Website System Design Using Agile Kanban Based On QR Code

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Abstract *– Business developments that occur today cannot be separated from the role of technology and information systems. The system that will be discussed in this journal is a Web-based Restaurant System that uses a QR code. This system will handle at least 5 types of users, namely admin, waiter, chef, cleaning service, and customers where the five kind of users have different access rights. Restaurant information systems using this QR Code can speed up performance in ordering menus, serving ordered dishes, paying bills to customers and cleaning tables after use. The use of the QR code itself is very suitable in the restaurant business and marketing practices because of its advantages, namely being mobile fried and easy to get information. This will improve the quality of the restaurant in terms of service and time. This Web-Based Restaurant Menu Ordering Application is designed using web programming languages, namely PHP. For the database, it will use MySQL and the system development method will use the Agile Kanban method which can help an organization produce software that has been tested and is ready to use. The results of the system design will be in the form of a comparison table for the old and new systems depicted by the PIECES table, then UML for system modeling, and website interface. The system created will help in reducing the amount of paper used for order receipts. In addition, users can also order menus during the COVID-19 pandemic with restaurants that use this system.*

Keywords – QR Code, Restaurant, PHP, Agile Kanban, PIECES

I. INTRODUCTION

Information technology, including computers, software, databases, internet, and other tools works specifically by giving a lot of information to various actors in various contexts. A computerized system will facilitate and assist companies in making decisions, especially being able to help various business fields in the midst of this covid-19 pandemic. The covid-19 pandemic has paralyzed all activities in various circles [1]. Covid-19, which has had many variants and has spread to almost all countries, requires changing almost all of our daily activities. The government has suggested many precautions for covid-19 to stop the spread of this virus, including social distancing, wearing masks, and avoiding crowds [2]. However, basic human needs such as food and drink cannot be replaced. The covid-19 pandemic has made people who want to visit restaurants to be more careful because it is considered as a place which has high percentage risk of the covid-19 virus can be transmitted [3]. In addition, the restaurant system which is still manual by means of the waiter approaching the visitor then writing a message on a piece of paper and delivering the customer's order to the chef makes the service take a long time, miscommunication between the buyer and the waiter and can cause crowds of visitors.

Based on these problems, to improve efficiency in the restaurant system, menu serving management, and resources are very important matters. How to increase efficiency in order to provide services to customers, so that they can produce good restaurant services [4]. Problem identification includes:

1. There are government precautions to avoid crowds which can facilitate the spread of the covid-19 virus.
2. The recording process is still manual which causes time efficiency.
3. There are still orders errors due to miscommunication between waiters and visitors

To overcome this problem, a web-based restaurant system was created using a QR code [5]. This research is limited by the limitations of the scope and management of data boundaries such as menu data, visitor data, payment data, ordering data, menu data, payment data, and table status data.

QR code is a two-dimensional barcode that contains written and printed data in a more concise medium. QR codes were first introduced by the Japanese company Denso-Wave in 1994 [6]. QR stands for Quick Response as it aims to allow its contents to be encoded at high speed. QR code is capable of storing all types of data, such as numeric, alphanumeric, binary, and kanji/kana [7]. The way the QR code works itself is first the pattern of the QR code is taken using a cellphone camera (HP) or another scanner that is able to translate the QR code. Then the pattern on the QR code is decoded using special software that can read the information stored in the QR code pattern. The QR code system consists of an encoder and a decoder. The encoder is responsible for encoding the data and generating the QR code, while the decoder decodes the data from the QR code [8]. The QR code will be integrated with the table and directly connected to the ordering system.

The program planning that is made will be displayed in a UML diagram and the framework used is the kanban method. UML is a predefined modeling language for

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software development. The UML approach uses an object-oriented approach. UML consists of 14 diagrams, which are used in this system, including Class Diagrams, Use Case Diagrams, and Sequence Diagrams [9].

Web based means the program to be made based on the website using the PHP programming languages as the main components. Which the main component is PHP as a Server-Side programming language. PHP is an acronym for Hypertext Preprocessor, an open source server-side scripting based programming language. Then the script from PHP will be processed on the server-side [10]. The database used is MySQL which is the most frequently used query programming language. MySQL is one type of database that is open source and is widely used to build web-based applications as a source of data processing. SQL (Structured Query Language) is the standard language used to access database servers. In the 70s this language was developed by IBM, which was then followed by Oracle, Informix, and Sybase. By using SQL, the process of accessing the database becomes easy [11]. By implementing the two things above, it is expected to create an orderly, neat, and smooth flow/process of work and the programs made can be more neat and structured. And finally, a program cannot be considered feasible if it has not received testing. The testing method used is black box testing.

Black Box is a testing method used to test an application/software without having to pay attention to the details of the application/software. Black Box testing only checks the output value based on the input value. Black Box testing process is carried out by trying the application/software and entering data on each form which aims to find out whether the application/software is running as desired [12].

In developing this system software, Agile Kanban methodology is used. This method is part of the SDLC development that can track the progress of each task being done and can limit the amount of work being done to provide a time limit for completing a task. Components in Kanban use boards and cards, the board is an environment of kanban containing various cards with tasks that need to be completed [13].

The web program is considered very suitable to be applied in the current era of technology, and also because of the restrictions due to the increasingly widespread Covid-19 pandemic. The development of this application will certainly improve the services provided by restaurants because currently each restaurant continues to strive to improve quality by providing the best service and one of them is by utilizing information technology to support the restaurant business [14].

The research topic written can be concluded that the purpose of this research by developing a Web-Based Restaurant System program using a QR Code is to improve restaurant service for customers, facilitate ordering by customers, reduce the spread of covid-19, and facilitate the management of restaurant activities. The results of the research are expected to be implemented in a restaurant so that the restaurant will benefit from the system built, namely the convenience between customers and employees.

II. RESEARCH METHODOLOGY

In developing a restaurant system website, the PIECES analysis method is used, which is a technique to identify and solve problems that occur in information systems. PIECES consists of performance, information analysis, economic analysis, security analysis, efficiency analysis, and service [15]. To produce quality software in a short time and at a low cost using a development process called the System Development Life Cycle (SDLC). The development stage in the SDLC can help an organization to be able to produce software that has been tested and is ready for use. The SDLC design method on this system uses the Agile method with the kanban framework. This Agile Kanban method is used to track progress and visualized using a kanban board, resulting in transparency on each member's work. Agile Kanban is more effective in managing software development. Compared to agile scrum, agile kanban does not have to wait as long as a sprint when a task has been completed. Kanban board has many forms of stages but the main ones are backlog, in-progress, and complete. Kanban implementation can create a more structured workflow [13] [16].

There are 6 stages used in this project management, and these stages are described as follows,

1. Backlog
   In the backlog, all tasks will be broken down into more detailed tasks, which will be performed and sorted according to different priority levels of work. All tasks related to this system will be collected in the backlog.

2. To Do
   After all the ideas are collected in the backlog, the tasks will be moved to the to do section. In this section, it is determined that all tasks are of high quality and will be carried out during development.

3. In Progress
   If there is a task to be done, then the task is moved from the to do stage to the in progress stage. At this stage, the work on the task is being carried out in order of priority. To increase efficiency and streamline workflows due to many unfinished tasks, it is necessary to set boundaries for work in progress, to focus the team on completing tasks systematically.

4. Testing
   If there is a task that needs to be tested, the task will be moved from the In progress stage to the Testing stage. This stage is optional, testing at this stage is carried out by the user and the team is also responsible for monitoring the progress of the test and following up on any problems that arise.

5. Feedback
   At this Feedback stage, the user provides input on deficiencies or problems with the tasks that have been tested by the user during the Testing stage.

6. Done
   A task is considered complete and will be entered into the Done stage if the results of the task have met the requirements and development standards,

the functional test has passed, and there are no errors in the task.

III. RESULTS AND DISCUSSION

The following are the results of the analysis based on the research method we used,

1. PIECES Table

   The comparison between the old system and the system made is shown in table 1 using the PIECES analysis indicator table.

Table 1. PIECES Analysis System Comparison

Component Analysis	Old System	New System
Performance	Menu ordering is still done manually	Menu ordering has been done online through the restaurant application
Information	Menu information for visitors can only be obtained if the waiter approaches the visitor	Menu information, and menu availability can be seen through the restaurant application.
Economy	The use of paper for receipts from ordering menus by visitors can be a waste of money.	The cost to buy paper is no longer needed because now visitors can view the order history independently through the restaurant application.
Control	In the process of ordering the menu, it is the waiter who is in charge of passing it on to the chef.	Menus that have been ordered by customers will automatically appear in the chef's application so that it can save time.
Efficiency	The resources needed are very large because they are still doing manual data collection, wasting time, and having many waiters to serve many tables	All activities carried out by customers are carried out independently, and can reduce unnecessary resources.
Service	In terms of service, visitors have to wait a while for the order to be forwarded to the chef.	In terms of service, visitors make menu selections and confirm orders, the orders will be directly forwarded to the chef.

2. Use Case Diagram

   This section will discuss the interactions between actors such as customers, waiters, admins, chefs, and cleaning services with the system described by the use case diagram in Figure 1.
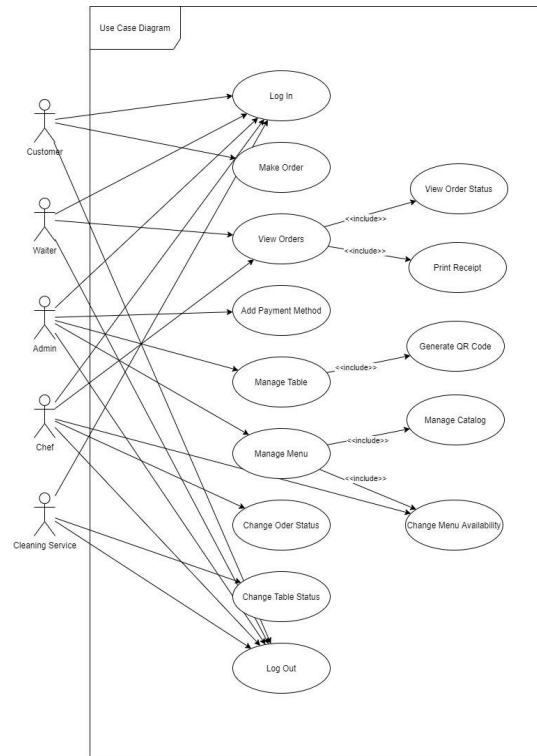

Figure. 1 Restaurant System Use Case Diagram

3. Sequence Diagram

   This section will discuss the sequence diagram used by this system, there are 9 sequence diagrams shown in Figures 2-10, namely logging in, logging out, viewing orders, making orders, managing tables, managing menus, managing payment methods, managing table statuses, and change the order status.
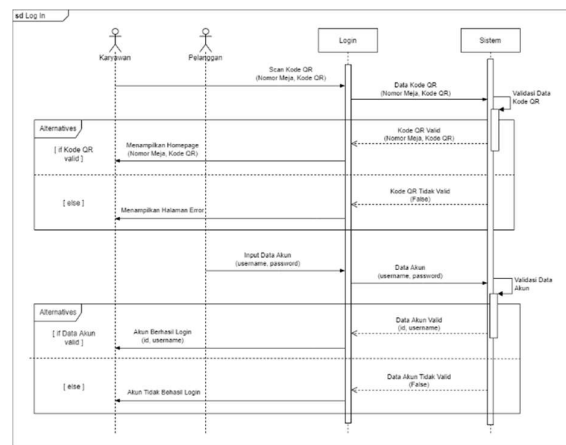

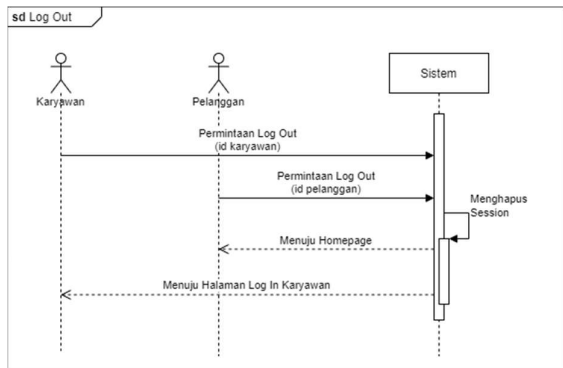Figure. 2 Sequence Diagram Log In
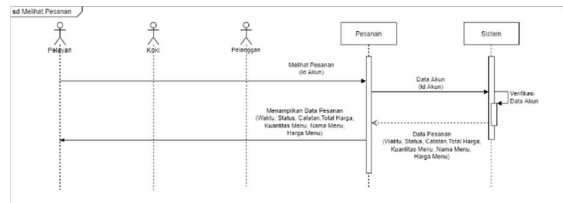
Figure. 3 Sequence Diagram Log Out

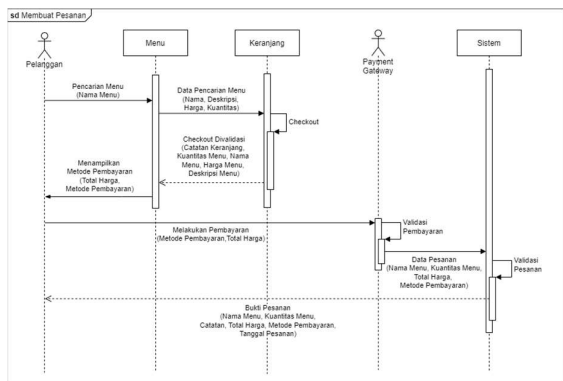Figure. 4 Sequence Diagram View Orders

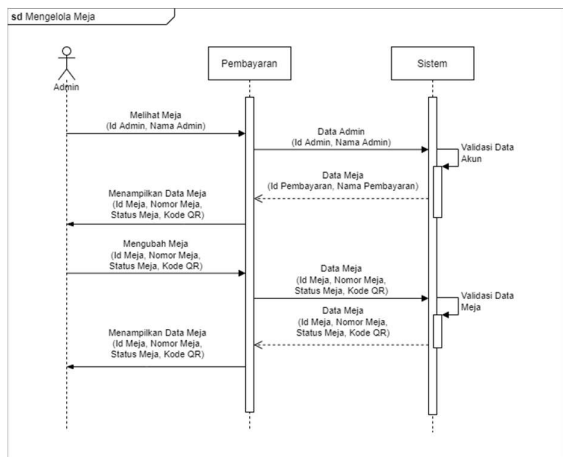Figure. 5 Sequence Diagram Make an Order

Figure. 6 Sequence Diagram Managing Table
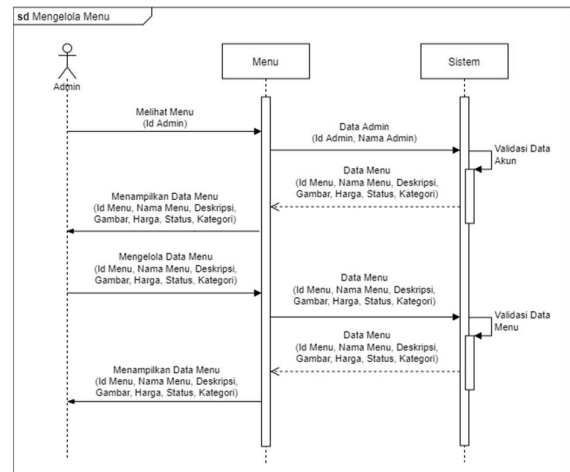

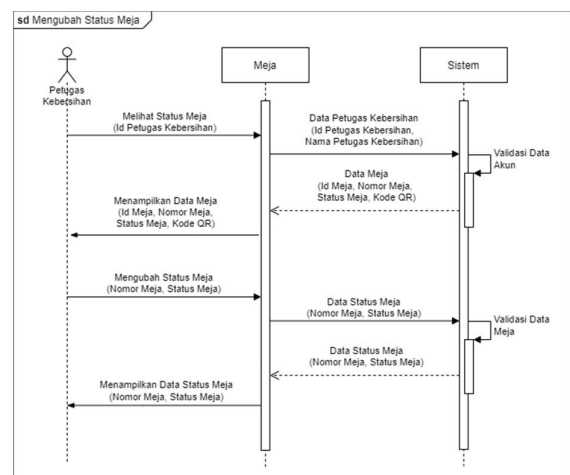Figure. 7 Sequence Diagram Manage Menu

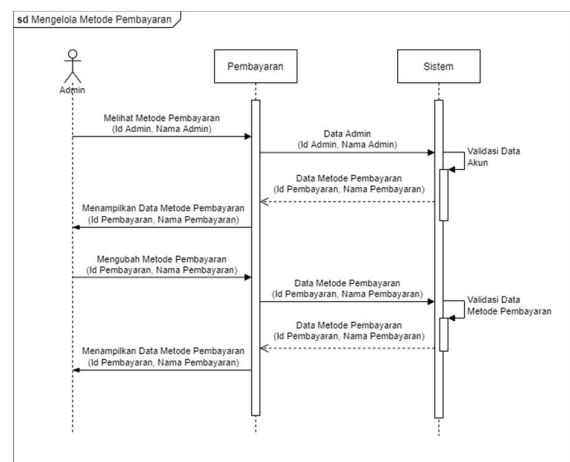Figure. 8 Sequence Diagram Manage Payment Methods
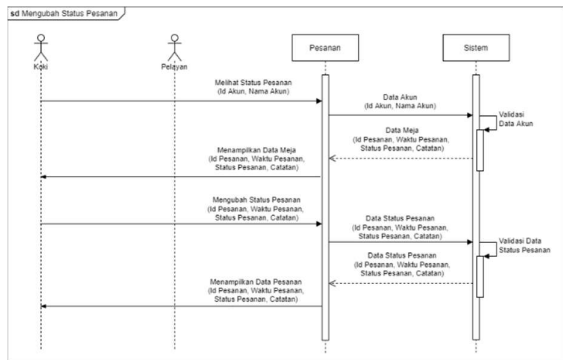

Figure. 9 Sequence Diagram Managing Table Status

Figure. 10 Sequence Diagram Change Order Status

4. Class Diagram

There are 12 classes in this system, namely Payment, Chef, Waiter, Customer, Basket, Basket Items, Orders, Order Details, Menu, Admin, Cleaning, and Table classes. The interactions between classes are shown in Figure 11 while the properties of the classes are shown in Figure 12.
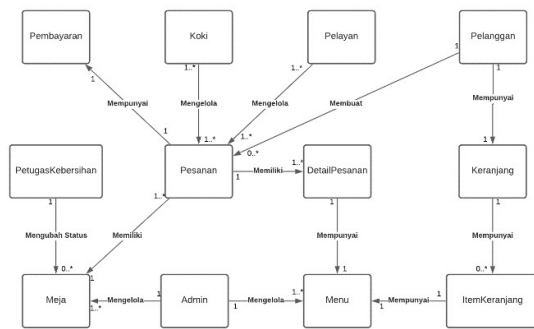

Figure. 11 Restaurant System Class Diagram

Figure. 12 Properties of Restaurant System Class Diagram

5. Website Interface

In the website interface, it will display the appearance of the website that has been designed according to the UML Diagram created. The

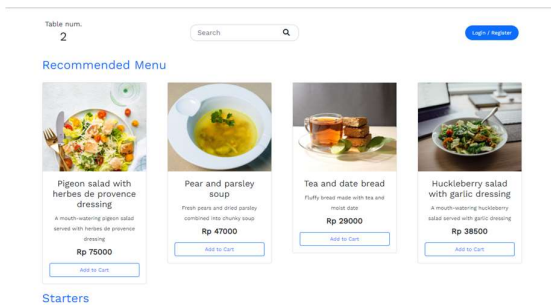following website interface has been included below,
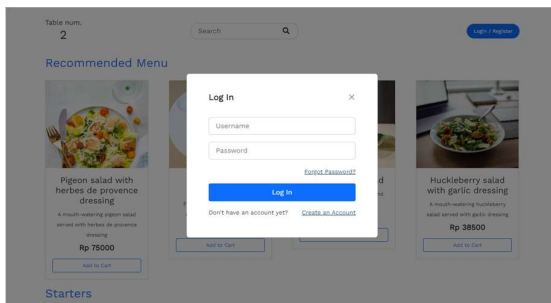

Figure. 13 Customer Homepage
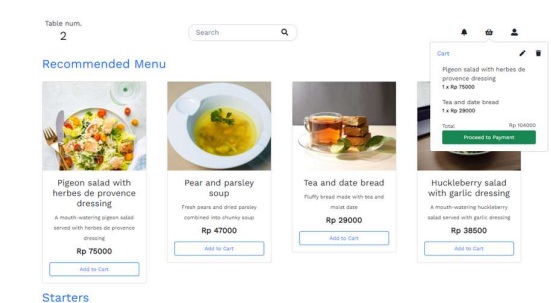

Figure. 14 Customer Log In

Figure. 15 Customer Cart

Figure 13 is the initial menu display, where customers can register an account and enter an existing account as shown in Figure 14 to be able to place an order by entering the menu in the restaurant into the basket in Figure 15.
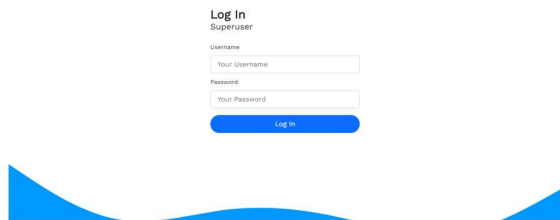

Figure. 16 Superuser Log In

Figure 16 is the initial menu for administrators, waiters, chefs, and cleaning services to be able to enter the system according to the username and password that has been registered by the administrator.
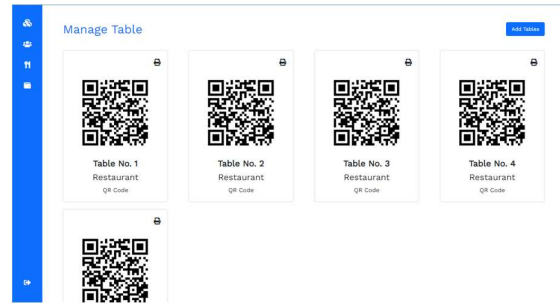

Figure. 17 Admin Menu - Manage Table
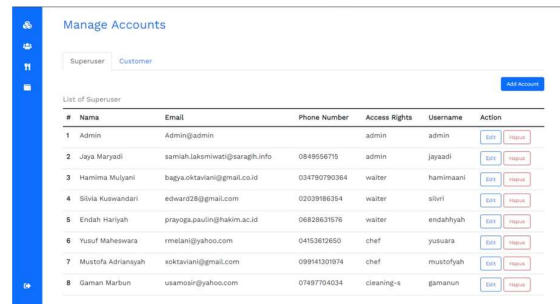

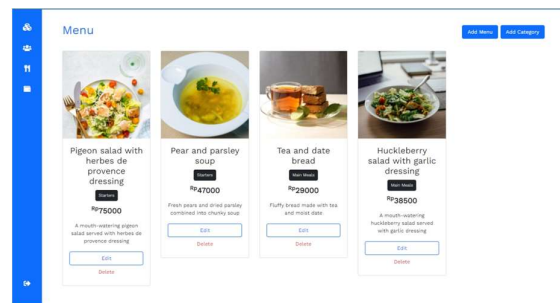Figure. 18 Admin Menu - Manage Accounts

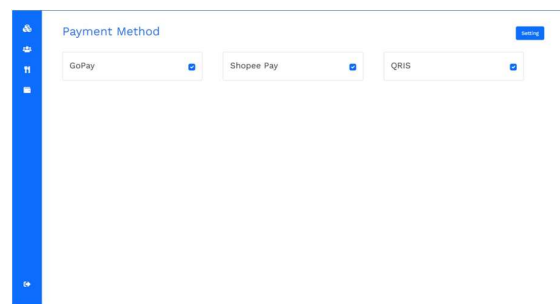Figure. 19 Admin Menu - Manage Menu

Figure. 20 Admin Menu - Manage Payment Method

Figures 17-20 is the menu that will be displayed after successfully logging in for an account with administrator privileges. In this menu, administrators can manage all accounts, manage menus, add payment methods, manage categories, and manage tables.
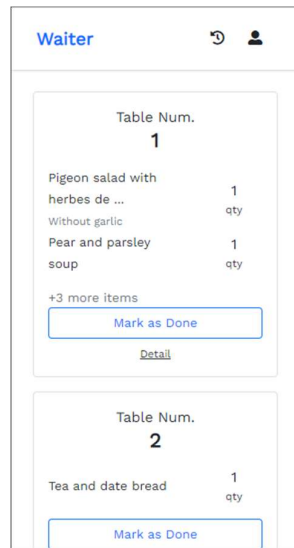
Figure. 21 Waiter Homepage

Figure 21 is a menu that will be displayed after successfully logging in for an account with waiter privileges. In this menu, the waiter can view order details and change the order status.

Figure. 22 Chef Homepage

Figure 22 is the menu that will be displayed after successfully logging in for an account with chef access rights. In this menu, chefs can view orders, adjust menu availability, change menu status, and change order status.
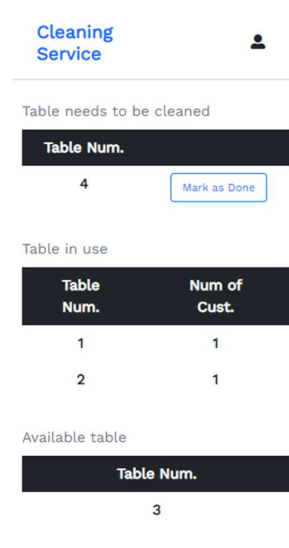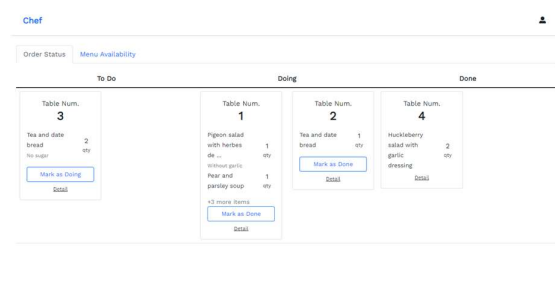

Figure. 23 Cleaning Service Dashboard

Figure 23 is a menu that will be displayed after successfully logging in for an account with access rights as a cleaning service. In this menu, the cleaning service can only change the usage status on each table.

To be able to test the results of this website system, a black box test was carried out whose results are shown in table 2 below. The black box test results on 4 system pages for customers, admins, waiters, chefs, and cleaning services get results that pass for each feature tested. Based on the research conducted, the PIECES analysis table, UML, and website interface have been designed.

Table 2. Black Box Testing Result

No	Test Case	Expected Output	Actual Output	Status
A	**Customer Page System**			
1	Create Account	Customer can create accounts	Customer can successfully create accounts	pass
2	Scan QR Code	Customer can scan QR Code to to go to customer homepage	Customer can successfully scan QR Code to go to customer homepage	pass
3	Log In	Customer can log in according to account data	Customer success log in according to account data	pass
4	Search Menu	Customers can search the menu in the search input field accordingly	Customers successfully search the menu in the search input field accordingly	pass
5	Add Menu to Cart	Customers can choose the desired menu and collect it to cart	Customers can successfully choose the desired menu and collect it to cart	pass
6	Make Order	Customers can choose and make orders according to the menu presented on the customer homepage	Customers can successfully choose and make orders according to the menu presented on the customer homepage	pass
7	Receive Payment	Customer gets a notification	Customer successfully gets a	pass

	Notifications	regarding the success or failure of the payment made	notification regarding the success or failure of the payment made	
8	Log Out	Customer can logged out from system	Customer successfully logged out from system	pass
9	View Order History	Customers can see details and history of transactions that have been made	Customers can successfully see details and history of transactions that have been made	pass
B	**Admin Page System**			
1	Log In	Admin can log in according to account data	Admin success log in according to account data	pass
2	Manage Payment Method	Admin can manage payment method	Admin can successfully manage payment method	pass
3	Manage Table	Admin can manage table	Admin can successfully manage table	pass
4	Manage Menu	Admin can manage menu and catalog	Admin can successfully manage menu and catalog	pass
5	Log Out	Admin can logged out from system	Admin successfully logged out from system	pass
6	Print QR Code	Admin can print QR code for each table	Admin can successfully print QR code for each table	pass
C	**Waiter Page System**			
1	Log In	Waiter success log in according to account data	Waiter success log in according to account data	pass
2	View Order	Waiter can view and change the order status	Waiter can view and change the order status	pass
3	Log Out	Waiter can logged out from system	Waiter successfully logged out from system	pass
D	**Chef Page System**			
1	Log In	Chef success log in according to account data	Chef success log in according to account data	pass
2	View Order	Chef can view the order status	Chef can successfully view the order status	pass
3	Change Order status	Chef can change order status	Chef can successfully change order status	pass
4	Adjust menu availability	Chef can adjust menu availability	Chef can successfully adjust menu availability	pass
5	Log Out	Chef can logged out from system	Chef successfully logged out from system	pass
E	**Cleaning Service Page System**			
1	Log In	Cleaning Service can log in according to account data	Cleaning Service success log in according to account data	pass
2	View Table Status	Cleaning service can see table usage status	Cleaning service can successfully see table usage status	pass
3	Change Table Status	Cleaning Service can change the usage status on each table	Cleaning Service can change the usage status on each table	pass
4	Log Out	Cleaning Service can logged out from system	Cleaning Service successfully logged out from system	pass

IV. CONCLUSION

Based on the results of the development of a restaurant system that was made according to the needs of the community during the covid-19 pandemic as well as the results and discussions above, it can be concluded that the system that has been created has been in accordance with the research objectives, and with the creation of this system can make the restaurant system more structured and organized. The use of this web-based system can also help reduce paper usage. On the other hand, customers can be more comfortable in ordering menus during the covid-19 pandemic with restaurants that use this system. The author's suggestions for this system to be able to help other developers maximize the performance of this system, by making a financial reporting system to be able to describe the financial condition of the restaurant.

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