DEVELOPMENT PROTOTYPE ON DEMAND APPLICATION OF MOTORCYCLE AND CAR WASH BASED ON ANDROID

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ABSTRACT

Ownership of motor vehicles that continue to increase each year resulted in the shift of motor vehicle function which is no longer only as a means of transportation but also a part of the life (lifestyle) to make the need for maintenance of motor vehicles also increased. One of the treatment of motor vehicles is the washing of vehicles. This is supported by the increasing number of vehicle maintenance business such as vehicle washing. However, vehicle owners sometimes have problems related to the maintenance of the vehicle. For example, customers do not want to wait a long time to wash the vehicle, the customer does not know the nearest wash site, and the customer does not know the exact time to wash the vehicle.

The trend is very developed today is the use of Mobile technology that is able to bridge the business and consumers. By taking the concept of on-demand services where entrepreneurs can reach all aspects that will be needed in their business development one of them is the consumer.

Supported by smartphone technology and GPS utilization. This app can help users to find and book places and recommend the right time to wash their vehicles based on weather forecasts.

Kata kunci : *Android App, On demand service, Tracking, GPS, Washing Vehicle.*

1. INTRODUCTION

Motor vehicle functions that is no longer only as a means of transportation but also a part of the life (lifestyle) makes the need of care for motor vehicles also increased. One of the treatment of motor vehicles is the washing of vehicles, where almost every rider or vehicle owner will feel more comfortable, confident and satisfied when driving their vehicle in a clean state. However, based on questionnaires conducted to 50 people who have vehicles with a range of age between 18-35 years obtained data in the form 28 people respondents stated that they wash vehicles with an indeterminate time. Other data indicating the intensity of washing in the washing site are 32 people claiming only occasional washing at the wash site. From the data it can be seen that most owners of motor vehicles do not always wash their vehicles at the wash site.

From the questionnaire also found the fact that about 34 people said that the factors that become obstacles to using vehicle washing services is lazy to wait. Another factor that is that they are lazy to go out to the washing places that is answered by 23 people, and as many as 24 people said the weather and 6 people complained about the distance. From the results of the questionnaire also found that there are still 15 people who still have difficulty in finding vehicle wash. In addition, from the results of interviews with vehicle wash owners, the problem was found in the form of vehicle wash owners difficulty in the field of promotion, and retain customers.

Technologi developments that increasing rapidly also require business owners to be creative and make the development of this technology as one of the weapons in business competition. The trend is very developed today is the use of Mobile technology that is able to bridge the business and consumers. One of the most popular mobile apps is the goat apps that utilize Mobile technology for shuttle services. By taking the concept of on-demand services where entrepreneurs can reach all aspects that will be needed in their business development one of them is the consumer. Another application that takes the same concept is minutes apps, this application is used to determine the location of the nearest salon and there is also a salon booking system. There is also a service provider application where this application uses an on-demand system for laundry pick ups. By utilizing the features contained in smartphones such as GPS, application applications can be considered successful to attract the consumer to order services online.Therefore, based on the above description will be built a software with the aim to help the problem. The environment that will be selected as a pilot project of this software is an android mobile device with consideration based on data from International Data Corporation (IDC) that analyzes OS smartphone market share that at this time android has a market share of 86.8% of all smartphones enabled in the world In the 3rd quarter of 2016.

2. RESEARCH CONTENT

2.1 Idea Validation

Idea validation aims to validate the ideas that exist in this study. Validation is done to know the phenomenon and problems that occur, the cause of the occurrence of the problem, and solutions that can be offered to overcome the problem. Steps of validation of ideas conducted in this research that is determining the main problem, determining the risk assumption, the validation process. The result of validating this idea is what functionality will be in the application.

a. Determination of the main problem

Determination of the main problem in this research is done by using questionnaire data retrieval technique. The main problem is based on the results of questionnaires conducted to 50 respondents. And interviews to vehicle washing business owners.

From the results of the questionnaire, formulated several major problems that will be used as the basis of this study. The problems are as follows:

1. Vehicle users do not wash their vehicles regularly.
2. Vehicle users do not know the information related to vehicle washings.

While based on the results of interviews with vehicle wash owners found the following problems:
1. The owner of the vehicle washing places difficulties in terms of promotion
2. The owner of the vehicle washing places difficulties in maintaining the customer

b. Determination of riskiest assumption

Determining stage Riskiest assumption is the stage of researching and making a list of assumptions of each issue to be discussed. The main problem in the riskiest assumption is obtained from the previous stage results.

Tabel 1 Riskiest assumption of vehicle users

No	Vehicle users do not wash their vehicles regularly.	Vehicle users do not know the information related to vehicle washings.
1	Vehicle users do not want to wash their own vehicles	Vehicle users have trouble knowing the nearest vehicle washings
2	Vehicle users do not want to wait for vehicles to be washed at vehicle washing places	Vehicle users do not know the right time to wash their vehicles
3	Vehicles users do not want to go to a vehicle washing places	

Tabel 2 Riskiest assumption owner of the vehicle washing places

No	The owner of the vehicle wash difficulties in terms of promotion	The owner of the vehicle wash difficulties in maintaining the customer
1	The customer only gets information about the washing place from the spot directly	The customer does not feel the need to return to the wash site.

c. Validating Process

At this stage validation of the main issues and riskiest assumption that has been described in the previous stage. This step is done by using interviews. Further validation will be done by using tools such as javelin board. Javelin board will use the riskiest assumption that has been defined in the previous stages.

Interviews were conducted on 10 prospective users who had the same criteria or characteristics or resembled the target users. User targets are tailored to the characteristics of the majority of respondents in the previously completed questionnaires. The characteristics of user target in this research are:

A. Users are between 18-35 years old.
B. Own a motor vehicle.
C. Using Android-based smartphone.
D. Living in Bandung.

And the characteristics for the target vehicle wash users are as follows:
A. Have a clear business license.
B. Has a place of business in the city of Bandung.
C. The company has criteria of small business or above

Javelin Experiment Board

Javelin experiment board is an approach from Lean Startup Machine to make ideas. The basis for the Javelin Experiment Board is to form a hypothesis. The hypothesis is to create an idea in a way that is easy to test. [1]

Javelin experiment board is done by interviewing prospective users based on predefined user criteria. Furthermore, the solution is determined based on each risk assumption. Solution is a functionality that functionality that will exist in the application to be built. The results of this

experimental javelin experiment is based on the problem, user criteria, and assumptions that have been described in the previous section.

Result javelin experiment board

Tabel 3 Solution in javelin experiment board

Problem	***Solution***
Vehicle users do not wash their vehicles regularly.	*Functionality of ordering vehicle washing services*
	Functionality of the place or time suggestion when the washing places is empty
	Functionalities of vehicle wash service services according to user location
Vehicle users do not want to wait for vehicles to be washed at vehicle washing places	*Functionalities to provide information on nearby vehicle washings.*
	Functionality to display time recommendations for vehicle washes based on weather.
The owner of the vehicle wash difficulties in terms of promotion	*Functionality to provide information about promotions*
The owner of the vehicle wash difficulties in maintaining the customer	*Provide promos for customers and Functionality to store customer orders, and remind customers to wash vehicles.*

Based on the results of the experimental board javelin, tailor-made software requirements specification aims to explain the needs of the software to be built.

Tabel 4 Software Requirements Specification

Code	***Software Requirements Specification***
SKPL-F-001	*Mobile subsystem for users provides the facility to register and login into the system*
SKPL-F-002	*Mobile subsystem for the user provides the facility to be able to see the nearest vehicle washing places*
SKPL-F-003	*Mobile subsystem for the user provides the facility to be able to see detail information of the vehicle wash*
SKPL-F-004	*Mobile subsystem for users provides the facility to be able to order services*
SKPL-F-005	*Mobile subsystem for the user provides the facility to be able to edit the profile*
SKPL-F-006	*Mobile subsystem for users provides the facility to view orders*
SKPL-F-007	*Mobile subsystem for users provides the facility to view orders*
SKPL-F-008	*Mobile subsystem for employees to provides the facility to log into the system*
SKPL-F-09	*Mobile subsystem for employees provides facilities to be able to verify orders from users*
SKPL-F-010	*Web subsystem for administrators where to provide facilities to log in to the system*
SKPL-F-011	*Web subsystem for administrators where to provide facilities to manage place data*
SKPL-F-012	*Web subsystem for the administrator where to provide facilities to view orders*
SKPL-F-013	*Web subsystem for the administrator where to provide facilities for receiving orders from users*
SKPL-F-014	*Web subsystem provides facilities for administrators to manage user data*
SKPL-F-015	*Web subsystem provides facilities for administrators to manage employee data*
SKPL-F-016	*Web subsystem provides facilities for administrators to administer the wash data*
SKPL-F-017	*Web subsystem provides facilities for administrators to manage order data*
SKPL-F-018	*Web subsystem provides facilities for administrators to track employees*

1.2 Designing the interface with google design sprint

Design sprint is a framework for teams of any size to solve and test design problems in 2-5 days. The sprint idea comes from the Agile framework. The idea of design thinking was developed at IDEO and d.school at Stanford. [2]

Google design sprint consists of 6 stages:

1. Understand

This stage is used to determine the needs of users, business needs, and application of technology. This stage is used to identify user needs, business needs, and technological needs that can be used.

A. User needs

Based on questionnaires and interviews that have been done before, obtained the needs and goals to be achieved by the users of which are:

1) Users want to know information detail about vehicle washing places in.
2) Users want to know the right time recommendation to wash the vehicle
3) Users want to wash the vehicle without going to the wash places
4) Users want to wash vehicles without waiting at the wash places

B. Business Needs

Based on the results of defining the existing problem, the business needs to be covered in this research are:

1) Present information about the place and time of vehicle washing.
2) Build an on-demand application system for vehicle washing.

C. Technology Needs

The technologies that will be needed to build this system are:

1) Smartphone Technology
This system will be built with the smartphone platform, because this application requires flexibility. This means that this application can be used anywhere without the need for excessive tool aids. The operating system to be used is android.

2) GPS technology
The system will require GPS technology for the process of determining the location and tracking process.

3) Mobile phone number technology
The mobile phone number will be used for login and registration into the system.

The result of this design is the application interface that will be built. The use of google design sprint in this study focuses only on designing mobile applications for users.

2. Define

This stage serves to define the idea into several categories, as well as determining the design strategy that will be applied. Here are some points that will be applied to the design of this research:

A. The built interface is based on Material Design by Google.

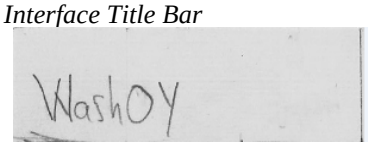
B. The interface that is designed only focuses on the user side of mobile applications.

C. The interface is designed to describe the aspects of simple, easy to use, and informative.

3. Diverge

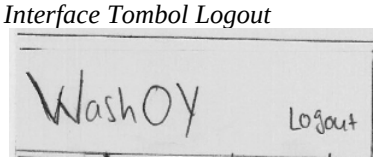
This stage is the stage of collecting ideas that can be applied in the application interface.

a. Interface Title Bar

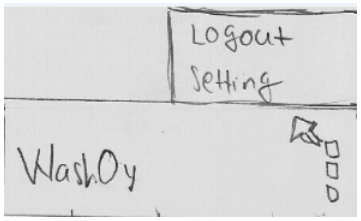


Gambar 1 Title bar diverge 1

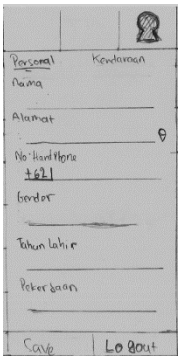
b. Interface Tombol Logout



Gambar 2 Interface logout button diverge 1

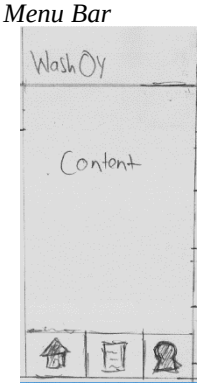


Gambar 3 Interface logout button diverge 2

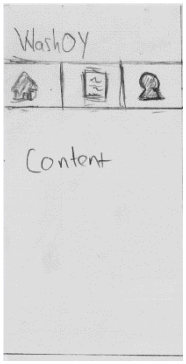


Gambar 4 Interface logout button diverge 3

c. Interface Menu Bar



Gambar 5 Interface menu bar diverge 1



Gambar 6 Interface menu bar diverge 2

4. *Decide*

This stage is to determine which interface design will be used in the development of the application based on the idea idea that has been delivered in the previous stage. The design of the selected interface is:

A. Display the logout button in the edit profile menu.

B. The menu bar display is on top.

C. Nearby views are created on a card and display pictures, distances, and place addresses.

D. Display orders created in lists with active and history tabs.

5. *Prototype*

The prototype is performed using the mockup model based on the design of the previous interface.



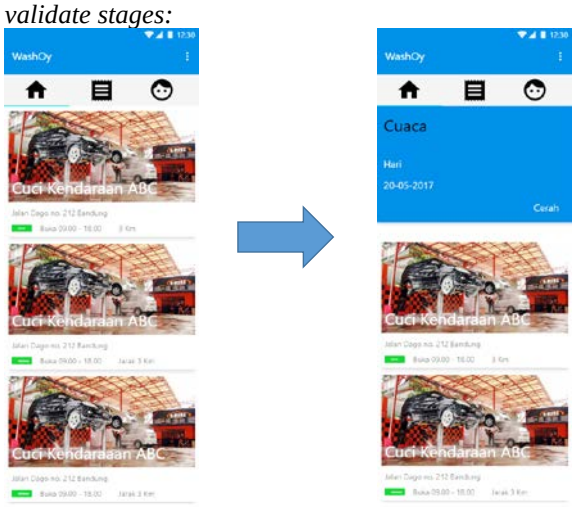
Gambar 7 prototype antarmuka login



Gambar 8 prototype interface home

6. *Validate*

This stage is the stage of validation to potential users to know whether the display has been made to meet the needs of users. Here are the results of the validate stages:



Gambar 9 Result validate

1.3 Analysis of Technology Use

Analysis of technology use in this app is done to explain the use of technology in this system. Analyzes to be performed include, login analysis, verification analysis, tracking analysis and analysis of vehicle wash time recommendations.

2.1 Login Analysis

Login pada aplikasi ini menggunakan Digits API untuk memverifikasikan nomor handphone pengguna.

Digits API

Digits is an ambitious Twitter project to replace the password system that has been used. Like two-step-verification, Twitter uses the mobile phone

number as a verification medium, so no need to remember the password again. Digits have three stages: first displays the option to login via mobile device, then display to enter mobile phone number, and last is display to enter confirmation code sent Twitter via SMS. [3]

API digits are used to create an account or sign in using a phone number. The use of the Digits API in this app is only to verify the user's mobile phone number that will be used to sign in to the system. Digits API provides a view to enter a mobile phone number that can be used within the application. Input will be entered by the user is the place code and mobile phone number. Digits API will verify the phone number entered by sending an sms containing OTP (One Time Password) which contains the code of 6 digits.

Furthermore, if the mobile phone number verified by Digits API, the application will request a request to the API in the web service to verify the mobile phone number is already in the database or not. If it already exists, then the web API will take the data in the database and send it back to the application in JSON format. But if the number does not exist in the database, the application will register / save the new data into the database and will return the error status if an error occurs.


```
{
  "error":false,
  "log":"login",
  "user":{
      "user_id":14,
      "user_uid":"59180c36a708e8.07830953",
      "no_hp":"+6283820595353",
      "nama":"Felix","email":"felixhudi.94@gmail.com",
      "alamat":"mekarsari no. 12",
      "gender":"Laki-laki",
      "tempat_lahir":"Bandung",
      "tanggal_lahir":"1994-10-30",
      "pekerjaan":"Mahasiswa"
      }
}
```


Gambar 10 Format JSON login


```
{
  "error":false,
  "log":"regis",
  "user":{
      "user_id":15,
      "user_uid":"59317bee7bd146.70444678",
      "no_hp":"+6283820595352",
      "nama":"",
      "email":"testing.2@gmail.com",
      "alamat":"",
      "gender":"Laki-laki",
      "tempat_lahir":"",
      "tanggal_lahir":"0000-00-00",
      "pekerjaan":"Pelajar"
      }
}
```


Gambar 11 Format JSON register

2.2 Tracking Analysis

Tracking in this app using Google Maps, Google Maps API and firebase to locate employees and users. Employee locations will be updated every few seconds to find out the latest locations of employees using the Google API. The location of the employee will then be sent to the firebase database. Tracking the location of employees will take data from firebase to display the location of employees on google maps.

2.3 Analysis of Washing Time Recommendation

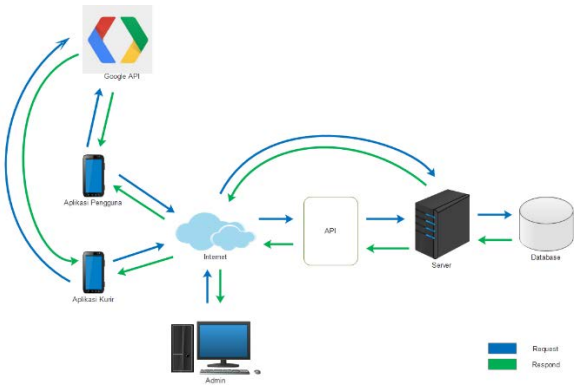
The vehicle wash time recommendation in this application uses weather data obtained from the Open Weather Map API. The data to be taken in the form of data forecasting the weather a week ahead and will be analyzed the right time with the following criteria:

1) Recommended time when the weather is not rain / sunny.

2) The weather recommendation will be affected by the place.

2.4 System Architecture Analysis

System architecture analysis aims to identify the architecture to be built based on two web and mobile subsystems.



Gambar 12 System architecture analysis

Explanation :

Here is a description of the system architecture

Web

Here is a description of the system architecture on the website platform

A. Admin sent request to the server via internet
B. The server receives a request for data from the admin and retrieves data from the database.
C. The database receives server requests and sends data to the server.
D. The server sends the requested data and sends it via the internet to the admin.

Mobile

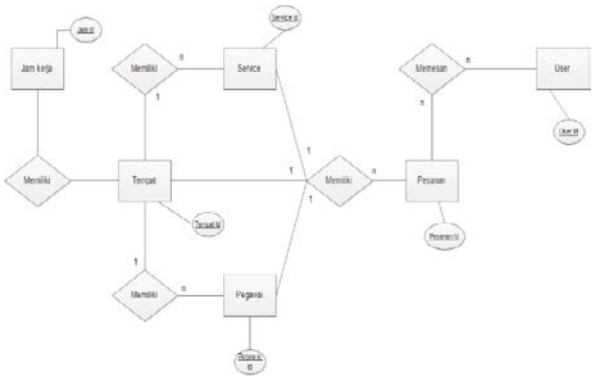
Here is a description of the system architecture on the mobile platform

A. Mobile app will receive the location from the google API
B. Mobile app request data to the server via the API

C. The server receives the request for data from the server.
D. The server retrieves the data in the database
E. Once the server receives the requested data the data will be returned in JSON form for user-processed mobile device.

2.5 Entity Relational Diagram

Entity relationship diagram is a database modeling diagram created by describing the relationship between entities that have different attributes.



Gambar 13 Entity relationship diagram

2.6 Implementation

System implementation phase is a design translation phase based on the results of analysis into a particular programming language as well as application of software built in the real environment.

A. Environmental Implementation

1) Hardware Specification
Here are the hardware specifications used in the implementation phase

Tabel 5 Hardware Specification

Web subsystem	*Mobile subsystem*
Processor AMD A10	*Android 5.0 Lollipop*
RAM 4GB	*RAM 1 GB*
Screen resolution 1366x768 Pixel	

2) Software Specification
Here are the software specifications used in the implementation phase

Tabel 6 Software Specification

Web subsystem	*Mobile subsystem*
Operating system Windows 10 64 bit	*Operating system Android 5.0 Lollipop*
Web Browser Mozilla Firefox 54.01	

2.7 Testing

Tests are performed on application functionality to assess whether the built application meets the criteria or there is a discrepancy in the functionality as contained in the design of the application.

Test Points	***Idea validation***	***Type of Testing***
Make it easy for customers to find out information about vehicle washing.	*Functionalities to know the vehicle wash nearest*	*Usability testing*
	Displays time recommendation for vehicle washing based on weathering factor	*Usability testing*
	Suggests the place or time when the washroom is empty	*Usability testing*
Help customers order vehicle wash service	*Create on-demand service for vehicle washing*	*Service Prototype*
	Providing washing vehicle on site	*Service Prototype*

1. Mobile Testing with Usability Testing

Usability testing is a research tool, rooted in a classical experimental methodology. The range of tests one can perform is quite large, ranging from true classical experiments to large sample sizes and complex test designs to highly informal qualitative research with only one participant. Each testing approach has different goals, as well as different time and resource requirements. [4]

A. Hypothesis Usability

In the early stages of testing the usability testing is to determine hypothesis hypothesis that will be tested.

Tabel 7 Hypothesis Usability

No.	***Testing Hypothesis***
1	*Users is not confused to login into the app.*
2	*Users are not confused in entering profile data.*
3	*Users have no trouble viewing information about the washing site.*
4	*Users are not confused in ordering services*
5	*Users have no trouble viewing order data.*
6	*Users are not confused to logout / logout from app.*

B. Usability Testing Scenario

Usability testing scenario is a command or command sequence that is tested or executed by the testers during the test. Usability scenarios consist of job scenarios and good job criteria and bad jobs.

No	Job scenarios	Good Job	Bad Jobs
1	Go inside the app	The testers pressed the "sign in" button and entered the phone number. (1 minute after the application is opened)	The tester presses the back button or can not enter the system
2	Fill your profile	Testers move to the profile tab, fill in the profile data and press the save button. (1 - 1.5 minutes)	Testers can not find the profile tab and fill the profile data in 1 -1.5 minutes
3	View weather forecast data for one week.	Testers moved to nearby tab and selected weather data (30 seconds)	Testers can not find the data in question after 30 seconds
4	Look at the washing place data and choose the closest washing place to your present location.	Testers move to the nearest tab and select the place data with the closest distance (30 seconds)	Testers can not find the data in question after 30 seconds
5	View the location of the washing place	The tester looks at the location tab and scrolls to view views of maps, addresses, and contacts. (30 seconds)	Testers do not see / scroll after 30 seconds.
6	Book car wash service at the nearest place	Testers choose the nearest place and then choose existing service and employees, and fill in the data provided. (1 - 2 minutes)	Testers do not choose the nearest place. Testers do not choose car wash service Testers do not select employees The testers did not fill in the order data.
			(1 - 2 minutes)
7	View the order you have ordered	Testers moved on the order / order tab, on the active tab and selected the data order previously created (30 seconds)	Testers moved on the order tab and did not select the order data.
8	Logout from the system	Testers moved on the profile tab and selected logout (30 seconds)	Testers can not find the logout button within 30 seconds

C. Usability Testing Results

After testing, the results of usability testing in the analysis in the form of ability to complete the job and interview results.

1. Ability to complete the job

Ability to complete the work obtained from the test results based on usability testing scenario. If the testers can do a well-assigned job then the value will be given 1 and if it will not be given a value of 0. Then the value will be changed in percent form based on the number of tasks.

Task	Testers			Amount	Percentage
	1	2	3		
1	1	1	1	3	100 %
2	1	1	1	3	100 %
3	1	1	1	3	100 %
4	1	1	1	3	100 %
5	1	1	1	3	100 %
6	1	1	1	3	100 %
7	1	1	1	3	100 %
8	1	1	1	3	100 %

2. Mobile Testing with Service Prototype

Service Prototype is a tool to test service by observing user interaction with service prototype placed in place, situation and condition where service really exists. The goal is to verify what happens when some external factors interrupt during service delivery, factors that are not possible to verify during previous tests in the laboratory but have a great impact on user perceptions and experience. [5]

a. Service Prototype Testing Results

After testing, the results of this test will be detailed simulation data and any constraint factors that may affect the service, and interview results.

1) Simulation Results

Here is the result of the test by simulation.

Tabel 8 Hasil Simulasi

No	Users	Places	Time	KendalaObstacle
1	Yudhi	User house	12.00	House has a narrow alley
2	Irpan	User house	13.00	Access road to narrow residence
3	Yohanes	Office	09.00	Place is in the middle of town, prone to congestion.

3 CLOSING

3.1 Conclusions

Based on the results of tests that have been done, it can be obtained conclusion as follows :

On demand applications in the washing field can assist users in ordering vehicle wash service. Because users no longer have to wait, or go to a launderette. In addition, the presentation of weather data and place data is considered sufficient for the user to know information about the exact place and time of vehicle washing. As for vehicle washing places, this application can be used as a tool for promotion and to expand business opportunities, by providing shuttle washing service. However, in the case of service, after testing a simulation with service prototype there are some obstacles to the implementation of business processes, such as the costumers place has a narrow path and doesn't have enough space to wash.

3.2 Sugestion

Based on the test results that have been done there are some suggestions that can be used for application development suggestions that can be given are:

1. Provide filter feature to search place and service.
2. Added rating feature.
3. Provide online payment feature.

Suggestions are also given in terms of business process services that is not dependent on the wash as a service provider, but build an institution / company itself. So that later the business process can be accounted for and the level of customer confidence can increase.

BIBLIOGRAPHY

[1] Y. v. Loon, "Ywan van Loon," 09 03 2014. [Online]. Available: http://ywanvanloon.com/javelin-experiment-board-content-marketing-for-the-travel-industry/. [Diakses 20 Mei 2017].

[2] N. Direkova dan G. S. M. , "Design Sprint Methods," Maret 2015. [Online]. Available: https://developers.google.com/design-sprint/downloads/DesignSprintMethods.pdf. [Diakses 17 April 2017].

[3] "Fabrics," [Online]. Available: https://docs.fabric.io/android/digits/sign-in-with-phone-number.html. [Diakses 2017 Agustus 21].

[4] J. Rubin dan D. Chisnell, Handbook of Usability Testing: how to Plan, Design and Conduct Effective Tests, Canada: Wiley Publishing, Inc., 2008.

[5] "Service Design Tool," 2007. [Online]. Available: http://www.servicedesigntools.org/tools/24. [Diakses 2 july 2017].