental business is not only implemented by large companies, but also many companies SMEs scale engaged in car rental.

Based on interviews of researchers to business owners of SMEs scale of Car Rental, there is a tendency owners of rental services experienced difficulties in managing his rental business, such as promotions to customers, and save the rental transaction. Including one of the obstacles in the car rental business, namely such as difficulty in adding cars, especially cars surrogate due to lack of information about people who are willing to entrust their personal cars for rent. On the other hand, business owners really hope many car rental agreement with the owner of the car to increase the car fleet units without the need to buy their own cars. With this concept, they said that their turnover will increase steadily as more and more transactions. At the same time, researchers distributing questionnaires to 90 respondents randomly distributed regarding the interest of respondents to leave their car rental service provider if they have more than one car.

Figure 1 Public Intensity of Hiring Car in a Period of 3 Months

From the data generated, it supports the same perception which is owned by the owner of the car rental by owner for partner in the business.
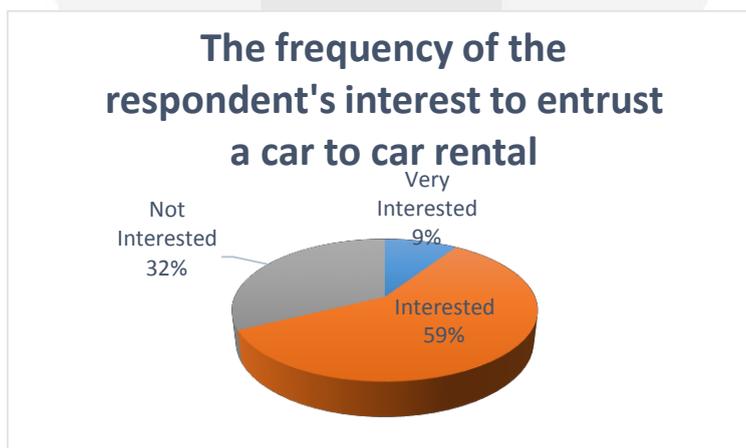

Figure 2 the frequency of the respondent's interest to entrust to a car rental service provider

Regards with research into the development of Web-based applications, the researchers also collected data on Internet users in Indonesia. The data of Internet users in Indonesia is projected to reach 107 million people [4]. Usually the Internet users use the Internet as a medium for information. However, this time the Internet has been

used to support the business, one of them is car rental service provider business. With the internet, the owner of the car rental services can easily manage and monitor its business.

Based on the above data exposure, it would be better if there is a container or a car rental company can assist in increasing the rental transaction, take over management of car care, car maintenance regularly and assist in the marketing especially in utilizing customer behavior towards leasing transaction data. With the data of customer behavior, the owner of the car rental services will be helped to carry out promotions to customers who have been and often do leasing, so that a more focused marketing process. The container is a web application with crowdsourcing method.

II. Car Rental Management System, Crowdsourcing, SMS Gateway

A. Car Rental Management System

Management Information System is an application of information systems in an organization starting from the management of a wide range of information which later became information that is needed by all levels of management.

One of the management information system developed is a car rental management system. This system is used to manage the rental car, which is then expected to accelerate data archiving service to customers better and more secure, making it easier for providers of car rental services if it requires such data. In the implementation of an online information management system, can support customers to make the ordering process, assist in the management part determine a rental car inventory at a particular time, and process transactions between a rental car or support the process of leasing transactions for the transportation itself is done by the customer. Thus, management information systems can provide satisfactory service to customers and support existing operational processes in the leasing service providers, so that the number of customers can be increased and will assist in the promotion of a rental car [5].

B. Crowdsourcing

According to Jeff Howe (2008) in an article in the International Achievement Institute summaries, crowdsourcing is an activity or action taken by a company or institution that takes one of the functions of the job / task that should be carried out by employees of the company, but openly and freely disseminated to many people are connected to a computer network, in this case the internet.

Based on the explanation Crowdsourcing for Dummies book, the author explains that crowdsourcing is a way of organizing and coordinating the work of individual human beings. As an illustration, you use the Internet and computer software to contact individuals, offering them to do something, and collect the results of their work.

The crowdsourcing in itself, there are four different elements, the first is "someone", generally referred to as crowdsourcer, scope as those who manage all processes on the system crowdsourcing. The second is "a group of people", usually referred to by the crowd, scope as the party doing the job offered and available on the system crowdsourcing. The third is the "market" is usually referred to as crowdmarket, scope as a place that is used to help manage the contribution of the crowd in crowdsourcing system (crowdmarkets often found on the internet site called crowdsites or platform). And the latter is "a way to communicate with the crowd", usually referred to as the Internet.

C. SMS Gateway

Short Message Service is a mechanism for sending short messages via the mobile network. It is a model of storage and how to transmitting messages to and from mobile phones. Messages from senders phone is stored in the central short message center (SMS), which then forwards it to the destination phone. This means that when there is a case that the recipient is not available, the short message is stored and can be sent later. Each text message can be no more than 160 characters, while these characters can be text (alphanumeric) or Non-Text binary form of short messages. For this application, it use Gammu Service SMS Gateway.
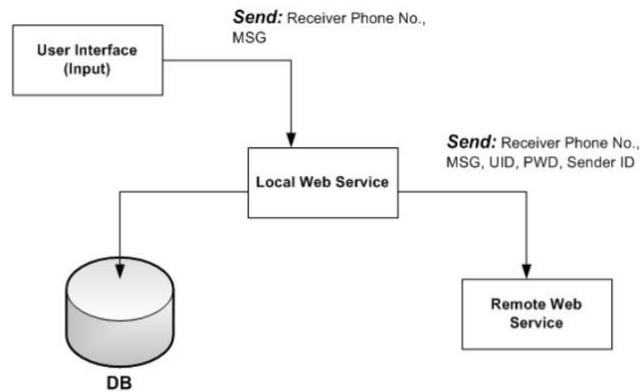
Figure 3 SMS Gateway UI [6]

III. METHODOLOGY

Research in this development of web-based rental applications is using the Scrum method. This method was chosen because it refers to features that are made will be done together with the team, so the scrum method is very supportive in the making, one through the daily scrum meeting as the supportive definition of scrum that Scrum is a simple framework in which people who will work can resolve complex issues and can develop products with the highest possible value in a productive and creative (Scrum Guide, 2014)[7]. Scrum approach focuses on the business needs of the project when developing products and services. It provides the same benefits to the management in line with only minor modifications to the tools. Scrum approach includes activities without added value and encourage delivery by focusing on the details directly. As Figure 6 shows the details of Scrum Methodology. Here are the steps undertaken in the development of web-based applications this rental

   a. Identification of problem that often occurs, especially with regard to rental, set goals and benefits and limitations of the research problem.
   b. Data collection, the analysis and design needs of initial application.
   c. Application development. In this phase, there are activities that are repeated in accordance with the division backlog at each sprint. And especially for this admin web rental application development, there are 6 sprints that are divided into 2 week in each sprint.
   d. Doing deploy applications and final testing.
   e. Application maintenance.
   f. Preparation of conclusions and suggestions for further application development.
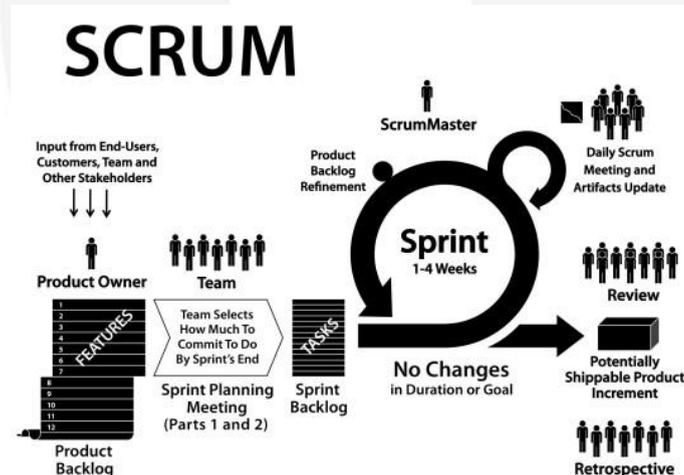
Figure 4 Scrum Methodology [7]

IV. THE DESIGN AND ANALYSIS OF ADMIN RENTAL WEB APPLICATION

Rental Web application is an application that can be used to manage all matters relating to the rental side of Crowdsourcing. This application will refer to the technical side of the car when the renter will rent in particular rental.

A. Application Functionality

The following are the main functions that are built into this application

- eRental Dashboard. This function is used by rental when starting to open applications, will appear briefly on the rental chart as well as Latest Order and Top Products. On this, the rental will be easy to see the important things in the car leasing

- *Rent (Penyewaan)*. This function is used by the rental when will see a list in his rental car rentals. Will also be shown on the rental payment status. And, no less important, is displayed amount of leasing in accordance with categories, such as today, this month and last month.

- *Rent Detail (Detail Penyewaan)*. This function is used by the rental to see the details of each leasing transaction.

- *Product (Produk)*. This function is used by the rental to see a list of existing in his rental car and check the availability of stock of each car. At this function also can add to the rental catalog in his rental car at each

- *Entrust (Titipan)*. This function is used by the rental car to see a list of entrusted of each rental. Including the approval and denial of entrusted proposal in the rental car.

- *Renter (Penyewa)*. This function is used by a rental to see the entire list of tenants who have had a car rental at the rental.

- *Branch (Cabang)*. This function is used by the rental to view and add to the list of existing branches in the rental.

- *Driver (Sopir)*. This function is used by the rental to view and add to the list of drivers that exist in the rental.

- *Graphic Statistic (Statistik Grafik)*. This function is used by the rental to see charts and graphs hire in rental income respectively. Especially can see a graph by year, month, week and day.

- *Customer Behavior*. This function is used by the rental tenants to know the habits of the transaction based on the number of transactions. And can implement a discount on a particular tenant.

- Manage Coupon (*Kelola Kupon*). This function is used by the rental to see a list of coupons and add coupons in accordance with the wishes of each.

- *Manage Financial Report (Kelola Keuangan)*. This function is used by the rental to see the influx of cash each based on the specified date. And can be used as a financial reports on each rental.

- *Account (Akun Profil)*. This function is used by the rental to see their personal profile and the profile of their rental.

- *Renter Detail (Detail Penyewa)*. This function is used by the rental to view a detailed data and certain tenant leasing.

- *Invoice (Kwitansi)*. This function is used by the rental to view the transaction receipts for each transaction.

- *SMS Gateway*. In this application will be equipped by sms gateway, renters and rental will be sent a message in certain conditions, so as to facilitate the notification.

B. Use Case

A use case diagram at its simplest is a representation of a user's interaction with the system that shows the relationship between the user and the different use cases in which the user is involved. A use case diagram can identify the different types of users of a system and the different use cases and will often be accompanied by other types of diagrams as well.

Figure 5 is a use case diagram of Admin Rental Web Application. There are several cases that functioned as include and extend.

C. Class Diagram

In software engineering, a class diagram in the Unified Modeling Language (UML) is a type of static structure diagram that describes the structure of a system by showing the system's classes, their attributes, operations (or methods), and the relationships among objects.

Figure 6 is a class diagram of Admin Rental Web Application. It represent the structure of the Laravel Framework.

D.   Application and Technology Architecture

This research development uses a framework as the tools to build. As the definition that framework is a basic conceptual structure used to solve or deal with a complex problem.
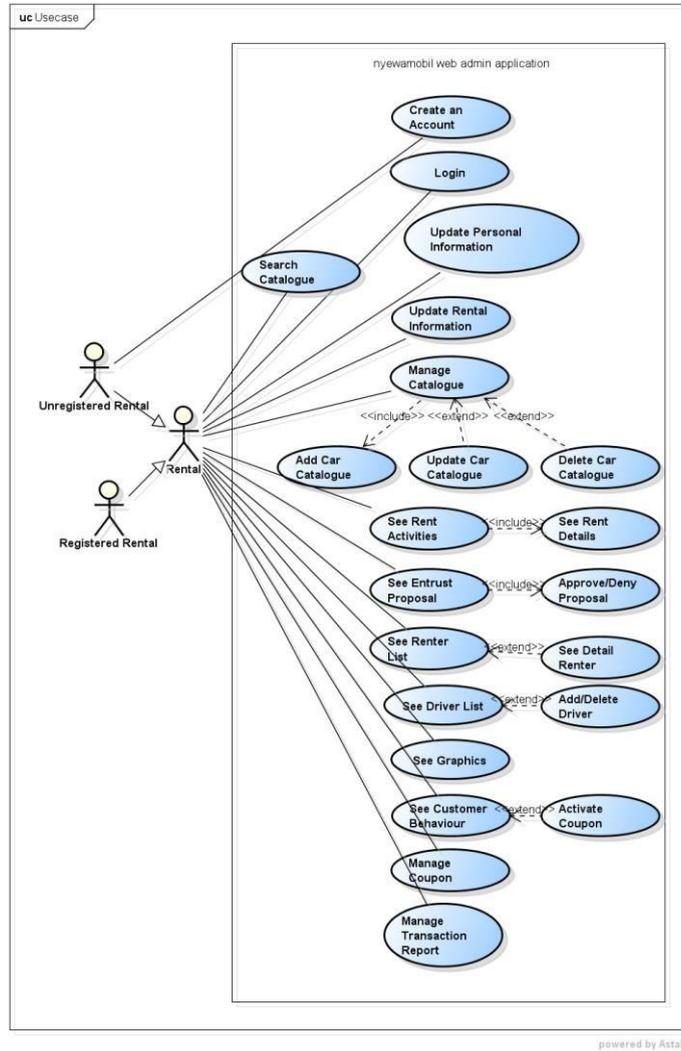
Figure 5 Use Case Diagram
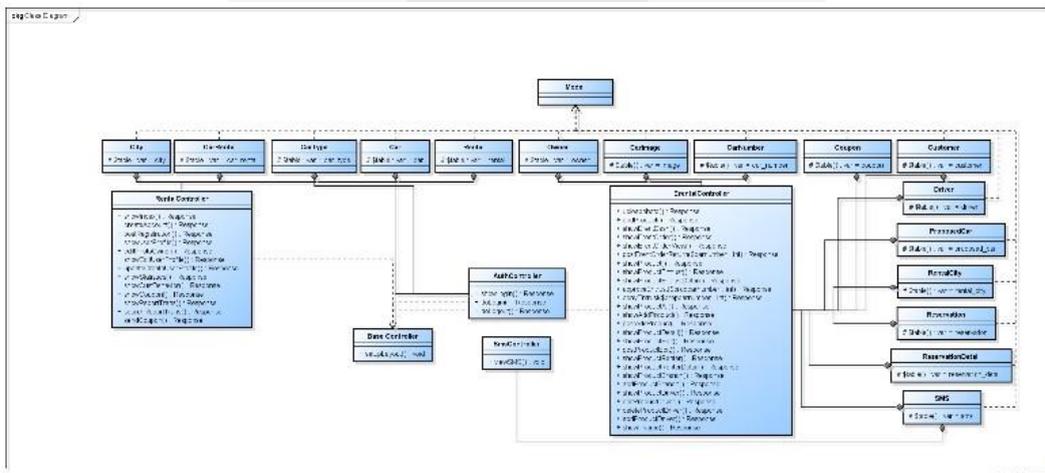
Figure 6 Class Diagram

The term is often used in the software field to describe a software system design that can be reused in developing it. Each framework will have its own uniqueness in the structure of their functions, while in terms of concept, some of all framework uses the same concept, namely the MVC (Model View Controller). Which makes the MVC framework really important is Separation Logic of representation layer (Views / HTML). MVC enables programmers to write code that can be divided by three things:

• Model: the way applications can interact with the data. It is the layer between data and applications. Data can be stored in a system database such as MySQL or MSSQL or Excel or XML file.
• View: a visual representation of the application. Views allow the programmer to write the presentation layer from the business logic.
• Controller: the relationship between the Model and the Views. The main responsibility of the Controller is to handle requests and trip data from the Model to display.
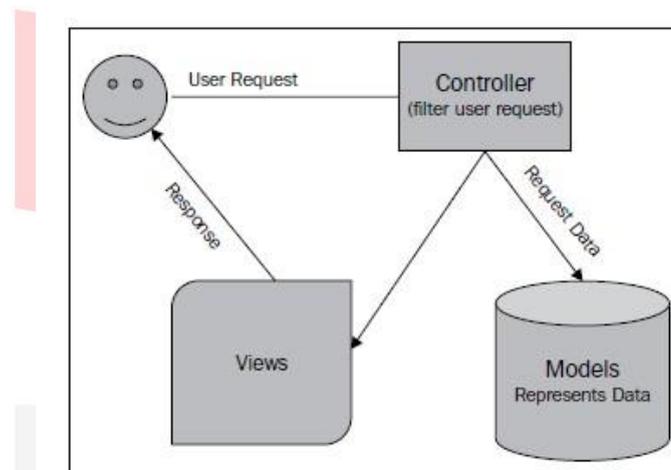
Figure 7 MVC Model [8]

Figure 7 shows the connection among model, views and controller. The benefits that can be obtained in the use of the framework, among others, can help the performance of developers in building applications, application design patterns that will facilitate the design, development and maintenance of the system, as well as the applications that will be made will be more stable and reliable because it is based on the framework that has been tested stability and reliability

E.   Result of Application

The following pictures are the functionality view result of Admin Web Rental Application. It's only several views shown.
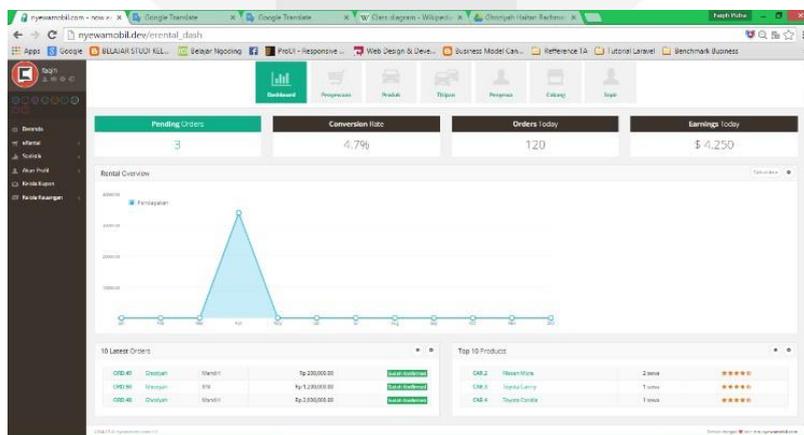
Figure 8 eRental Dashboard

Figure 8 is a page that shown in the first time user want to use the functional of application. There are several views in this page, those are graphic, latest order and top products.
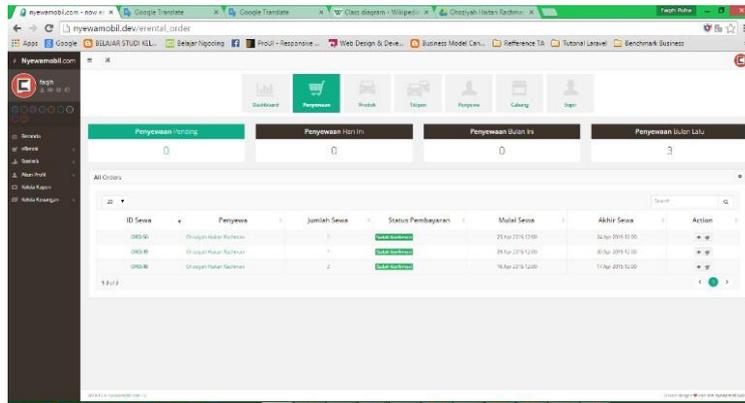
Figure 9 Rent (Penyewaan)

Figure 9 is a rent page. Rent page shows the list of renter who rent into that specified rental with the status of payment.
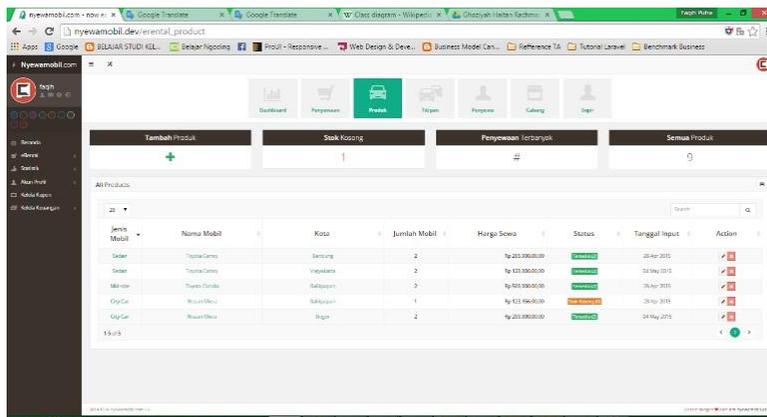
Figure 10 Products (Produk)

Figure 10 is a products page. It shows the list of car that listed in that rental. Include the amount of stock and also the status of car whether it as available or out of stock.
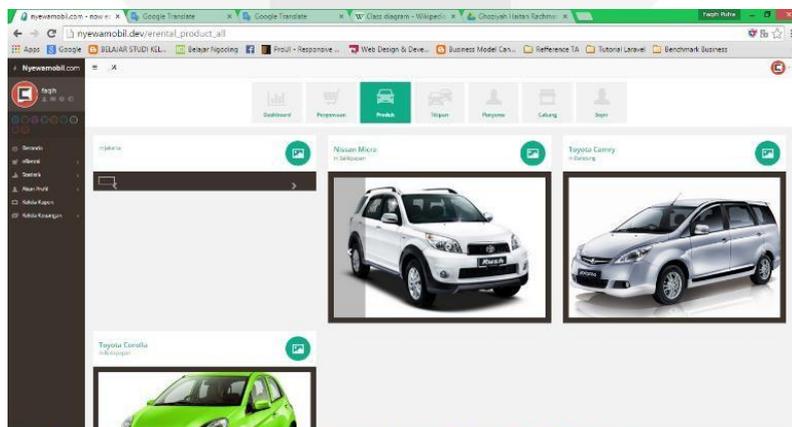
Figure 11 All Products (Semua Produk)

Figure 11 is an all listed picture products. It is shows the car picture in every category of the car that are available in the specified rental.
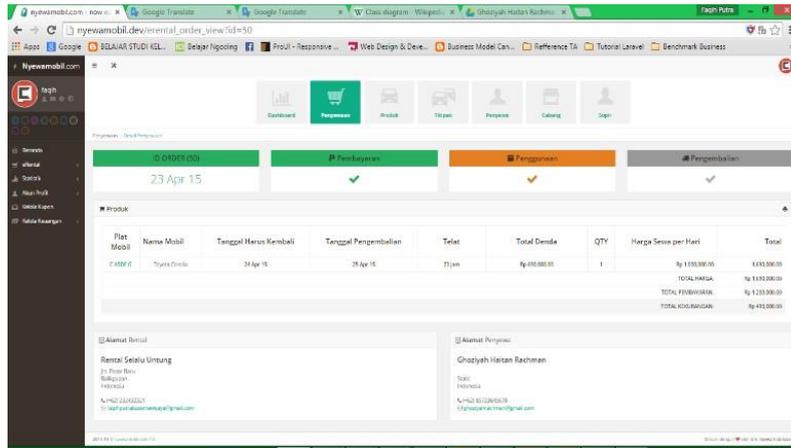
Figure 12 Rent Detail (Detail Penyewaan)

Figure 12 is a page to show the detail of a car rent, including the calculation of price and the charge when the renter is late in returning the car.
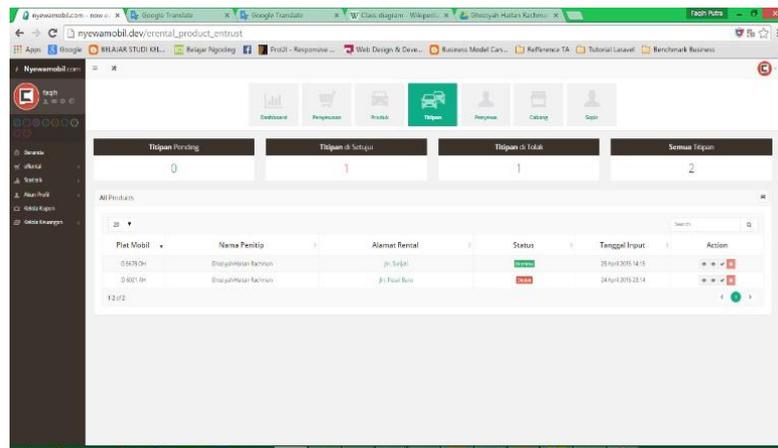
Figure 13 Entrust (Titipan)

Figure 13 is a page to show the list of submission car into that specified rental. And the rental can also approve or deny this submission after see the details of submission.
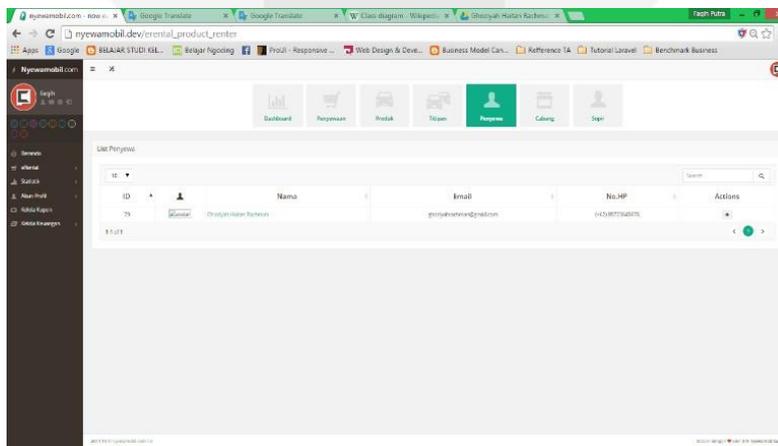
Figure 14 Renter (Penyewa)

Figure 14 is a page to show the listed renter that ever rent into that specified rental.
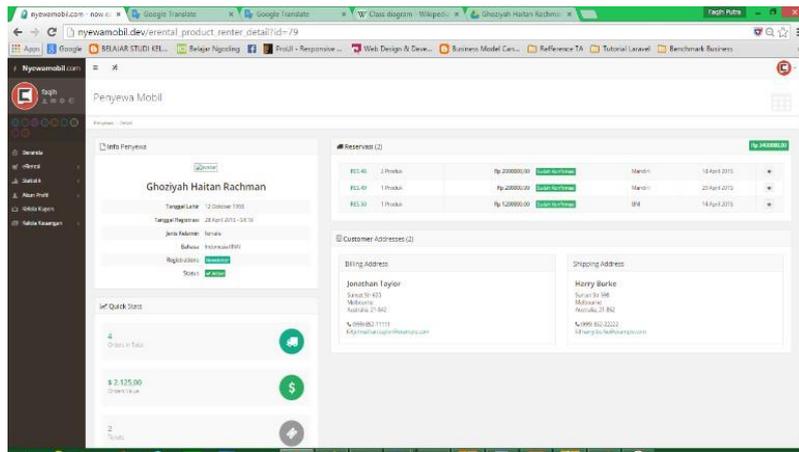
Figure 15 Renter Detail (Detail Penyewa)

Figure 15 is a page to show the personal detail and also the transaction detail of renter.
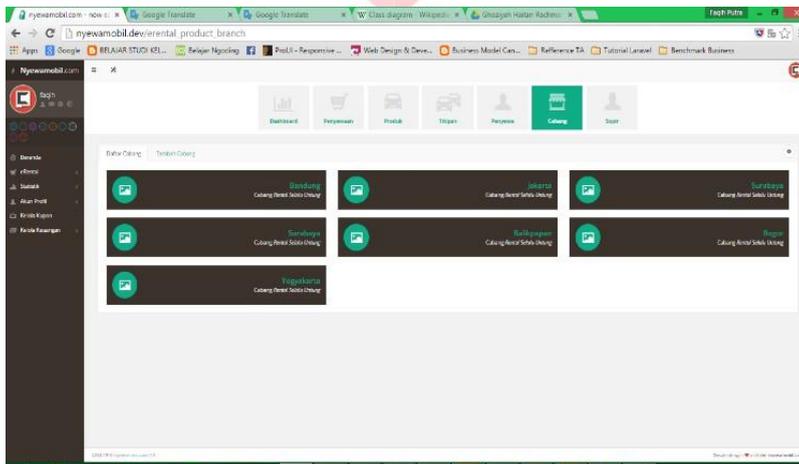
Figure 16 Branch (Cabang)

Figure 16 is a page to show the list of branch that available in the specified rental. Also the rental can add the branch.
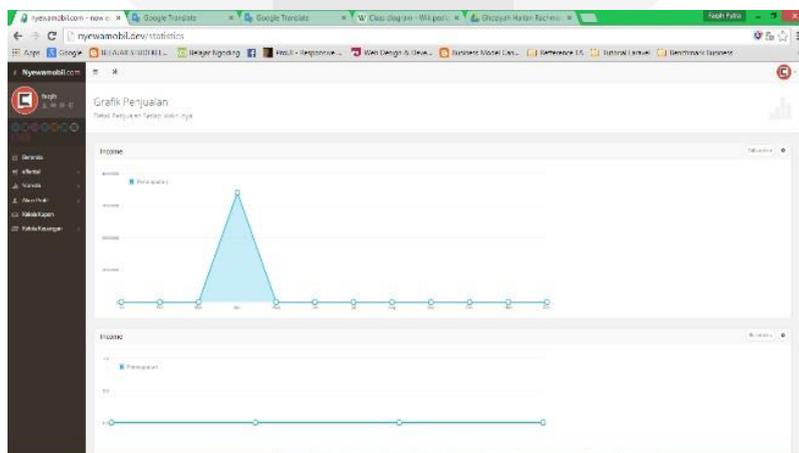
Figure 17 Graphic (Grafik)

Figure 17 is a page that show the graphics of income and transaction of rental. In these graphics, there are several categories to be chosen, such as graphic by year, by month, by week and also by today.
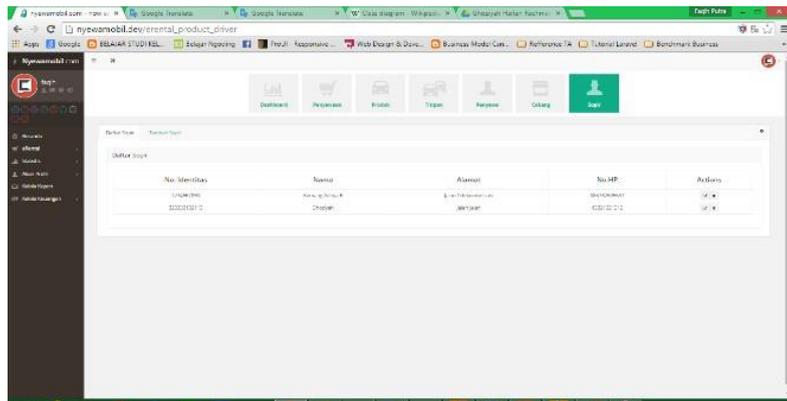
Figure 18 Driver (Sopir)

Figure 18 is a page that shows list of driver in that rental. Rental can also add the driver in this page by clicking the tab.
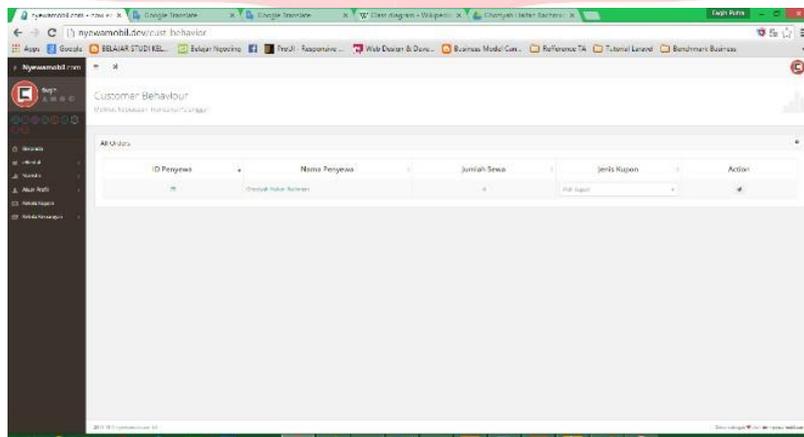
Figure 19 Customer Behavior

Figure 19 is a page to show the list of renter that order by the number of transaction. It will implement the customer behavior by set the discount active to the specified renter.
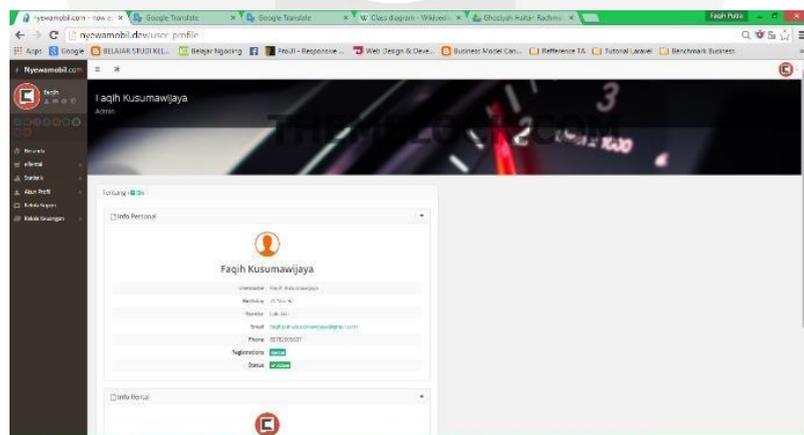
Figure 20 Accounts (Akun Profil)

Figure 20 is a page that shows the personal detail of rental owner and also shows the rental detail.
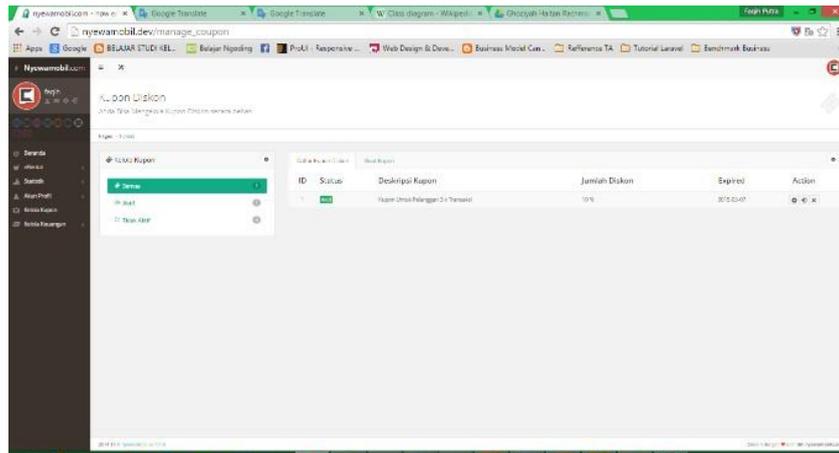
Figure 21 Manage Coupon (Kelola Kupon)

Figure 21 is a page that shows the list of coupon. The rental can also define the new coupon to be implemented as will.
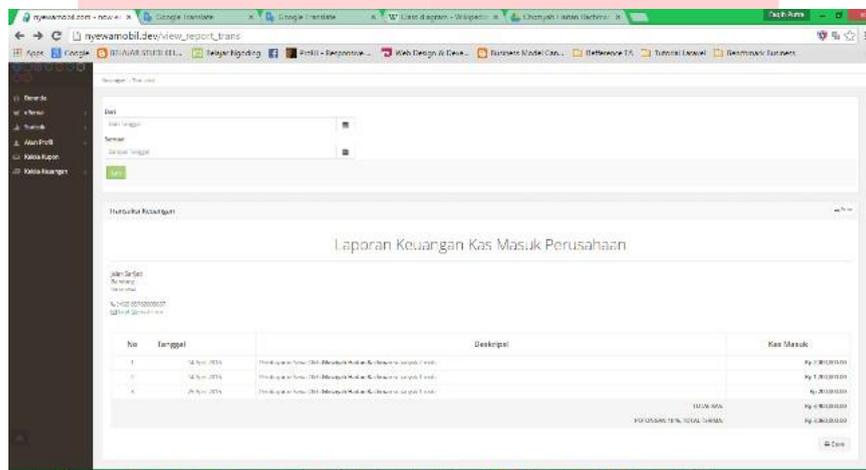
Figure 22 Financial Report (Laporan Keuangan)

Figure 22 is page that shows the financial statements of rental based on the transaction. So it is just show the Cash in of rental.

V. TESTING

Testing is a phase of development application that is done when the application installation is complete. Testing aims to determine whether the application functionality runs well and measure the performance of the application. Testing was conducted in Acer Notebook Aspire 4740G Intel Core i5 CPU processor 2, 27 GHz using Apache Localhost Server. The Testing is only use Blackbox Testing. The result of testing for nyewamobil.com for Rental is shown in table 1.

TABLE 1 Test Result of nyewamobil.com (Rental)

No	Test	Expected Result	Result
1	Sign Up	Successfully Registered	Passed
2	Login	Successfully Login	Passed
3	See the list of rent	Show the list of rent and details of the rent	Passed
4	See the list of submission	Show the list of car submission and approve it or deny it	Passed
5.	Print invoice	Printing the invoice of rent details	Passed
6.	See the Product	Show the all products include the amount of stock of the product	Passed

No	Test	Expected Result	Result
7.	Add/Edit Product	Show the notification of successfully edited/added or not	Passed
8.	See the Branch	Show the list of branch of rental and add it if wills	Passed
9.	View the customer	Show the list of customer and customer details of transaction as well	Passed
10.	View the driver	Show the list of driver and also ad it if wills	Passed
11.	Manage Coupon	Successfully add coupon into that rental	Passed
12.	Manage Customer Behavior	Show the list of renter that already have many number of transaction and implement it by sending coupon to specified renter	Passed
13.	See the Graphic	Show the graphic of income and number of rent with categories	Passed
14.	See and Print the financial statement	Successfully show and print the financial statement based on date	Passed

VI. CONCLUSION

These followings are the conclusion of this research
1. This research application use the concept of crowdsourcing based on the market target of car rental.
2. The application was developed with web-based look at internet users that is very broad and rapidly growing in the current era.
3. Utilize technology sms gateway for notification to the user is one of the features that can be seeded in the development of this application.
4. Implement customer behavior in this application can make rental owner can apply marketing concepts well.

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