Journal of Technology and Computer (JOTECHCOM)
Vol. 2, No. 4, November 2025, pp. 244~253
ISSN: 3048-0477 (Media Online)

Development of a Website-Based Online Rice Bowl Ordering System Using Agile Methods for Culinary_bykiki UMKM

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Article Info

Article history:

Received November 03, 2025
Revised November 11, 2025
Accepted November 26, 2025

Keywords:

Online ordering system
Ricebow
web-based
Agile
SMEs

ABSTRACT

The development of information technology has encouraged Micro, Small and Medium Enterprises (MSMEs) to adapt in managing their businesses more efficiently and competitively. One of the main challenges for culinary MSMEs is the limitation of manual ordering systems, which often leads to issues such as service delays, mistakes in order recording, and suboptimal product promotion. This study aims to design and build a *web*-based rice bowl ordering system that can facilitate the transaction process between consumers and business actors. The development method used is Agile, due to its iterative and flexible nature, as well as its ability to dynamically adjust to user needs. The research process includes needs analysis, system design, and testing stages. The results of the study indicate that the developed system can enhance the efficiency of order management, expand marketing reach, and provide an experience better users. Thus, this system is expected to be an innovative solution for culinary SMEs in facing competition in the digital era.

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1. INTRODUCTION

The rapid advancement of technology has significantly influenced various sectors of human activity, including the culinary industry. In recent years, digital transformation has reshaped how businesses operate and interact with their customers. One of the most notable developments is the implementation of web-based ordering systems, which enable customers to make transactions conveniently, obtain real-time information about products, and improve overall service efficiency. For micro, small, and medium enterprises (MSMEs) operating in the culinary sector, the adoption of digital systems has become a strategic necessity to remain competitive and meet modern customer expectations.[1]

Culinarybykiki is one of the MSMEs engaged in the culinary business, focusing on the sale of rice bowl dishes with various menu options that are popular among consumers. However, the current ordering process still relies on manual methods through messaging applications, which often result in several challenges such as order recording errors, slow response times from administrators, and inefficient order recap processes. These limitations not only hinder operational effectiveness but also have the potential to decrease customer satisfaction as the business continues to grow. To address these issues, it is essential to develop a web-based ordering system that allows customers to place orders independently while viewing menus, prices, and product availability in real-time. This system is expected to improve service quality, minimize human error, and help Culinarybykiki manage transaction data more efficiently.

The development of this system adopts the Agile methodology, a flexible and iterative software development approach that emphasizes adaptability to changing user requirements[2][3]. Agile promotes collaboration, continuous improvement, and customer-focused design, making it suitable for small-scale enterprises that require rapid and dynamic system development. Furthermore, to optimize delivery management, this study incorporates the Haversine Formula, which calculates the distance between two geographical points based on their latitude and longitude coordinates[4]. This approach helps define delivery boundaries accurately and ensures more efficient order distribution.

Previous studies have demonstrated the effectiveness of the Agile method in improving project efficiency, responsiveness, and quality outcomes in various system development contexts[5]. [6]Similarly research conducted by, the development of web-based food ordering systems has been shown to facilitate online transactions, promote local culinary businesses, and expand market reach. Building upon these findings, this study proposes the development of a The proposed system aims to support Culinarybykiki in transitioning from manual to digital operations, thereby enhancing service quality, increasing business efficiency, and contributing to the digital empowerment of local MSMEs in the culinary sector.[7][8]

2. METHOD

The research methodology is divided into several stages: system design, implementation, and software development.

2.1 System Desain

The stages of system design will be explained in detail, from start to finish, so that the design and development process can run smoothly and in accordance with the research objectives and the appropriate solutions to the problems to be solved.

2.1.1. Activity diagram

A diagram is a model of the workflow or activities of a system or business process used to model the workflow or activities in a system, describing the sequence of activities from start to finish, including branches and parallel activities.[9]

The customer accesses the website via a link, and the system responds by displaying the website. The customer logs in by pressing the login button and entering their username and password in the form provided by the system.

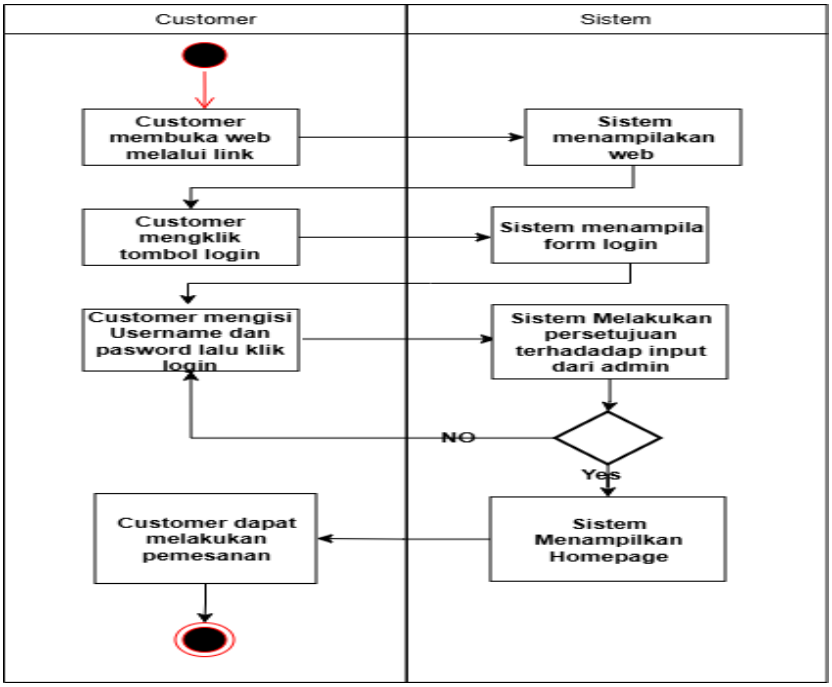

Figure 1. Activity diagram customer

Customers who access orders via the order button. Customers then fill out the form displayed by the system according to their preferences. In the payment method section, if they choose the cash method, the system will enter the order into the table, whereas if they choose cashless, the system will display the payment layout.

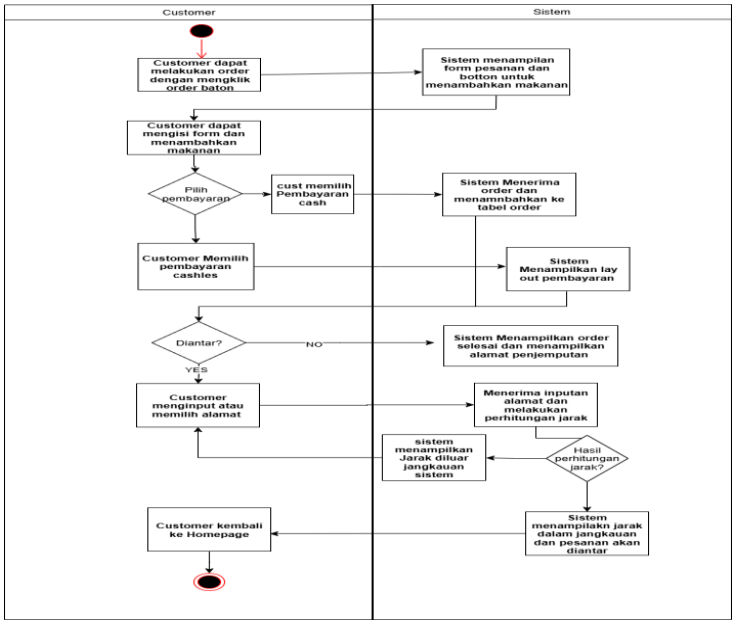

Figure 2. Activity diagram customer

The administrator can access the dashboard to receive orders with cash payment methods. The process begins when the administrator enters the dashboard displayed by the system. Then the administrator selects the order table and the system displays the order table. The administrator can update the order status of cash payment customers, after which the system updates the order status data in the order table. Next, the administrator can see the changes in the order table data.

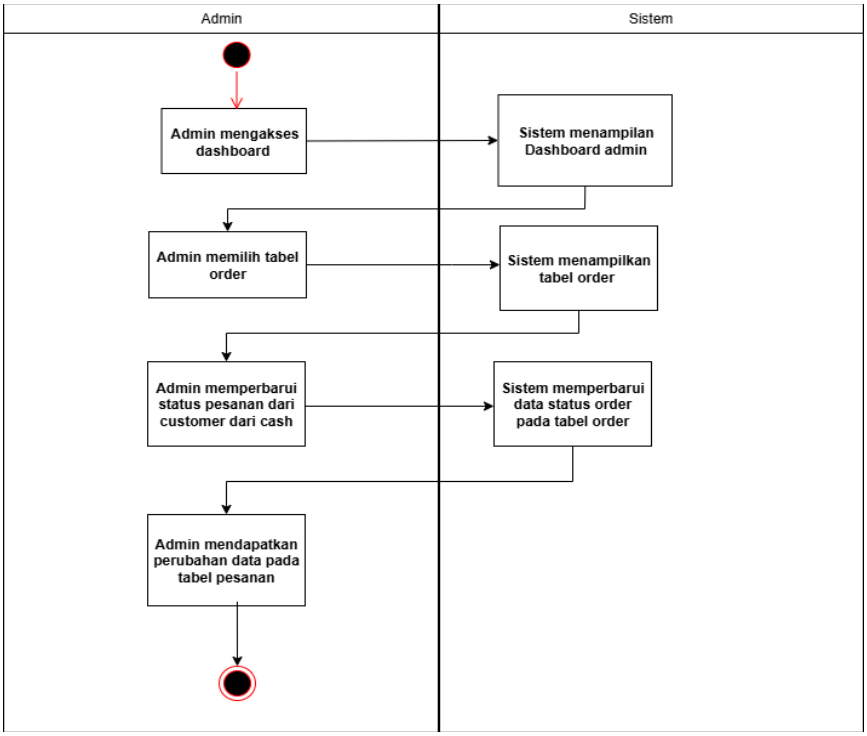

Figure 3. Activity diagram customer

2.1.2. Interface design

Interface design is a specialized field focused on designing displays/interfaces that provide a good user experience and are expected to understand all the functions available on the interface system display.

is the homepage design. The homepage contains product images, taglines, and order buttons to enter the menu display.

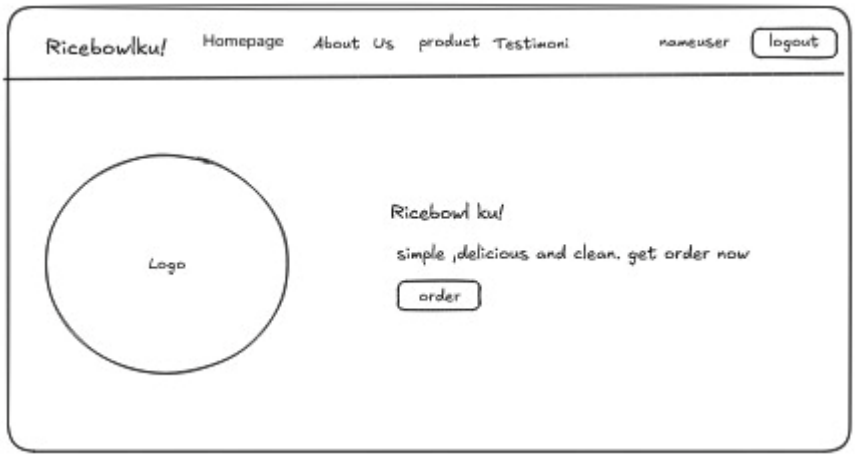

Figure 4. Interface design home

The order form allows customers to order their chosen food items. It consists of the order form itself, the available menu, and the payment methods that can be selected. There are two payment methods: cash and cashless.

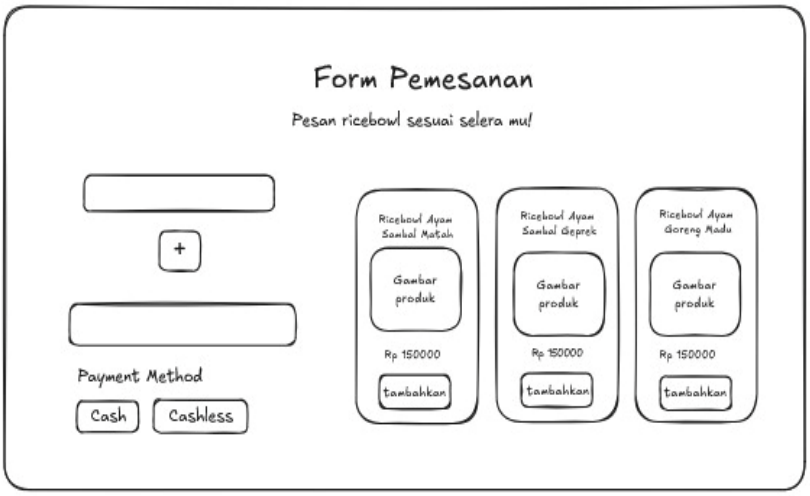

Figure 5. Interface design form pemesanan

Design the delivery location selection display. Customers will search for and select their address and add it to the list, then check the delivery location distance.

Figure 6. Interface design form pemesanan

design a dashboard display showing the number of users and food products. Display dashboard buttons, user management, products, orders. Can manage this data.

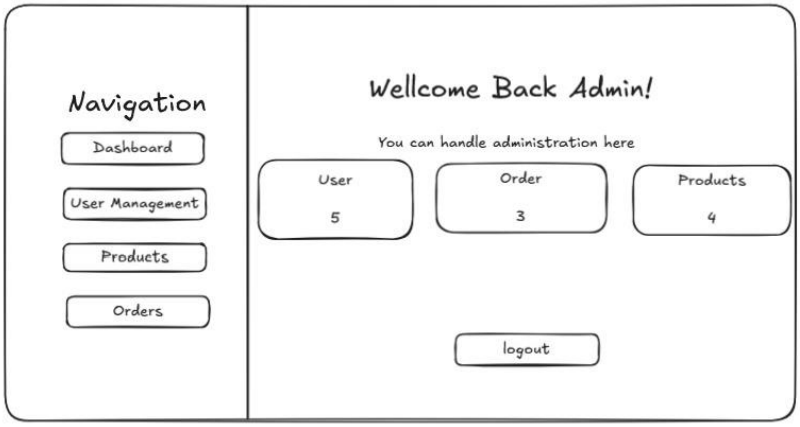

Figure 7. Interface design admin

2.2 Agile Method

The Agile method or Agile Development is a software development methodology based on the same principles as short-term system development, which requires developers to adapt quickly to specific and measurable changes. Agile Development also allows the development team to conduct reviews and reflections after each iteration to evaluate the results achieved and improve the quality of the application developed in any form.[10].

The application of the agile method at this stage is to implement the theory explained in the previous chapter. The goal is to develop software according to client requests and respond responsively to changes requested by the client for their website.

The following are the steps for applying the agile method:

1. Needs analysis

At this early stage, the development team will discuss with Culinarybykiki UMKM to determine the desired requirements for the application. At this stage, the author conducted brainstorming sessions through interviews and direct observation at relevant locations.

2. Design

At this stage, the development team will plan or design all requirements for the website that have been agreed upon with UMKM Culinarybykiki based on the requirements that have been discussed, such as the database, application structure, interface, and features needed to meet the needs of UMKM Culinarybykiki.

3. Implementation and Unit Testing

At this stage, based on the design, it will be implemented into software, in this case a website. In addition, the stage continues to unit testing where the results obtained will be tested to ensure that all features work and meet the requirements.

4. Testing
   At this stage, the results of the unit test will be analyzed, any errors found will be corrected and retested until the results match the initial objectives. This will strengthen the development results and reduce the risk of errors occurring in the future.
5. Maintenance
   This stage focuses on maintaining the system, such as the code and database, so that the system remains secure and accessible at all times.

2.1 Haversine Formula

The Haversine formula is a method for calculating the distance between two points, taking into account that the Earth is not a flat plane but a sphere with a degree of curvature[11].

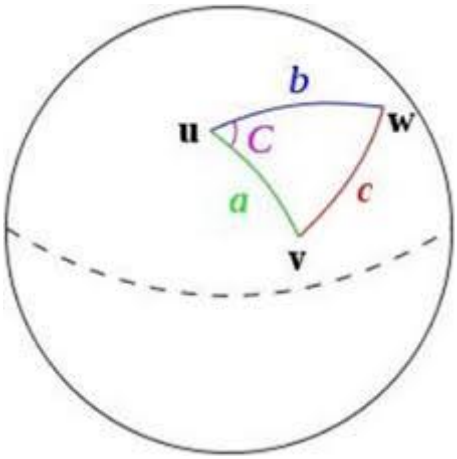

Figure 8. Haversine Formula

To determine that the Haversine formula can calculate the distance between two points on the earth's surface, calculations must be performed using the Haversine formula method with each of its steps.

1. Determine two coordinate points: (lat_1, lon_1) and (lat_2, lon_2).
   a. coordinate Point UMKM *Culinarybykiki*:
      Lat1: 3.5673
      Long1: 98,6932
   b. shipping address coordinates:

      Lat2: 3,5459

      Long2: 98,6946
2. Convert all degree values to radians.

$$radian = \frac{\pi}{180}$$

$$Lat1 = 3{,}5673 * \frac{3{,}14}{180} = \frac{11{,}2013}{180} = 0{,}06222$$

$$Long1 = 398{,}6932 * \frac{3{,}14}{180} = \frac{309{,}8966}{180} = 1{,}72164$$

$$Lat2 = 3{,}5459 * 3{,}14/180 = \frac{11{,}1341}{180} = 0{,}06185$$

$$Long2 = 98{,}6946 * 3{,}14/180 = \frac{309{,}9010}{180} = 01{,}72167$$

3. Calculate the difference in latitude and longitude:

$$\Delta Lat = Lat2 - Lat1$$
$$\Delta Lat = 0{,}06185 - 0{,}06222$$
$$\Delta Lat = -0{,}00036$$
$$\Delta Lng = Lng2 - Lng1$$
$$\Delta Long = 1{,}7217 - 1{,}72164$$
$$\Delta Long = 0{,}00003$$

4. Enter into the Haversine formula:

$$a = sin^2\left(\frac{\Delta Lat}{2}\right) + cos(Lat1) * \cos(Lat2) * sin^2\left(\frac{\Delta Long}{2}\right)$$
$$\cos(Lat1) = \cos(0{,}062222) = 0{,}99999941$$
$$cos\ (Lat2) = cos\ (0{,}06185) = 0{,}998087898$$
$$\cos(Lat1) * cost(Lat2) = 0{,}998087303$$
$$\left(\frac{\Delta Lat}{2}\right) = \left(\frac{-0{,}00037}{2}\right) = -0{,}000185$$
$$sin^2(-0{,}000185) = 0{,}00000003422$$
$$\left(\frac{\Delta Long}{2}\right) = \left(\frac{0{,}00003}{2}\right) = 0{,}000015$$
$$sin^2 = (0{,}000015) = 0{,}000000000225$$
$$a = 0{,}00000003422 + (0{,}996165558 * 0{,}000000000225)$$
$$a = 0{,}00000003422 + 0{,}0000000002$$
$$a = 0{,}00000003442$$

5. Calculate the center angle of the Earth:

$$c = 2atan2\left(\sqrt{a}, \sqrt{1-a}\right)$$
$$c = 2atan2\left(\frac{\sqrt{0{,}00000000344}}{\sqrt{1-0{,}00000000344}}\right)$$
$$c = 2atan2\left(\frac{\sqrt{0{,}00000000344}}{\sqrt{0{,}9999999966}}\right)$$
$$c = 2atan2\left(\frac{0{,}0001854}{0{,}9999999828}\right)$$
$$c = 2atan2(0{,}0001854)$$
$$c = 2 * 0{,}0001854$$

6. Calculate the final distance:

$$d = R.c$$
$$d = 6371 * 0{,}00037$$
$$d = 2{,}36\ km$$

3. RESULTS AND DISCUSSION

At this stage, we will explain each function in the website-based online ricebowl ordering system at Umkm Culinarybykiki. This explanation covers the process of inputting, displaying, deleting, and editing data, which aims to provide users with a clear and comprehensive understanding of how the application system works and how to use it.

3.1. Results of the agile method

The following are the results obtained from applying the agile method of designing and developing software according to demand and responsively responding to changes requested by related parties to the website.

3.1.1 Main page display results

The image shows the results of applying the agile method to the homepage of the Culinarybykiki ordering system. This page features a simple and clean design with main navigation at the top, such as Homepage, About Us, Products, and Testimonials. There is also user information and a logout button on the right side.

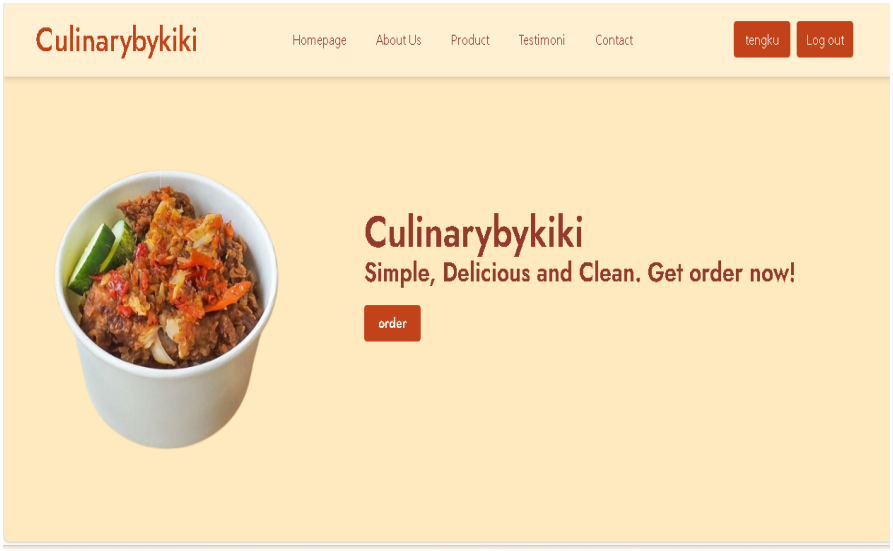

Figure 9. Display results

3.1.2 Results of applying the agile method to the order form display

The image shows the results of applying the Agile method in developing a web-based food ordering system. Through the iterative Agile approach, each feature—such as the order form, menu list, order quantity settings, and payment method options—was developed and tested in stages based on user feedback. The end result is a simple, responsive, and easy-to-use interface that makes it easy for users to order rice bowls.

Figure 10. Interface web

3.1.3 Results of applying the agile method to the appearance and functionality of the admin dashboard

Displaying the appearance and functions of the admin dashboard page of a system built using the Agile method. On this dashboard, admins can view the number of products, users, and orders recorded in the system. The design is simple and focuses on ease of navigation, with a menu on the left side to access pages such as User Management, Products, and Orders.

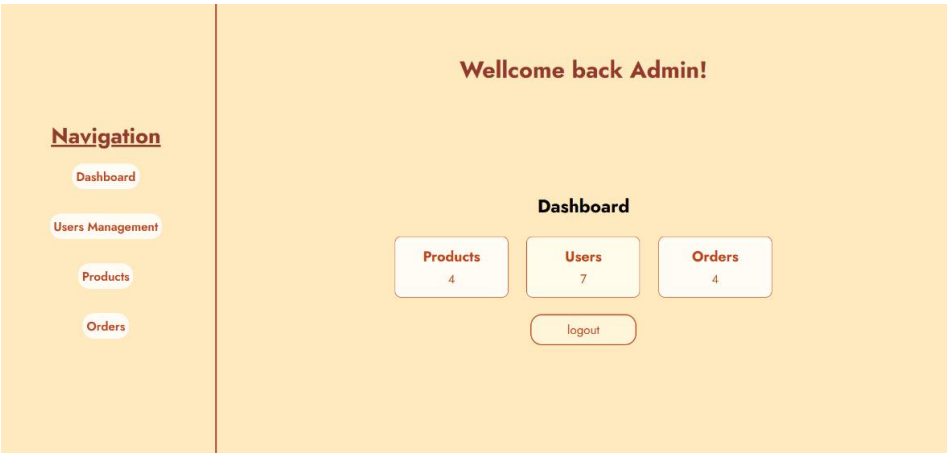

Figure 11. Interface web admin

3.2. Result of applying the haversine formula method

The following are the results obtained from applying the Haversine Formula, a mathematical method used to calculate the distance between two points on the earth's surface based on latitude and longitude coordinates.

3.2.1. Function results and display from applying the haversion formula method

Results of applying the Haversine Formula method on the delivery page. This method is used to calculate the distance between two geographic coordinates—namely, the user's location and the delivery destination. In this system, the Haversine Formula works by taking the latitude and longitude coordinates of both locations, then calculating the curved distance on the earth's surface (not a straight line). The calculation results are displayed automatically when the user presses the “check distance” button.The application of this method ensures that the distance displayed on the shipping page is more accurate and realistic, thereby helping the system determine shipping cost or time estimates based on the actual distance.

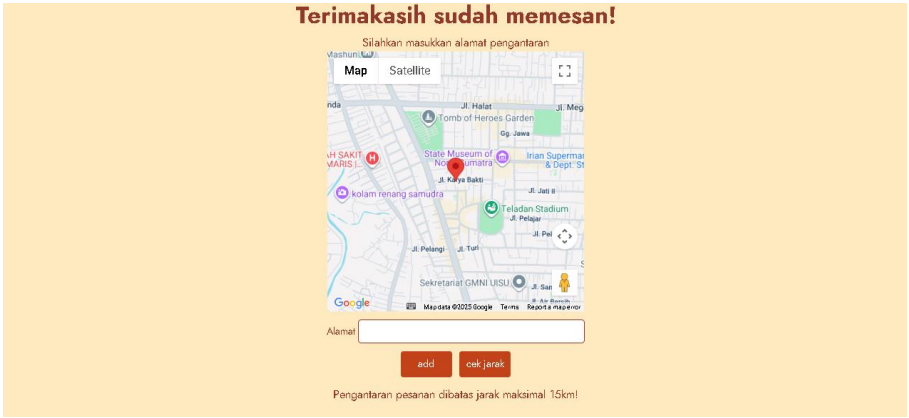

Figure 12. Interface web

4. CONCLUSION

This web-based online ricebowl ordering system application was developed using JavaScript and designed to improve operational efficiency through features such as menu ordering, product management, and admin dashboard.

The implementation of the Agile method provides high flexibility in development, allowing for adjustments to the needs of MSME owners through an iterative process and continuous communication.

In addition, the delivery system uses the Haversine Formula method to accurately calculate the distance between the customer's location and the MSME location based on geographic coordinates, thereby helping to provide more accurate estimates of delivery distance and time.

ACKNOWLEDGEMENTS

The author would like to express sincere gratitude to all individuals and parties who have contributed to the completion of this research. Special thanks are extended to the supervising lecturer for valuable guidance, constructive feedback, and continuous encouragement throughout the research process. Appreciation is also given to the management and staff of the UMKM involved, whose cooperation and data support were essential in developing and testing the online ricebowl ordering system. Lastly, heartfelt thanks go to family and friends for their unwavering moral and emotional support, as well as to everyone who has directly or indirectly contributed to the success of this study.

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