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The Development of Self-Service Application at Martabak Air Mancur Restaurant

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Abstract. The amount of time spent in requesting and waiting for the meal in Martabak Air Mancur restaurant may permanently multiply the number of customers in the line waiting especially during peak hours and on weekend. It will affect the quality service of the restaurant and the loyalty of the customer. From the observation, most of the customers spent a great deal of time making an order when faced with many proportionate choices. The study proposed a system by using self-service technology and the waterfall model. In the beginning, the time needed from making an order to finishing the payment is 15 minutes. The system built can reduce the transaction time to 10 minutes.

1. Introduction

Air Mancur Bogor is the first established martabak restaurant in 1993. Despite the multitude of martabak restaurants around, Martabak Air Mancur Bogor remains popular with its loyal customer even it has seen a steady rise of late in its number of customers. The main attraction of this place is the maintained taste, affordable price, and a variety of modern toppings.

Restaurant services such as making and processing orders, calculating the bill, and delivering meals commonly need a cashier to input customer order and then relay to the kitchen for dishes preparation. The amount of time spent in requesting and waiting for martabak in the restaurant may permanently multiply the number of customers in the line waiting since the services are handled by a cashier alone. From the observation, most of the customer has a difficult time making a decision when faced with many equivalent choices.

The long queues usually exist from 04:00 PM to 09:00 PM with the average number of customers of 75%. The ordinary number of the customer from Monday to Thursday is 60 customers and the remaining days is about 100 customers. The average time the customers stand at the waiting line is about 15 minutes excluding waiting for a meal. During peak times on the weekend, the waiting time will be much longer and create a congestion experience for the customer.

The objective of the study is to create a self-service system that allows customers to get services free from the direct involvement of waiters in Martabak Air Mancur Bogor. The use of self-service technology can enhance the satisfaction and loyalty of the customers [1]. Besides, self-service technologies give power to both employees and customers by increasing time and place convenience [2] [3] even simultaneously reduce the waiting-times of the customer [4] [5].

The adoption of self-service technology has been studied from many perspectives in contrasting contexts such as banking [6], air travel [7], and hospitality [8]. In this study, the system is created by developing a tablet-based application for the restaurant ordering system. It is designed to be interactive with the customer and to be effortless with the chef. The system provides the facility to update the menu,

print the bill at the customer side and receive the order from the server to the kitchen. The implementation of the system may enhance the quality of both services and customer's dining experience. To achieve these objectives, because it presents the group of menus precisely patterned to what the restaurant is suggesting, thus the application considered formulating the menu by sub-classifying the dishes to make customer effortlessly decide their option of dish afterward.

Recently, the researchers look forward to tearing down the time consumed through the integration of the mobile technology in automating the task of conventional food ordering system [9] by using an android application, since the number of android users is superior compared to the other existing mobile operating system [10]. In [11], designed a system to replace the use of pen and paper as well as to reduce the level of error in the processing of the consumer's order with digital devices such as tablets/smartphones based on android. Gohil and Shekh [12] constructed an intelligent restaurant by using a digital touch screen menu, meal serving robotic technology and android mobile for online payment.

2. Literature review

2.1. Self-service technology
Self-service technologies (SSTs) are technological interfaces that allow consumers to serve themselves, independent of direct involvement with employees [13]. SSTs lead to active customer participation in the co-production of service, which is a component of value co-creation. This participation

SSTs provide customers with a greater choice of how and when to receive a service. SSTs have also been assumed to help firms improve their productivity and reduce their operating cost [14]. Consequently, SSTs have increasingly been seen as a cost-effective way to reduce waiting-times and hence improve satisfaction [15].

2.2 Waterfall model
A waterfall model is defined by a linear progression of discrete, in sequence action phases. Each phase must be accomplished thoroughly before fully before the next phase can start. Every single step additionally assembles on the others, specifically to declare the results of upstream stages contribute the input for downstream stages. Figure 1 visualizes the waterfall model.
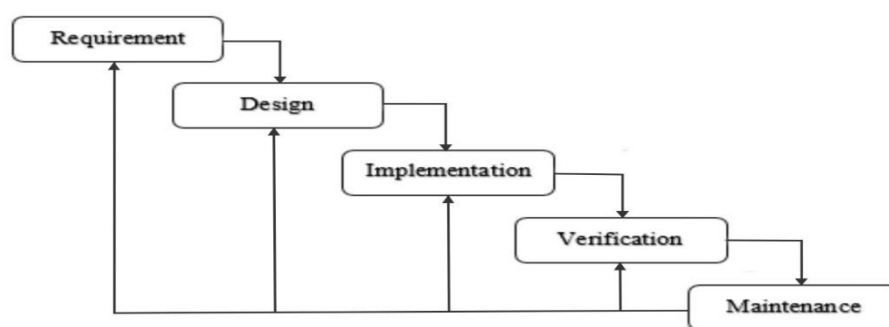

Figure 1. Waterfall model.

Partitioning the development activities into predetermined phases guarantees that it stands very understandable. Besides, it is correctly appropriate to outcome-based designing, since the final of each stage administers the best achievement for accumulating in-between outcomes.

3. Methodology

3.1. Data sources
The location of the study was Martabak Air Mancur restaurant located in Bogor. The sources of the data to develop a food ordering application were from observation and interview. The observation was needed to be familiar with the problem of the restaurant i.e. the time the long queues arise.

From the observation, the customer made an order from 10:00 am to 10:00 pm. We found out two different quantity of customer; first, the average number of the customer from 10:00 am to 04:00 pm was 25% and the remaining was from 04:00 pm to 10:00 pm.

We conducted several series of interviews with the manager of the restaurant to understand the queue problems and to collect the list of menus offered by the restaurant; needed to design interactive applications.

3.2. Waterfall phases

The food ordering application is developed by using a waterfall model of the system development life cycle (SDLC). The stages are:

3.2.1. Requirements determination. Analyzing the current business process to recognize the weaknesses of the manual system. The current business process comprised 3 parts namely ordering a meal, paying the bill, and handing over the meal. We present the whole parts of the business process in figure 2, figure 3, and figure 4, separately.
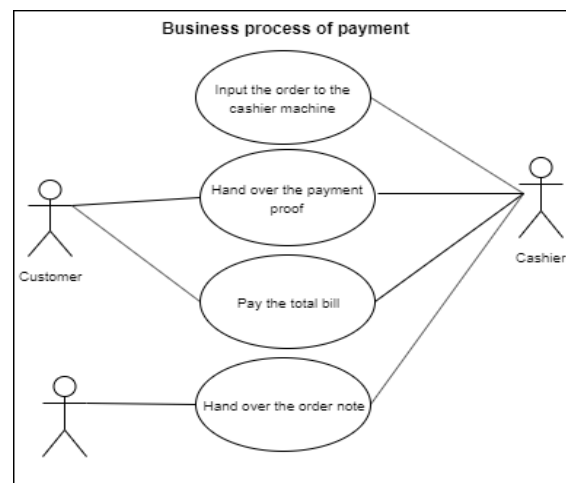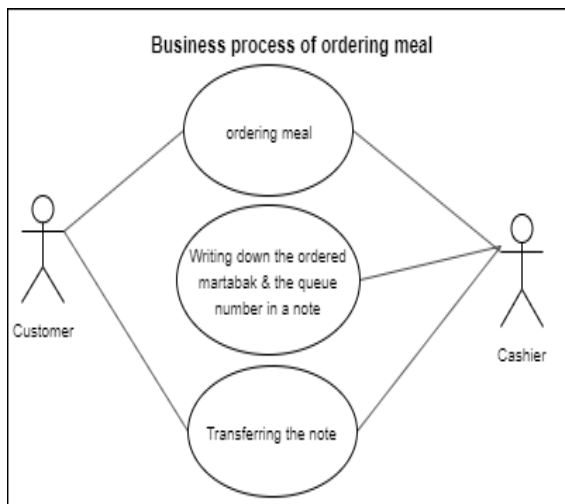

Figure 2. Use the case of manual order.   **Figure 3.** Use case of the business process of payment.
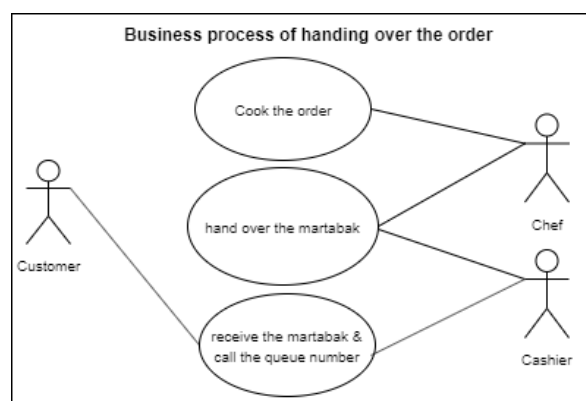

Figure 4. Use the case of handing over the meal.

3.2.2. Designing the proposed system. The architecture of the proposed system was created by implementing self-service technology. The design of the application is displayed in figure 5.
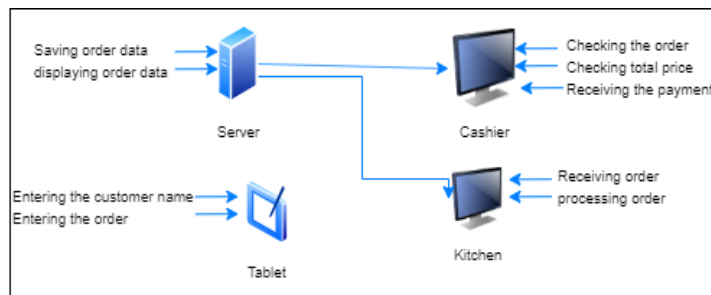
Figure 5. The proposed design of the application.

The order flow through the proposed application is:
- Customer input name into the tablet.
- Customer choose the category of the martabak.
- Customer click the back button (to go back to dashboard screen).
- Customer click finish button to complete the order.
- The customer gets the queue number.
- The customer's order will be saved in the database server.
- The saved order will be displayed in the cashier's computer; Cashier rechecks the order and receives the payment.
- Customer pay the bill to the cashier.
- Cashier change the status of the order to be "payment completed".
- Chef proceed the order.
- Cashier print out the payment proof and hand over the queue number.
- The customer receives the queue number and waits for the meal.
- Chef finishes cooking the meal and hand over it to the cashier.
- The cashier calls off the queue number and hand over the meal.
- Customer pick up the meal.

4. Result and Discussion

4.1 Implementation
The system layout is implemented to identify whether the proposed system correspondingly works as needed. We provide the detail of the user interface on the customer's side in which queue time reduced in figure 6 to figure 9.
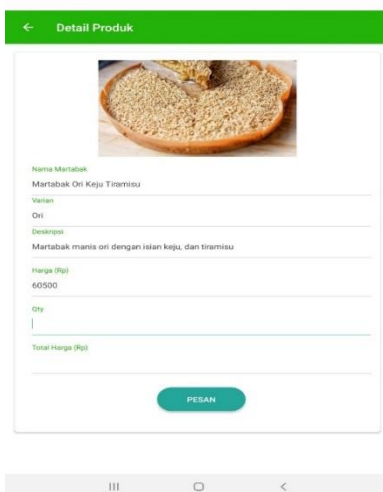

Figure 6. Detail product screen.

Figure 7. My order screen.

We separate the detailed product and the order summary on two different screens. This allows the user to browse between the two; without having to go back and forth in the system. The detailed product was designed to provide a clear overview of the selected item. The concept of being able to see and edit the number of items added as seen in figure 6. Whereas the My Order screen was to display a list of user orders before being sent to the kitchen via the apps (figure 7). The implementation can boost the queue time since the total bill is automatically calculated by the app. The detail of the item is saved in the database once the order button is clicked.
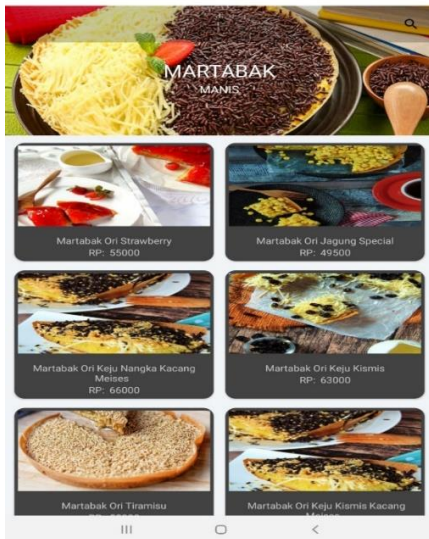

Figure 8. Sweet martabak screen.

Figure 9. Egg martabak screen.

Figure 8 and figure 9 display the menu category page; categorized by the taste of the martabak. There are two categories of the offered martabak, namely sweet martabak and salty martabak (egg martabak). The user can spot the entire martabak menu together with the look and the price of the martabak. Those pages are to accelerate the order time due to less time to ask the cashier about the look of each menu.

4.2. Testing
Testing of the system was performed to find flaws and errors in the application being tested. Besides, to determine whether the developed application met the appropriate criteria. Testing on the functionality of the system based on the specified requirement was performed in this study as seen in table 1.

Table 1. Black box testing.

No	Screen	Input	Expected Result	Result of the test
1	*My Order*	Display the summary and the price of the order	After finishing the order, the summary and total bill of the order display on My Order menu	Success
2	Martabak Manis	Display look, name, and price of each type of sweet martabak	When the customer chooses the sweet martabak category, then the screen shows sweet martabak menu. On this screen, the customer can see the look, name, and price of each type of sweet martabak	Success
3	Martabak Telur	Display look, name, and price of each type of salty martabak	When the customer chooses the salty martabak category, then the screen shows egg martabak menu. On this screen, the customer can see the look, name, and price of each type of salty martabak	Success

4	Detail Produk	Display the look, name, variants, brief description, price, and the total bill. Input the number of items needed.	When the choice of the martabak is selected, then the detail of ordered martabak is showed up. The customer needs to enter the number of the item needed and the total bill is revealed.	Success

5. Conclusions

The purpose of the study is to reduce queue time in the waiting line. The cashier is dispensable to take a note of each order manually. The reduction time is to 2 minutes from 15 minutes (starting from ordering time to the payment time). The total bill can be automatically calculated through the application. The reduction in time is 3 minutes. The customer is needless to remain standing at the waiting line after finishing order and payment since the cashier will hand over the queue number to the customer. The customer receives the meal once the queue number is called off by the cashier. For further development, this system may integrate into the other payment methods such as using EDC machine or cashless payment.

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