

System design for business location searching using distance approach based on Android

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Abstract. Indonesia is large country with dense populations. Many entrepreneurs take Indonesia as world business target since people are commonly using a smart phone in their daily life. In Bengkalis, people are looking for business location conventionally by visit the shop and others. Social media like Facebook and Instagram also give the information about the shop and its products. But all the method was very inefficient since consumer spend a lot of energy, time, and money to buy something. Business and technology are two thing that can't be separated where there are greatly needed to support the success of business. The distance location formula between two points P and Q with latitude and longitude (x1, y1) and (x2, y2) respectively named coordinate. This formula base on Haversine Formula which is very accurate to calculate the distance. In this paper, we create a system of business location searching using distance approach. The main purpose of this application is to give the visitors about the information of product and a map that show the nearest shop according to product they needed, distance estimation to reach the location.

1. Introduction

company. Furthermore, a place is something that is used to put (store, put, etc.). So if two words place and business are combined it will become a new word, which means it is a container or media for someone (business actor) to carry out trading/offering services a company is an activity (work and so on) that is organized with equipment or in an orderly manner with the aim of looking for profits (by producing something, processing or making goods, trading, providing services, etc.).

Basically, people need a time to achieve a goal. The shorter distance traveled, the less time is needed. This shows that the level of time efficiency is used in the pattern of human life. Along with the development of time, humans experience various kinds of obstacles to reach a destination location. Technology always grow up and make people able to find some effective and efficient way when doing something. A location that was once taken in a very long time can now be reached with a very short time with technology. The path to a business location with the shortest distance and time is a human need as a consumer today. This is because time constraints, transportation costs, and congested road conditions sometimes make consumers want to find the nearest business location from their position to get the product they want, [2]. According to [3], Puspitorini claim that consumers are more interested



in the online purchasing system where consumers or buyers only need to choose the items needed and order the items online that are equipped with search features or item recommendations.

Online Business is a business activity involving consumers, manufacturers, service providers and intermediaries, using computer networks, namely the internet. In other words, Online Business is a commercial transaction that is carried out between the seller and the buyer or with another party in the same agreement relationship to send several goods, services, or rights expertise [9].

Now, many online businesses grow in Indonesia, moreover all things related to the purchase of a product can already be done online. There are so many stores that provide attractive products on the losing island of Bengkalis, the other being in the City of Bengkalis and Sungai Pakning. In Bengkalis stores that provide gift products are Snoopy, Heliena, Valentine, 2000 Library, Dragon, and others. While in Sungai Pakning are Kado Palace, Pollythan Baby Shop, Rainbow Shop, Demasra, Pamolle Shoes, Farhan Collection, and others.

Today's problem is that consumers want the best service, the applications needed by consumers not only provide recommendations on the place of business according to the product category needed, but also provide the closest location (closest distance) to the place of business that will cause consumers to save the time and cost to go to the location of the place of business. With this problem, an android based application is designed with a distance location approach. There are several papers study about shortest path of [4-8], [10], and [11].

2. Literature review

2.1. Distance calculation

Pythagorean theorem is capable to measure the distance between two points on a plane (flat) surface. Since the world is spherical, instead of using Pythagorean, the distance between two location on Earth surface can be solved using the Haversine Formula. The haversine formula is an equation giving great circle distance between two points on a sphere from their longitudes and latitudes [1]. Haversine formula will be used in calculating the distance between two GPS points. In this case is the user's GPS point and destination GPS point, this GPS point contains latitude and longitude, so that it becomes the main key, a in the comparison of distances in determining the nearest business location.

$$d = 2 R \sin^{-1} \left(\sqrt{\left(\sin \left(\frac{lat_2 - lat_1}{2} \right) \right)^2 + \cos(lat_1) \cos(lat_2) \left(\sin \left(\frac{long_2 - long_1}{2} \right) \right)^2} \right) \quad (1)$$

The distance d between two given latitudes and longitudes are computed using Haversine formula in equation (1), where $R=6372.797560856$ is the radius of Earth.

3. Methodology

3.1. Research materials and procedures

The research material used to design the system is the location of the business distance, product, contact person (handphone and WhatsApp), internet network or internet package. In order for research to be directed, the procedure is carried out by identifying problems, determining data collection methods, and analysing systems. The research procedure can be seen in Figure 1.

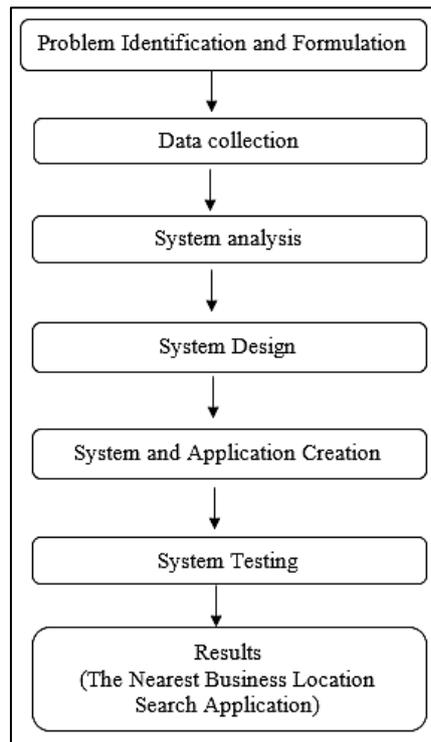


Figure 1. The research procedure.

3.2. Existing system

Figure 2 shows the existing system to be analysed.

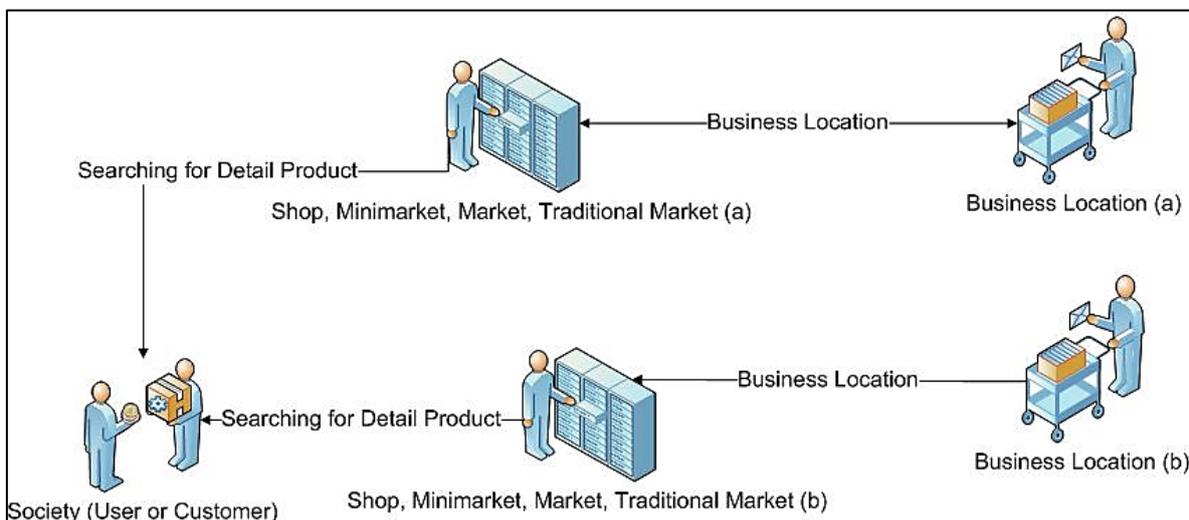


Figure 2. The existing system.

3.3. Proposed system (new system design)

System Design for business location searching using distance approach base on Android is an application built with the Android programming language (level view) and web-based (admin level) which is integrated with the MySQL database. The parts involved in the design of the system such as Admin, Business (Partner) and Society. Each section has different access part, for example partners can only enter product information, and information about business owners. For the community to be able

to see the product, the details of the business actor and can contact through the contact person and WhatsApp, while the manager of the system (Admin) can monitor the activities that occur in the system as shown in Figure 3.

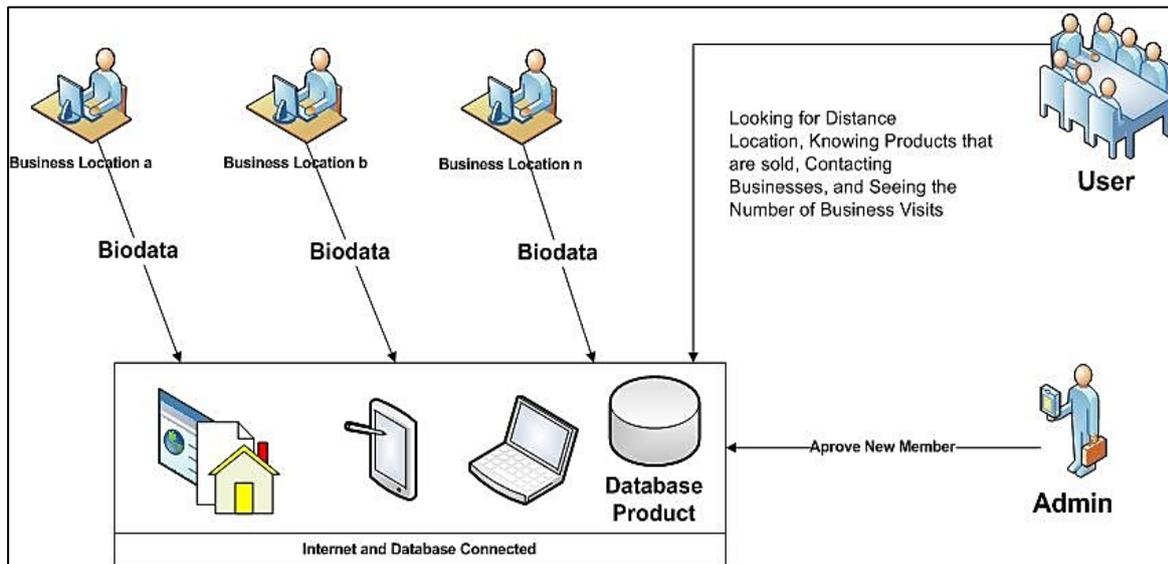


Figure 3. New system design.

3.4. System design

There are three people take a part in the system design for business location searching using distance approach based on Android such as System Administrator, Businessman, and costumer (user). Android application developed to estimated business location to visit due to the product that consumer's need. Other than information specified by user, the client data also includes user location information generated from GPS sensor. The data then will be submitted to the web services to initiate the business location searching process as shown in Figure 4. According to this use case diagram system, we describe as follow:

- System administrator input data business location (the location consists of latitude and longitude), maintenance (update status, update menu, update submenu, banner). Before any activity in list above, administrator should log in into the system.
- Businessman who was join into this system login into the system before input data into the system, update and delete data product.
- User (Costumer) can see the information about business location and the product, also can get communication with the businessman through phone and WhatsApp application.

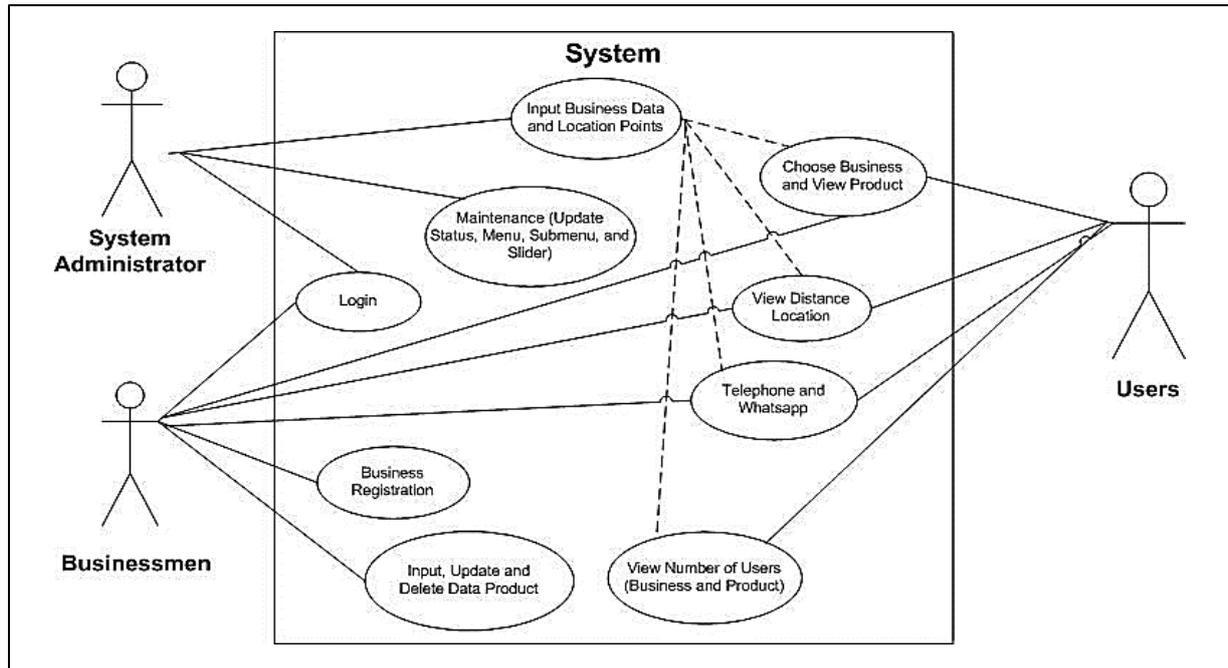


Figure 4. Use case diagram system.

3.5. Database system design (existing system)

the database for information on business and product of business actors is still carried out traditionally or stored at the business location (place of business). All product data is stored on a computer in the form of an image file. This aims to serve customers who come directly to the place of business as shown in Figure 5.

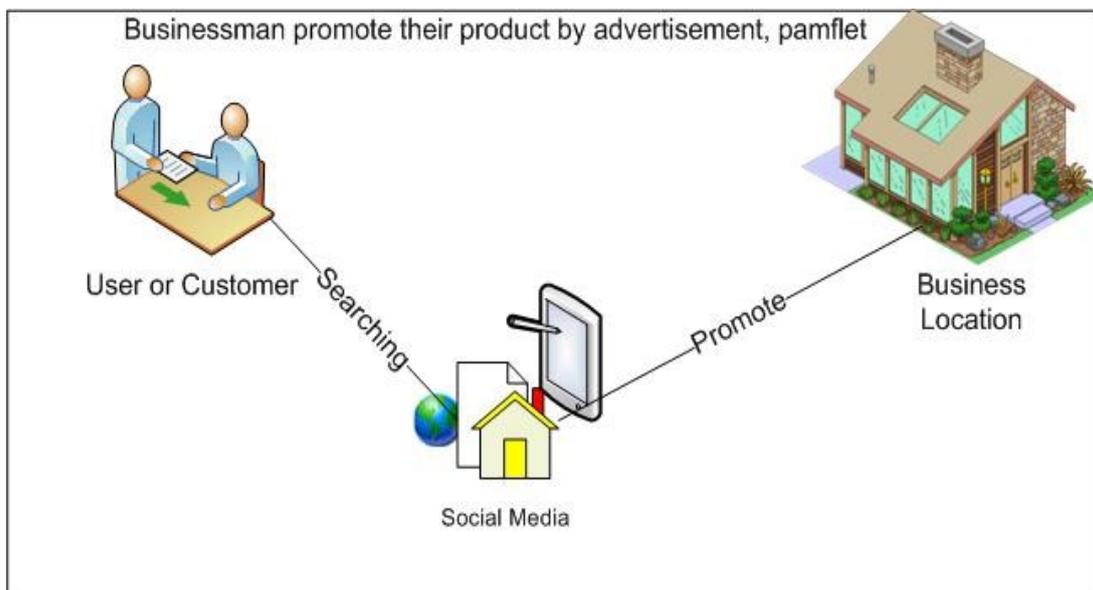


Figure 5. Database existing system.

3.6. Database design conceptual

Conceptual design discusses building a model of data used for systems in designing databases logically and physically. In conceptual design, an entity relationship (ER) will be discussed which can describe the data in full. This can be seen in Figure 6.

This database system and computation of business location searching performed on the server side, while customer input and output visualization on the Android Application at the client side as described on Figure 7.

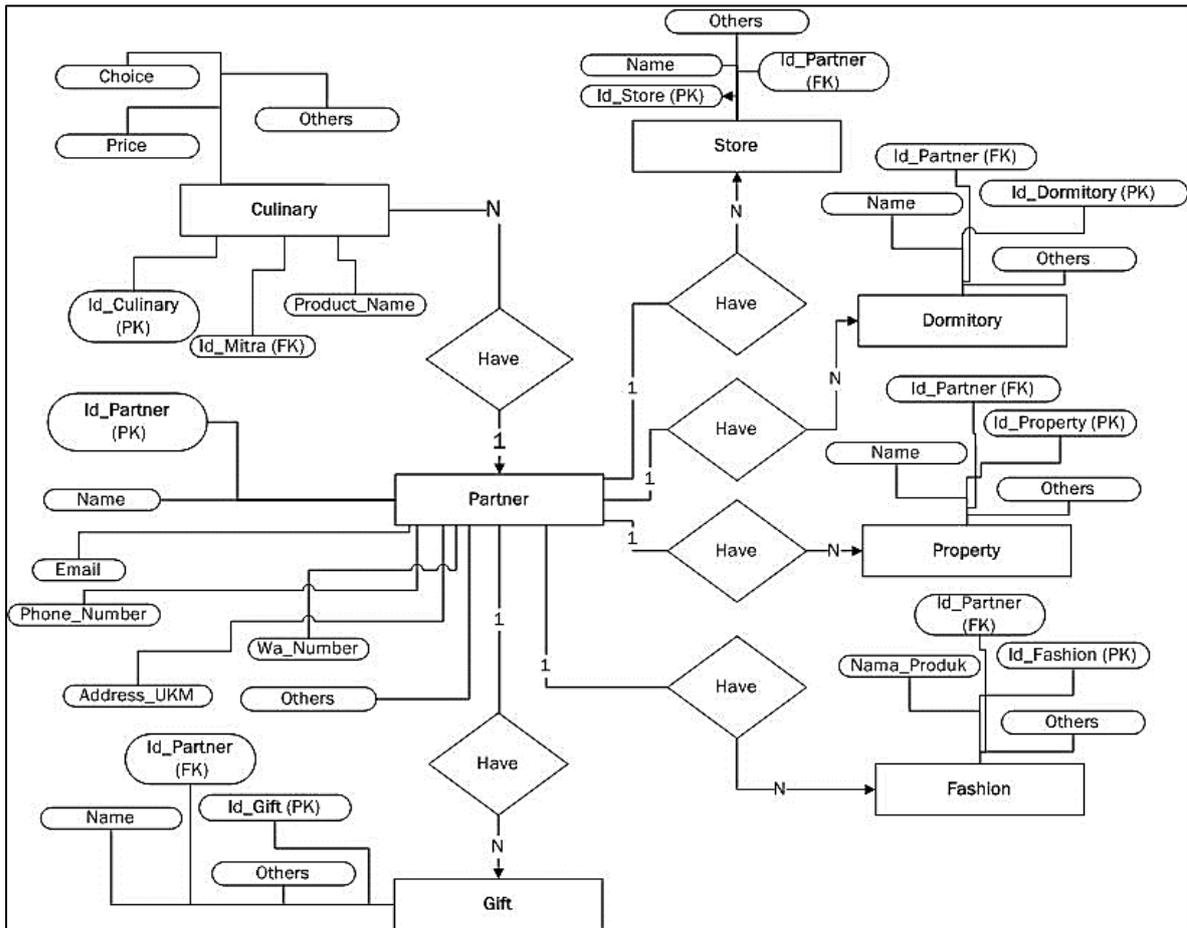


Figure 6. Database design conceptual.

Android application developed to generate client data for the business location searching system. The data includes culinary place, fashion shop, and other that are preferred by user. Users also can search the information regarding their product priority that they want. In addition, users also can call the seller or type by WhatsApp application. Then, application show the maximum distance that they would travel. Other than information specified by user, the client data also includes user location information generated from GPS sensor. The computation will be described in detail later. After a searching result has been returned. Web services the business location information and lists of restaurants to the Android application. Lastly, the Android application will present the searching result to the user and displays the recommended list of business location on a map. This way, users can easily get a business location recommendation anytime and anywhere using their Android devices.

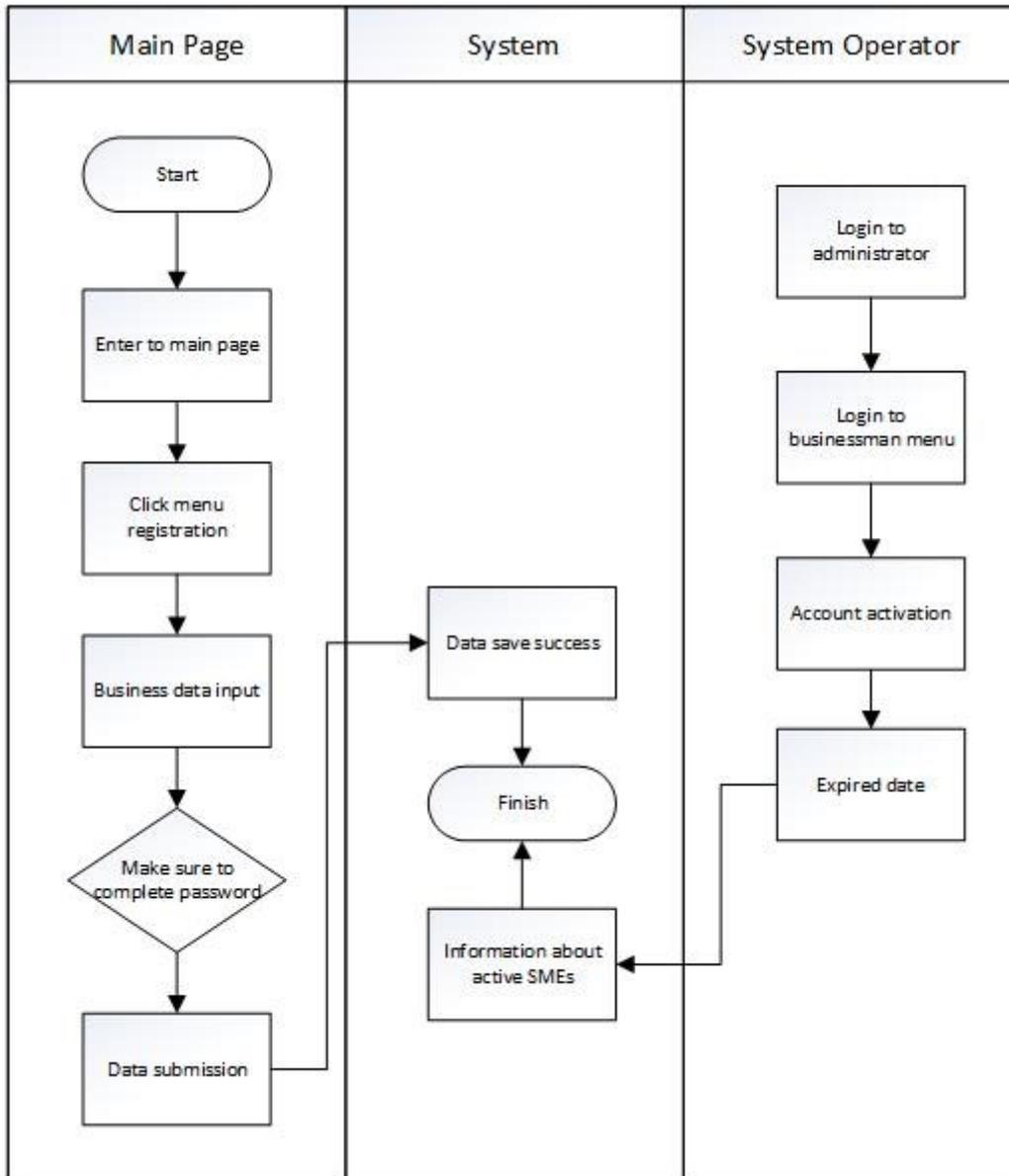


Figure 7. Activity diagram for businessman.

4. Results

By giving the same alternatives and criteria order from the Android application, the system of business location searching using distance approach based on android was able to produce the estimation of distance between user (customer) and business location as shown in Figure 8.

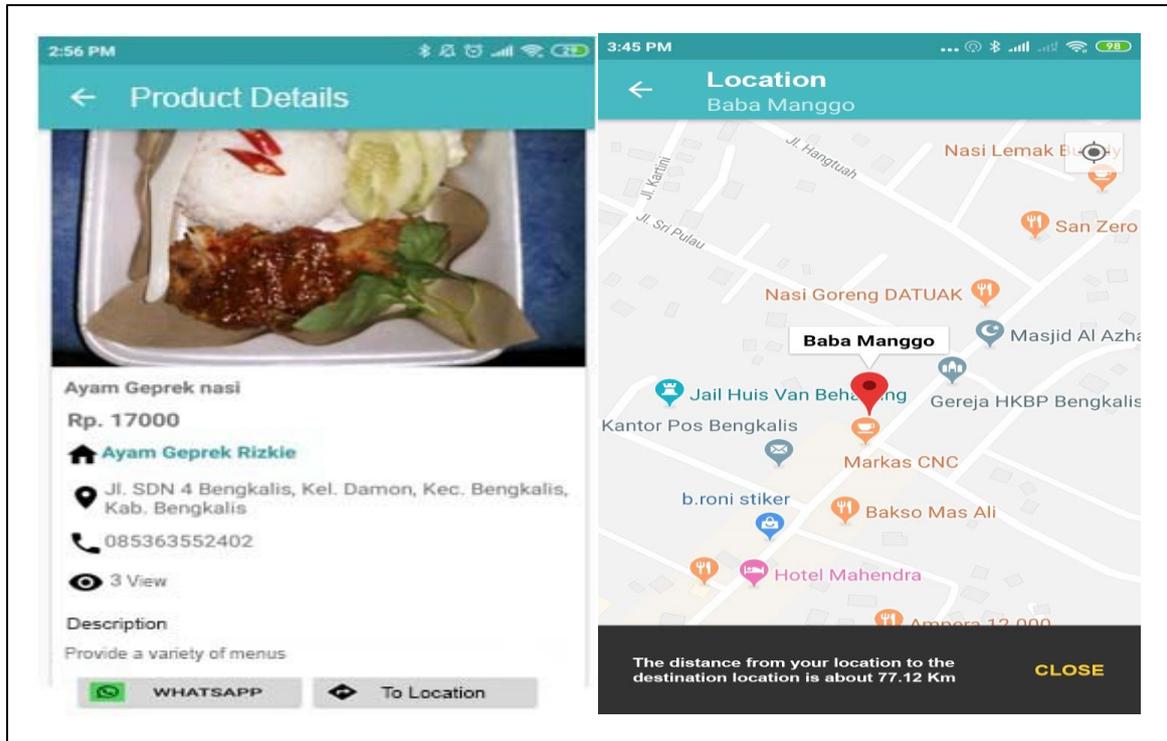


Figure 8. Description of menu, address and distance location.

Haversine Formula then will calculate the distance between the current customer location and the business location to visit. After that, the Android Application will present the distance between user to the business location on a map. Hence, user can easily get the map to reach the business location.

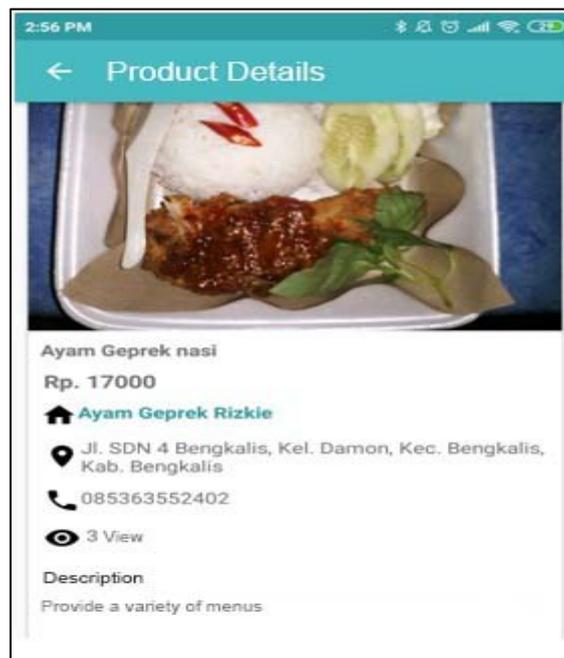


Figure 9. Description of business location.

User also can get communication with the businessman by phone or WhatsApp application.

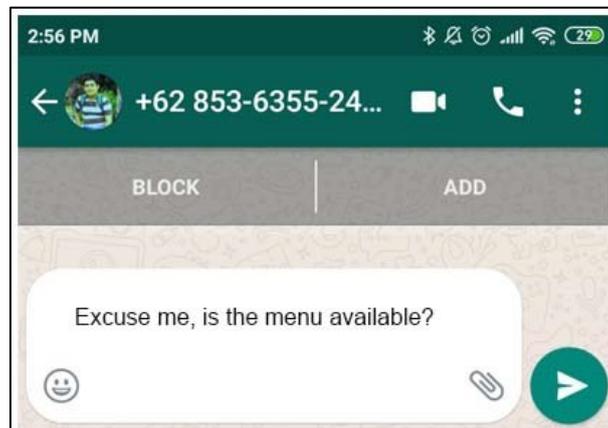


Figure 10. Communication between customer and the seller.

5. Conclusions

There are several conclusions based on this research. By the test conducted, the system able to calculate the distance between customer's (user) current location and business location to visit. The business location, which provide business location re able to be visualized on a map basis using google maps API on the Android Application. User can use this application every time and everywhere with the internet connected. The system also has been tested in culinary, fashion business and others.

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Acknowledgments

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