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Developing Fixher Using Scrum Model

Hendi Sama, Darvin
Information System Study Program, Universitas Internasional Batam
Jl. Gajah Mada, Baloi Sei Ladi Batam 29442
Email: hendi@uib.ac.id; darvinhuang97@gmail.com

Abstract

The automotive industry in Indonesia has suggestively increased during the past several years, thus drives people with the desire to own private transportations, in which positively correlates to generate huge markets in repairing and maintenance works. Meanwhile, lots of automobile owners have troubles in selecting workshop due to their either lack of available workshops' information or even due to services being provided by workshops. The goal of FiXHER is solving the problems stated. By providing detail information to their very door step in application mobile platform, is believe to be able to minimize breakdown and improve productivity for both automobile owners and workshops. With the help of agile methodology, scrum model, FiXHER mobile application is maintained in its best way and finished before estimate times.

***Keyword**: Automobile, Online Workshop, Mobile Application, Scrum, Agile Methodology*

I. INTRODUCTION

The automotive industry in Indonesia has suggestively increased during the past several years with more and more people investing in transportation especially vehicle whether 2 (two) or 4 (four) wheels, use as a primary mode of transportation. This is clarified by the rapid growth of middle class people to be reached 7 million per year and has been increased 1.49% since 2003 to 2012, from 37.7 percent to 56.5 percent [11]. Thus, drives them with the desire to own private transportations, mainly automobile(s), positively correlates to generate huge markets in repairing and maintenance works [14].

Repairing and maintenance works refers to a practice where an automobile is serviced on a regular basis to prevent a major breakdown or the need for major repair [9]. Examples of high demands for repairing and maintenance purposes are changing engine oil, coolant replenishment/replacement, tires pressure, and cleaning of vehicles. These are caused by continuous uses of automobiles and poorly or delayed service, results in their general wear, faults, parts breakdown or even wear out.

Lots of automobile owners encounter difficulties in selecting automobile repair workshop due to the advancement in vehicle infrastructure and technology, and yet several are expertise in only traditional ways. One of another variables being considered by owners is responsiveness, willingness to solve customer cars' issues and provide immediate services with proper technical examination and works [7].

Consequences due to delayed/poorly service and breakdown trigger 2 (two) crucial variables which are altering daily routine and impact on productivity of owners, with more surprisingly also leads to one's health risk (Fig. 1). In addition, car's breakdown is out of owners' control and it's unpredictable. It could be arisen even in rural places with hardly any workshops could be found.

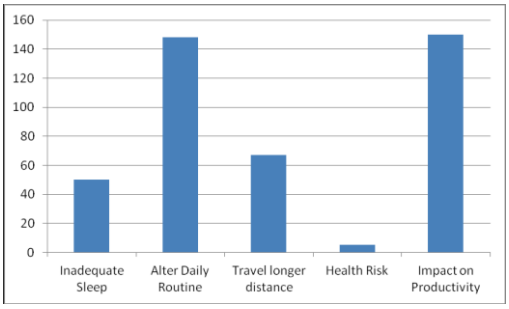

Figure 1.1 Impact of delayed/poorly service and breakdown

With the annual 10% growth rate of mobile phone users worldwide since 2014 has sparked the rapid growth of mobile applications [12]. By that, it is even possible to reach owners to their very door steps and minimize the percentage of delayed/poorly service and breakdown with the help of mobile application specializes in online repairing and maintenance works.

While developing software in general can be more efficient with agile methodologies, the development of mobile application should be obligated in using agile methodologies since its direct benefits from its implementation. One also proposes in developing mobile application should not be used with traditional methodology based on documentation or time consuming processes, but should pursue with well time-boxed schema, especially developing a continuous application [13]. Based on the above exposure, author eagers to write a study entitled "**Developing FiXHER using Scrum Model**".

II. PURPOSES AND BENEFITS

In accordance with the research problem describes above, the purpose of this study are as follows:

1. Minimize the percentage of delayed/poorly service and breakdown with the help of mobile application specializes in online repairing and maintenance works,
2. To meet one of the requirements to achieve a bachelor degree in Information System Faculty of Computer Science,
3. To prove expertise in solving problems found.

The benefits of this thesis involve several parties, author, automobile owners, and repair and maintenance workshops.

1. Author, able to provide easiness and effectiveness in doing repair and maintenance automobiles' services,
2. Automobile owners, easiness and effectiveness in creating transaction of automobiles' repair and maintenance services and increasing daily routines,
3. Repair and maintenance workshops, providing better customer service quality to automobile owners to their very door steps and increase on productivity,
4. Academics, able to help author in developing mobile application by providing advance knowledge and management.

III. THEORETICAL BASIS

A. Scrum

Scrum is not just a definitive method or technique but a framework to help in achieving a clear view of the relative efficacy of various techniques and product management [10]. To summarize, scrum consists on creating an incremental framework for projects, where a project can be understood as any complex activity or task developed an achieved within the course.

Scrum has milestone of sprints which each iterations must not last more than a month, and must be acquired in a consecutive manner without pause, especially when it is time-boxed. With this, developers are able to acquaint with time submissions and work cycles [8].

It's proved scrum, an agile methodology has produced a good quality software in a short period of time and can be applied immediately either desktop application, web application or mobile application. It is also mentioned they had successfully delivered an useful application for a client and were motivated to use scrum in future projects [13].

B. React Native

React native is an open source JavaScript framework developed by Facebook that allows to render mobile applications for both iOS and Android. It makes them possible to write two different applications just by using single language, in which saves time, ease in fragmentations, shortens development processes, and also helps in migrating web to mobile development [3]. It utilizes the JavaScript runtime of the targeted system, either Android devices or iOS devices.

C. Laravel

Laravel, an MVC based website development, is known as PHP framework for web artisans, designs to improve software quality by providing expressive, clear and time-saving syntax [5]. It is free, open source PHP framework wherein applications are built in the MVC pattern, with the aim to make the entire web development process quick, example common tasks to have in every projects, authentication, routing, session have been covered by Laravel itself.

D. Information System

Information system is an integrated set of components for collecting, storing and processing data and for delivering information, cards, and digital products, commonly used to carry out and manage operations in firms [2]. The main function of information system to avoid the uncertainty and unknown circumstances creating a solid basis for qualitative decision making in the management and leadership.

E. Application Programming Interface

API is a set of software chunks, in xml format. There are different methods in communicate between different platforms by using GET, POST, DELETE, PUT [15]. User sends request to API with specified service database and get responses by the calls accordingly. It plays roles of the interface between different software programs and make ease of their interaction similarly as user interface facilitate between human and computer. In general, API is machine readable interfaces that connect multiple applications, provide methods to govern interaction and establish communication between applications without the need to understand the inner flow of how the API works [6].

F. JavaScript Object Notation

JavaScript Object Notation (JSON) is a text format for the serialization of structured data. It is derived from the object literals of JavaScript. It can be represent four primitive types (string, numbers, Booleans and null) and two structured types (object and arrays) [16].
JSON is chosen in this project because of its flexibility and can handle high throughput and low latency without sacrificing and scalability. JSON is also directly supports inside JavaScript and the best suited for JavaScript application; thus provide significant performance compare to XML or relational databases.

G. Entity Relationship Diagram

Entity Relationship Diagram is a collection of entities where interacts between each other entities in a diagram. Entity Relationship Diagram is defined as a conceptual and abstract of data representation. Entity relationship is a method of database model use to provide a visual starting point of database design which helps organization to determine requirements of information system. While diagram is to view or draw Entity Relationship, in which is called as Entity Relationship Diagram or ER Diagram or ERD [7].

H. Use Case Diagram

According to Ogedebe & Silas, use case diagram is a representation of sequence of transactions executed by actors from external. Use case diagram is a methodology used in system analysis to identify, clarify and organize system requirements, shows how a system interacts with the external entities which are end-users [1].

I. Activity Diagram

Ogedebe & Silas (2015) define activity diagram as a diagram concerns with dynamic behavior of a systems that drives event or object from one to another state. Activity diagram consists of nodes and edges, where nodes mainly contain basic activity nodes, object nodes, and control [4].

IV. RESEARCH METHOD

A. Research Flow

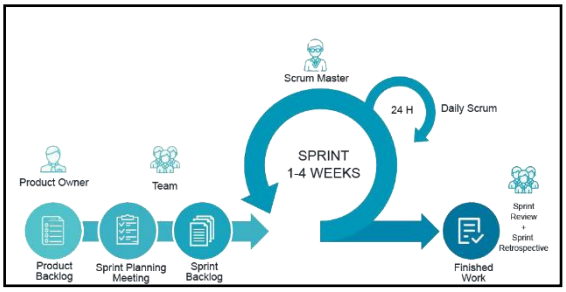

Figure 4.1 Scrum Research Flow

Based on model above shown in Figure 3.1, a finished product is achieved through several successful steps. Each step plays immense roles to the product in which effects the results even the slightest. Starts from product backlog, where owner requires several backlog to be fulfilled at first while others to be considered as additional features for further developments such as chatting, virtual payments and etc. Sprint planning meeting, in this case is played by product owner and author whom is developer, starts from 7pm to 7.15pm to follow up progress, complete tasks, ongoing tasks, and etc. Continue with sprint backlog, which an activity to finish each breakdown of product backlog within estimate times. Please refer to Appendix 1 for further breakdown of Fixher product backlog.

B. Problem Analysis

In analyzing problems found, author implements comparative studies by examining to (or more) cases, specimens or events to be noted and record for each of the cases. The goal of problem analysis is to reveal the general underlying structure in which supporting the reasons Fixher, an automobile service and repair workshop to be found and developed.
In local which is Batam especially, a manual transactions are still being adopted between car owners and workshops by using call service center without showing any available workshops or nearest workshops informations. These are only being achieved if one has contact numbers of the workshops or received any information from the public. Above system is not applicable for those whom either unexpected breakdown happened in rural places or in emergence situations.
Other cases happened in other countries, technologies which focus on repair and maintenance of automobiles have been

developed and running well, example *CarBengkel* in Malaysia, *RepairPal* in San Francisco. And for both, ordering automobile service and maintenance transactions are available through mobile phones and web applications.

With that, author believes by developing mobile application focusing on specific features, such as pick up by selected partners' engineers, ordering tow-truck and even managing cars with all of their transactions in details provides best solution for the problem findings. Additional features will be catching up soon for further developments.

C. Development Methodology

Author chooses scrum model as development method in developing mobile application for automobile service and maintenance. Scrum model helps modeling backlogs of required product in details. By implementing agile method, scrum also clarifies estimate time for each priority backlogs to be finished and to be delivered to product's owner in time. The main purposes of scrum in helping developer is to deliver product within client's requests, in this case, product backlog at first or being able to be create transactions and with high possibility to add more features in future developments. While in this case, product owner states the first request as explained in table 4.1.

1. Product Backlog
   Product backlog contains prioritized features list with short description of each function in the product. Below table 3.1 explains the backlog of fixher in **user view**, an automobile service and maintenance mobile application at first.

Table 4.1
Product Backlog

No.	Product Backlog	User Story
1	Registration	As a user, I would like to register my account in order to start transaction in fixher
2	Login	As a user, I would like to login my own account to start ordering transaction in fixher
3	Token Authentication	As a user, I would like to verify my account whether login and registration using OTP Token
4	Google Map with markers	As a user, I would like to view available workshops with their service types, distance from user and others properties supporting user in selecting workshop
5	Order Transaction	As a user, I would like to order transactions to the selecting workshop
6	Payment and History	As a user, I would like to view the amount of payment and all history transactions
7	Logout	As a user, I would like to secure my account by logging out account.

2. Sprint Planning
   While in sprint planning, product owner shows up with the prioritized agile product backlog and describes the top items to the team, in this case developer himself. Author then decides which backlog can complete during the coming sprint, move product backlog to sprint backlog and expand each sprint backlog item into several tasks to develop efficiently. Below table 3.2 explains expanded authentication backlog complete with their tasks.

Table 4.2
Authentication sprint planning complete with their tasks

No	Product Backlog	Type	Task
1	Registration	Mock Up	Create and design registration mock screen with input textbox and button

No	Product Backlog	Type	Task
		Front End	Create and design registration view with input textbox and button
		Back End	Validate request with rules and response
		Back End	Store requests to database table
			Verify phone number using OTP Token
2	Login	Mock Up	Create and design login mock screen with input textbox and button
		Front End	Create and design login view with input textbox and button
		Back End	Validate request with rules and response
			Validate if account exists
			Verify account with matching phone number and OTP Token
3	Token Authentication	Mock Up	Create and design token authentication mock screen with input textbox and button
		Front End	Create and design token authentication mock screen with input

No	Product Backlog	Type	Task
			textbox and button
		Back End	Register API account
			Verify account and payment details

3. Sprint Backlog

   Based on authentication sprint planning above, developer concludes to have authentication sprint backlog with the most prioritized product backlog items into working mobile application. Below Table 3.3 shows sprint backlog of authentication sprint planning.

Table 3.3
Authentication Sprint Backlog

Sprint #1	**Sprint #2**	**Sprint #3**	**Sprint #4**	**Sprint #5**
Create authenticate OTP Token, registration and login mock up design screen	Create database tables, models, controllers, migrations and routes	Create function in sending OTP Token using third-party API	Test Backend APIs using Postman	Test Authentication Module in mobile application
Design front end design for authentication, registration and login based on mock up design screen	Back end preparation, create functions in handling JSON response, create functions in handling errors messages, etc	Create function in registering new user, validate requests with rules, handling errors, and user authentication using JWT	Integrating Front end and Back end using *Axios* & *Fetch*	
Navigate between screens using react navigation	Register API for sending OTP through messages	Create function in verify user when login	Handling response and errors (Front End)	
	Generating API Token and custom numbers for mobile application			

D. Entity Relationship Diagram (ERD)

Entity Relationship Diagram which best designed mobile application *fixher* in server-side, an automobile service and maintenance workshop online, is explained details as below. Database of fixher consists of 11 (eleven) tables which each table is fully functioning the mobile application in either processing or viewing results.

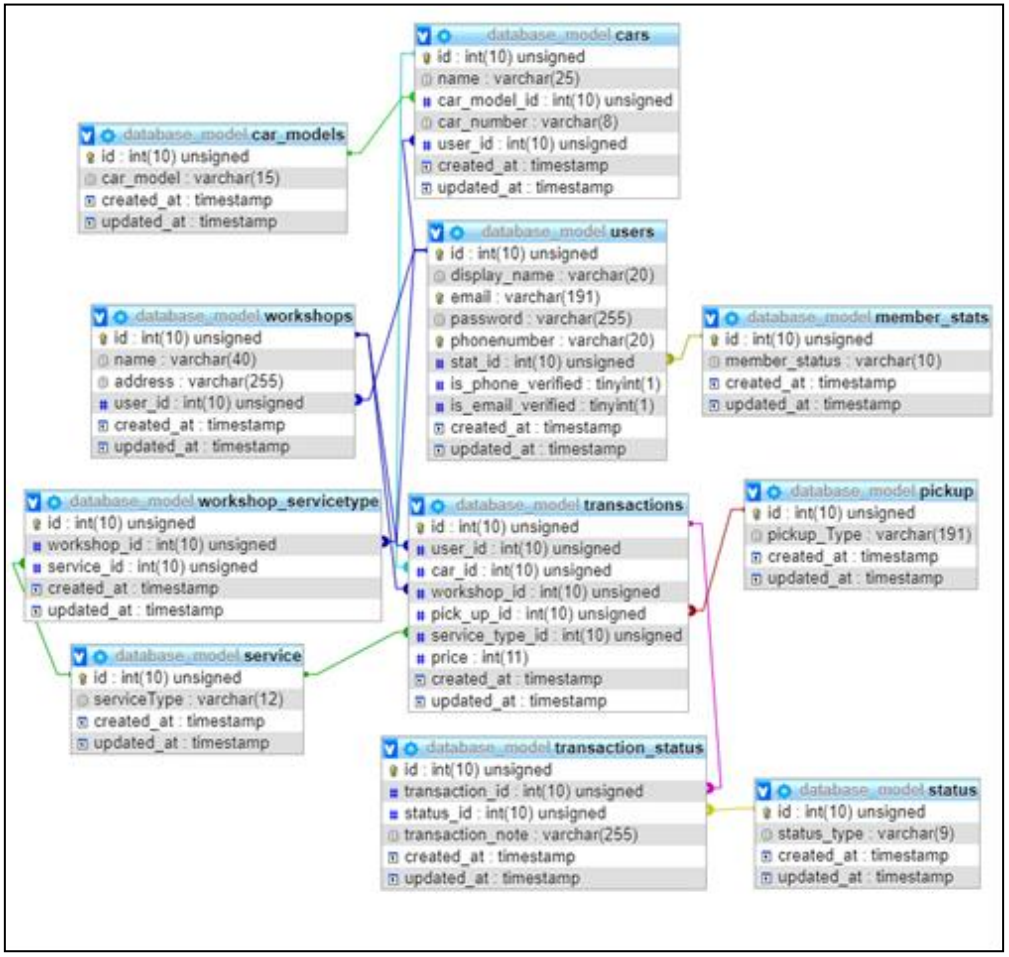

Figure 4.2 Entity Relationship Diagram

E. Use Case Diagram

Use Case Diagram which best designed the flow of mobile application *fixher*, an automobile service and maintenance workshop online, is explained details as below. As a car owner, managing cars, order transactions, receive notifications and manage account are facilitated by fixher, while as a workshop owner, in this case as a partner, fixher facilitates the user with the support of receive notifications, managing orders, transaction histories and managing account. And to be notified, all supports require user to login with registered valid account with a valid One Time Password (OTP).

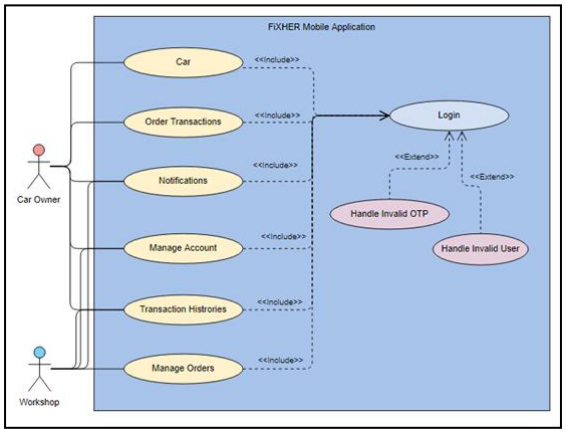

Figure 4.3 Use Case Diagram

F. Activity Diagram

1. Login Activity Diagram

Login Activity Diagram which best designed the login flow of mobile application *fixher*, an automobile service and maintenance workshop online, is explained details as below.

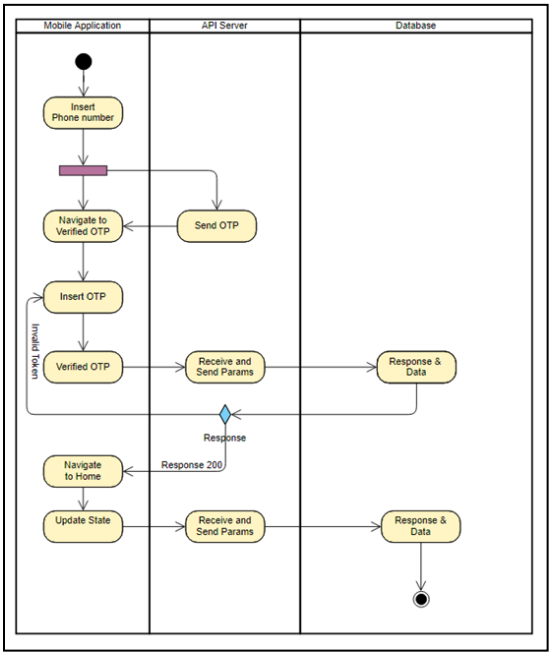

Figure 4.4 Login Activity Diagram

2. Registration Activity Diagram

Registration Activity Diagram which best designed the registration flow of mobile application *fixher*, an automobile service and maintenance workshop online, is explained details as below.

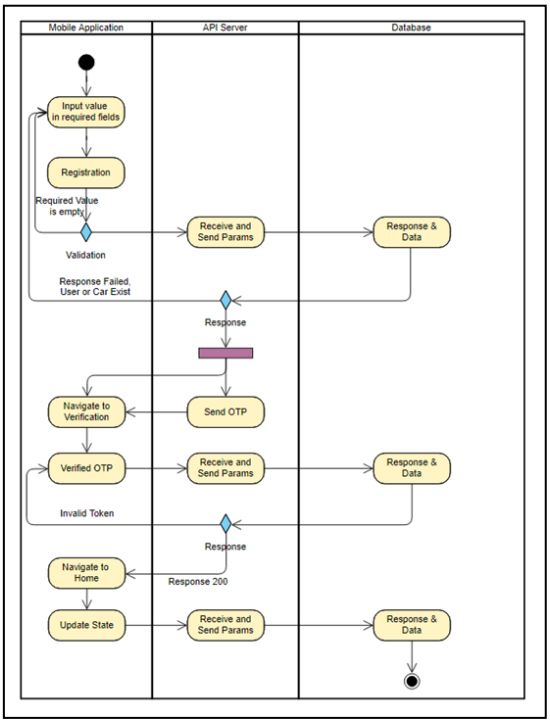

Figure 4.5 Registration Activity Diagram

3. Transaction Activity Diagram

Transaction Activity Diagram which best designed the transaction flow of mobile application *fixher*, an automobile service and maintenance workshop online, is explained details as below.

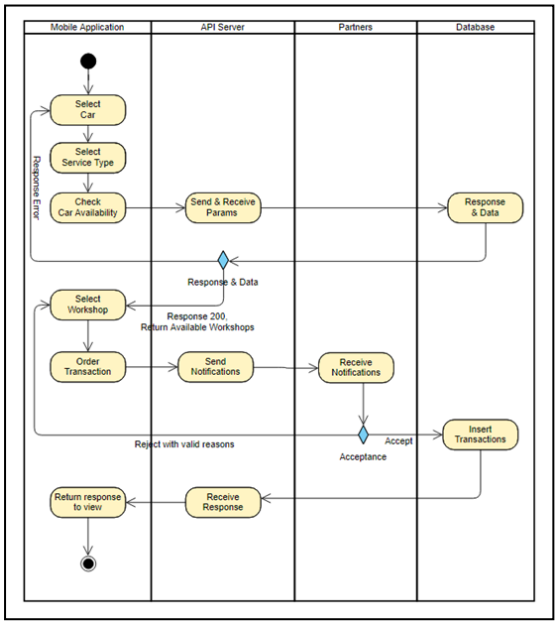

Figure 4.6 Transaction Activity Diaram

Figure 3.1 Transaction Activity Diagram

V. IMPLEMENTATION

5.1 Mobile Application Wireframe

Wireframe is a simple graphical skeleton, in this case mobile application that guides content and concepts of the application itself. Similar to blueprint of a building, wireframe helps in specifying details of whole project at the initial stage as the project description. Wireframe also displays mobile application architecture in visual, allows in clarifying features, helps in design process iterative and one is sure, save time on building either application or web since it has clearly stated the flow, design and features of the application which comes handy for developers.
Below attaches Figure 4.1, which best describes the flow, design and features of fixher, an automobile service and maintenance workshop online visually.

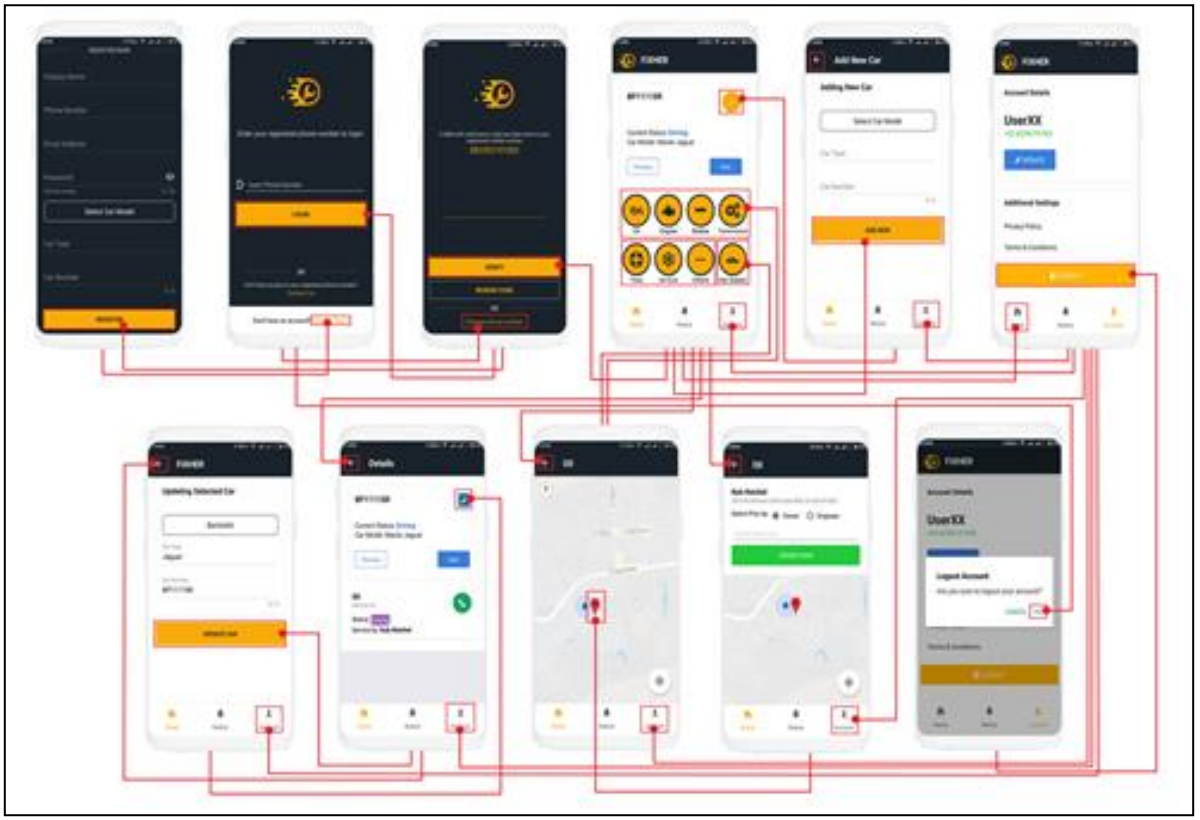

Figure 5.1 Wireframe of FiXHER

5.2 Login Screen

Login screen of fixher, an automobile service and maintenance workshop online is the first screen when the application runs. It contains a single input text field and button to verified registered user as shown in Figure 5.2.

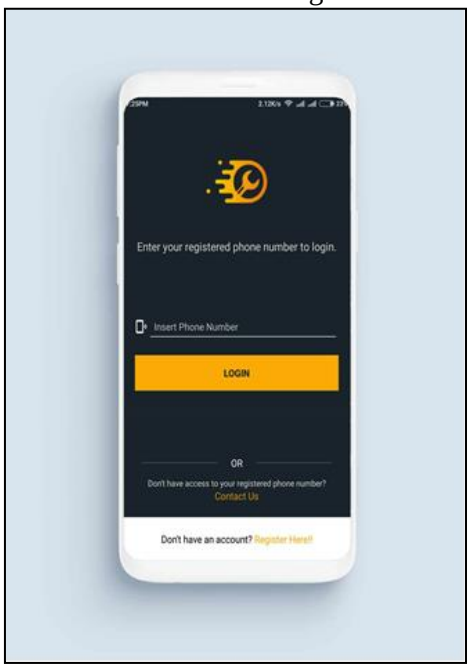

Figure 5.2 Login Screen

5.3 Registration Screen

Registration Screen of fixher, an automobile service and maintenance workshop online is being shown after user clicks *Register Here* to register new account and starts in using features being provided by fixher. In this screen, contains multiple input text field to be filled and marks as required.

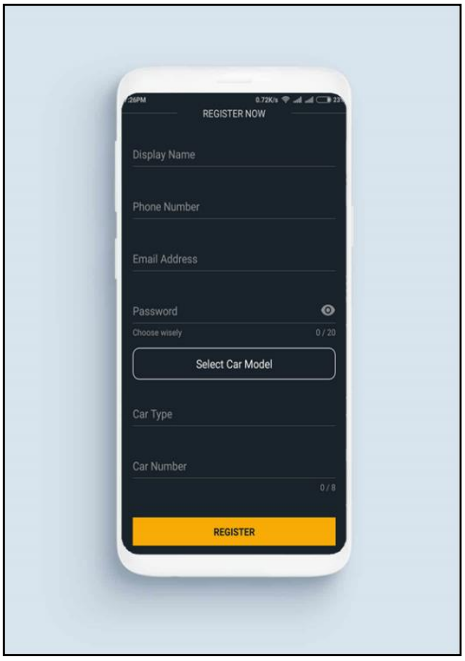

Figure 5.3 Registration Screen

5.4 Verification Screen

Verification screen of fixher, an automobile service and maintenance workshop online is being shown after user has either registered or logged in to verify the account and phone number.

Figure 4.2 Registration Screen

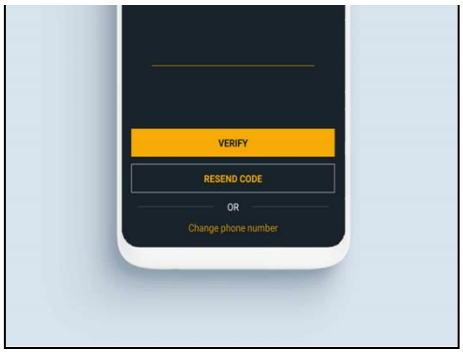

Figure 5.4 Verification Screen

5.5 Transaction Screen

Transaction is fired after user has registered account with verified phone number. In this transaction screen, service types are divided to

7 (seven) types to give partner an understanding about specific problems being faced by end-users.

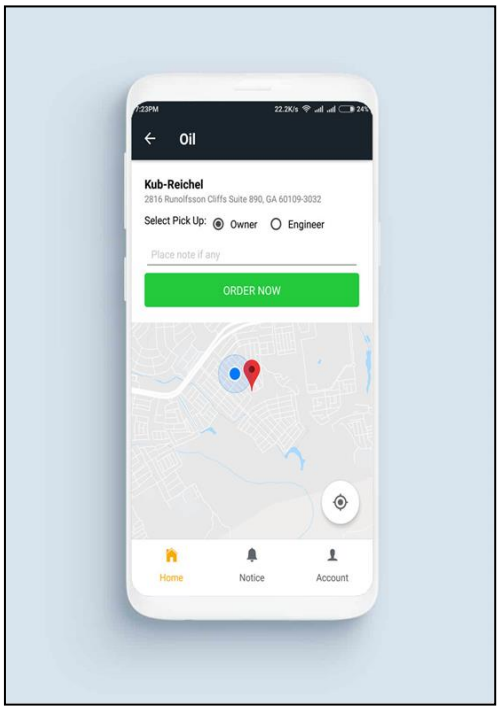

Figure 5.5 Transaction Screen

5.6 Home Screen

Home screen is shown after user has successfully logged in and verified OTP to registered phone number. In this screen, user is provided with multiple features, such as adding new car, monitoring transactions of each registered car, and most importantly order transaction by selecting service type.

Figure 4.3 Transaction Screens

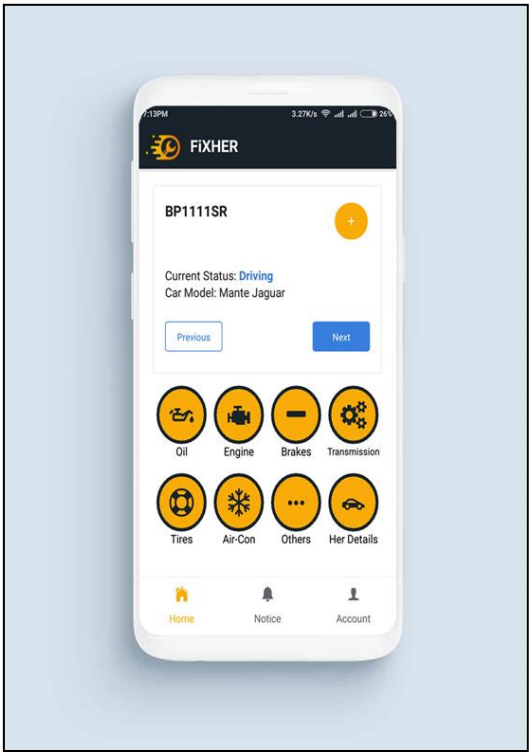

Figure 5.6 Home Screen

5.7 Implications

Developing Fixher, an automobile service and maintenance workshop online using React Native as front-end framework and Laravel as back-end framework, merging with multiples libraries and packages by communities are able to help author to finish the mobile application within time estimation. In addition, scrum model gives a clear view of delivered product as required and being detailed in product backlog by client.

VI. CONCLUSIONS &

RECOMMENDATIONS

A. Conclusions

A huge markets in repairing and maintenance works are shown by the accelerating growth of automotive industry by 7 million purchase within a year, increased from 37.7% to 56.5%. Lots of automobile owners encounter difficulties in selecting automobile repair workshop due to advancements in vehicle infrastructure and technologies, plus the limited information to the service station is the main concern for every automobile owners. Thus, one can only rely on the by-pass cars and there's a high risk of being scammed.

By implementing scrum model in developing FiXHER, an automobile service and

maintenance workshop online, author concludes automobile owners has limited information in contacting automobile service providers as lack of knowledge is one of the main causes of breakdown or delayed/poorly services. It is also believes as the main cause of poorly/delayed services is responsiveness, willingness to solve owners' car issues and provide immediate services with proper technical examination and works. Thus, the needs of Fixher, an automobile service and maintenance workshop mobile application is essential to minimize the percentage of delayed/poorly services and breakdown. Regarding of responsiveness, Fixher selects workshop/s only if has/have fulfilled a standard procedures as being stated in contracts.

Fixher is developed using scrum model as development method. Scrum model is able to provide effectiveness in developing either mobile applications or web applications as it gives developer a clear visual of mobile application overviews. Scrum model also helps in managing time by defining sprints, which able to finish product (mobile application) within time.

B. Recommendations

There are some suggestions for future researches as follows:

1. Scrum model is best with plural developers are cooperating together, and being monitored by chief in enhancing time and qualities of application,
2. Integrating with payment gateway to give end-users an comfortable trips and experiences,
3. Modification of mobile application's interfaces for best experience if any.

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