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Development of a Web-Based Food and Beverage Ordering System for University Canteens Using the Laravel Framework at University of Technology Yogyakarta

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ABSTRACT

The canteen at University of Technology Yogyakarta (UTY) often experiences overcrowding, particularly during peak hours, leading to long queues and potential errors in order processing. This research aims to design and develop a website-based food ordering system using the Laravel framework to facilitate the ordering process for students, lecturers, and staff, while also assisting canteen owners in efficiently managing orders. The system allows users to select menus, place orders, and complete payments online, significantly reducing the need for in-person queuing. The solution is expected to improve the canteen environment, providing a more organized and comfortable space for the UTY academic community. Functionality testing using Black Box Testing demonstrated that all core features operated as intended without issues. Additionally, usability testing through the System Usability Scale (SUS) yielded an average score of 97.58, categorizing the system in the "Excellent" or Grade A range. This high SUS score reflects strong user satisfaction, indicating that the system is both effective and well-received for enhancing food ordering and management processes on campus.

Keywords: *Ordering System, Online Ordering, Website, Laravel, Canteen.*

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INTRODUCTION

An ideal campus is one that is able to support the various lecture activities of the entire academic community. One important aspect of a good campus is the availability of adequate facilities, including a canteen (Putri Rizqi et al., 2023). The canteen is an area in a building, such as in schools, campuses and offices that serves as a place to enjoy food and drinks or as a place to rest. (Raynaldi & Somya, 2023). The canteen at the University of Technology Yogyakarta (UTY) often faces overcrowding problems, especially during lunch or break times. This leads to long queues and makes it difficult for students, lecturers, and employees to get a seat. This condition also increases the risk of errors in ordering due to the large number of orders that must be handled by the seller in a short time.

Based on previous research conducted by Aldisa (2021), it shows that a website-based food ordering information system provides benefits in the process of ordering food and reserving places quickly, easily and flexibly. (Raynaldi & Somya, 2023) built a website-based e-canteen application that can be used properly, so that it can overcome problems in the campus canteen case study. In addition, according to Sekar Sari et al. (2024) a website-based ordering system can help and facilitate canteen owners in managing food orders better and more organized.

Based on the background and previous articles, to overcome these problems, a system is needed that can speed up the ordering process and reduce queues and errors. One approach that can be taken is the development of a website-based food ordering system that allows students, lecturers, and employees to order food online without having to come directly to the canteen. The system allows users to select a menu, place an order, and complete payment online, thereby reducing queues at the canteen in person. This web-based solution also has the potential to help vendors manage orders more efficiently, as order data is recorded directly in the system and can be accessed in real-time by the canteen, which reduces the risk of order errors and service delays.

The formulation of this research problem is how to design a website-based food ordering system that can facilitate students, lecturers, and employees in placing orders online, and help canteen owners manage orders more efficiently. This system is expected to reduce queues in the canteen and improve order management so that services become more efficient and accurate. Therefore, this research aims to answer questions about ways to create an effective and user-friendly web-based food ordering system.

This research aims to design and develop a website-based food and beverage ordering system using the Laravel framework that allows the entire academic community of Yogyakarta University of Technology to be able to access and place orders online.With this system, it is expected to be able to overcome the problems that have been mentioned, so that it can create a good campus environment and a comfortable resting place for the academic community.

METHOD

This research consists of needs analysis, design, implementation, and testing.

1. Requirements Analysis

The research began by conducting a requirements analysis by conducting observations through interviews with system users, which are students, lecturers, employees, and sellers in the University of Technology Yogyakarta canteen. Requirements analysis is an important step to build and become the foundation for a successful system or software project (Saroja & Haseena, 2023). This analysis produces two outputs, namely functional requirements and non-functional requirements. Functional requirements contain characteristics requested by users, such as special features or certain functions that must be present in the system (Tiun et al., 2020). While non-functional requirements contain minimum requirements or criteria that must be met by the product. (Jarzębowicz & Weichbroth, 2021). The results of this analysis include functional requirements such as

features and non-functional requirements including aspects of performance, ease of use, and security in accessing and using the system.

2. Design planning

This design section aims to develop a comprehensive framework for a web-based food and beverage ordering system at the University of Technology Yogyakarta (UTY) using the Laravel framework. The design process is a crucial stage in system development, where various technical and functional aspects will be designed to meet user needs. In this design, the Unified Modeling Language (UML) method is used which consists of use case diagrams, activity diagrams, sequence diagrams, table relations to interface design. UML is used in this research because it is a standard for describing object-oriented design models (Koç et al., 2021). In addition, UML makes it easy to identify the requirements and scope of systems and applications by presenting them in a visual model. In this context, the food ordering system is expected to provide an efficient solution that enhances user experience and optimizes canteen operations.

2. Implementation

At this stage, a series of steps were taken to realize a web-based food and beverage ordering system at the University of Technology Yogyakarta campus canteen. The implementation process consists of several crucial steps, including setting up the development environment, developing core modules, and merging with existing systems. This implementation uses the Laravel framework to build the website. Laravel is a framework for creating websites based on the PHP programming language that has a variety of modern features that can help develop websites more efficiently (Mahardika, 2023).

3. Testing

In the testing phase, a thorough evaluation of the food and beverage ordering system is conducted to ensure that all functions operate in accordance with expectations and meet user needs. This testing process consists of two main methods, namely Black Box Testing and Usability Testing. Black Box Testing focuses on testing the main features of the system by looking at the output results without paying attention to the details of the code inside (Wicaksono, 2022). Usability Testing is a method used to measure the extent to which the system can run effectively, efficiently and provide satisfaction to users (Wicaksono, 2023). In this study, the System Usability Scale (SUS) measurement instrument was used. SUS is a usability testing instrument consisting of 10 fixed questions as an evaluation tool (Kurniawan et al., 2022). There is a determination of Percentile Rank on the SUS Score using the following conditions: 1) Grade A for scores of 80.3 or higher, 2) Grade B for scores between 74 to less than 80.3, 3) Grade C for scores between 68 to less than 74, 4) Grade D for scores between 51 to less than 68, and 5) Grade F for scores below 51 (Welda et al., 2020).

Table 1 System Usability Scale Question

No	Question	Strongly Disagree				Strongly Agree
		1	2	3	4	5
1	I think that I would like to use this system frequently.					
2	I found the system unnecessarily complex.					
3	I thought the system was easy to use.					
4	I think that I would need the support of a technical person to be able to use this system.					
5	I found the various functions in this system were well integrated.					
6	I thought there was too much inconsistency in this system.					
7	I would imagine that most people would learn to use this system very quickly.					
8	I found the system very cumbersome to use.					
9	I felt very confident using the system.					
10	I needed to learn a lot of things before I could get going with this system.					

FINDING AND DISCUSSION

1. Analysis Requirement

In this analysis stage, it starts with observing the food and beverage ordering process and interviewing the owner of the University of Technology canteen and potential users such as students, lecturers, and employees. The aim was to understand the needs of the users as well as to identify the main features required in this system. From the interviews and observations, it was found that the canteen often faces overcrowding issues, especially during lunchtime. This leads to long queues and difficulties for students, lecturers, and employees in getting a seat. This situation not only reduces user convenience, but also increases the risk of ordering errors due to the large number of orders that the vendor must handle in a short period of time.

From the analysis, it was found that there are several functionality and non-functionality requirements that must be met by the system. Functionality needs include online ordering features, menu management, order confirmation, and notification. Meanwhile, non-functionality needs include aspects of performance, ease of use, and security in accessing and using the system.

2. Design

This design stage aims to create a design that is structured and easy to implement. Here researchers use the Unified Modeling Language (UML) which includes use case design, activity diagram, sequence diagram and user interface design.

a. Use Case Diagram

In Figure 1 below is the use case diagram of the Food and Beverage Ordering System for University Canteens that has been developed. This web-based food ordering system use case diagram illustrates the interaction between three main actors: Buyer, Owner, and Admin. Buyers can login or register, then access various features, such as viewing the main page, selecting a canteen, food category, and available menu. After selecting a menu, the Buyer can place an order, determine the pickup method (pickup or dine-in), and view the order details before finalizing the transaction. Meanwhile, the Canteen Owner and Admin have managerial functions. The Owner can access the dashboard, manage the menu list, and confirm dine-in orders. On the other hand, the admin is responsible for managing user data and food categories, including adding new categories to the system. This diagram details the roles and responsibilities of each actor in the system, ensuring the food ordering process runs effectively according to their respective roles.

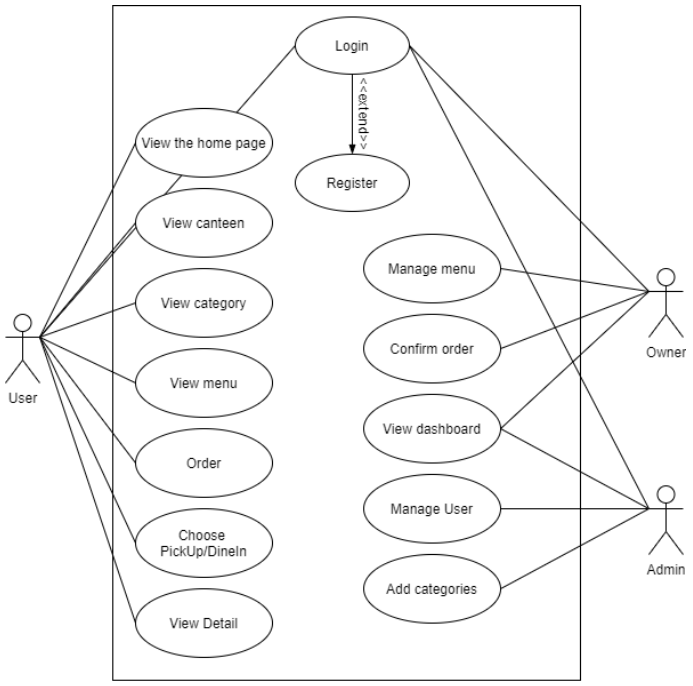

Figure 1 Use Case Diagram

b. Activity Diagram

In Figure 2 below is an activity diagram of the Food and Beverage Ordering System for University Canteens which illustrates the flow of the food ordering process from the perspective of the buyer, system, and seller. The process starts with the buyer opening the website and the system displaying the login

page. If the buyer does not yet have an account, they must register first if they can immediately log in. After login, the system displays the home page, where the buyer can select the canteen and view the available menu. The buyer then orders food, and the system displays the order details. The vendor receives the order and confirms that the order has been completed. Finally, the buyer picks up the order that has been confirmed completed by the seller.

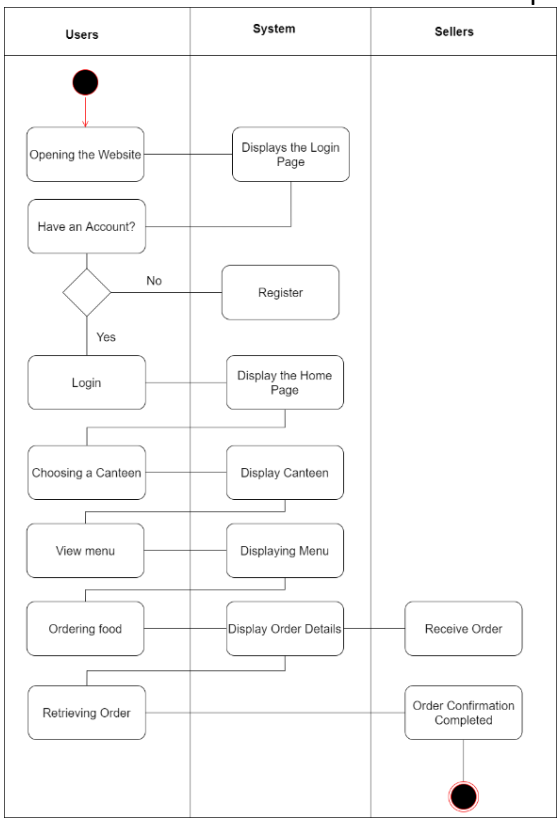

Figure 2 Activity Diagram

c. Sequence Diagram

This sequence diagram illustrates the flow of interaction between the user and the system to order food. The process starts when the user logs in or registers. After successful login, the system displays the home page. From the home page, users can see the available menu. After selecting from the menu, the user places an order. The system then saves the order into the database. Figure 3 below is the sequence diagram created.

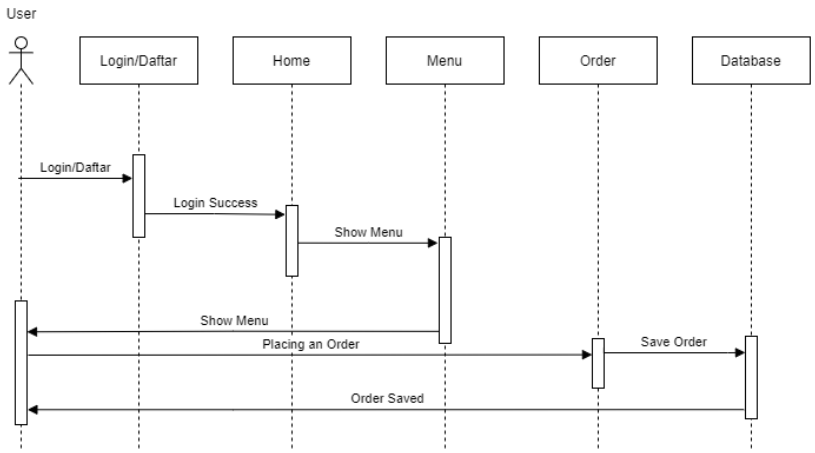

Figure 3 Sequence Diagram

3. Implementation

At this implementation stage, researchers began to realize the website using the Laravel framework. This website has various menu sections including the home page, menu page, dashboard page on the admin side and dashboard page on the seller side.

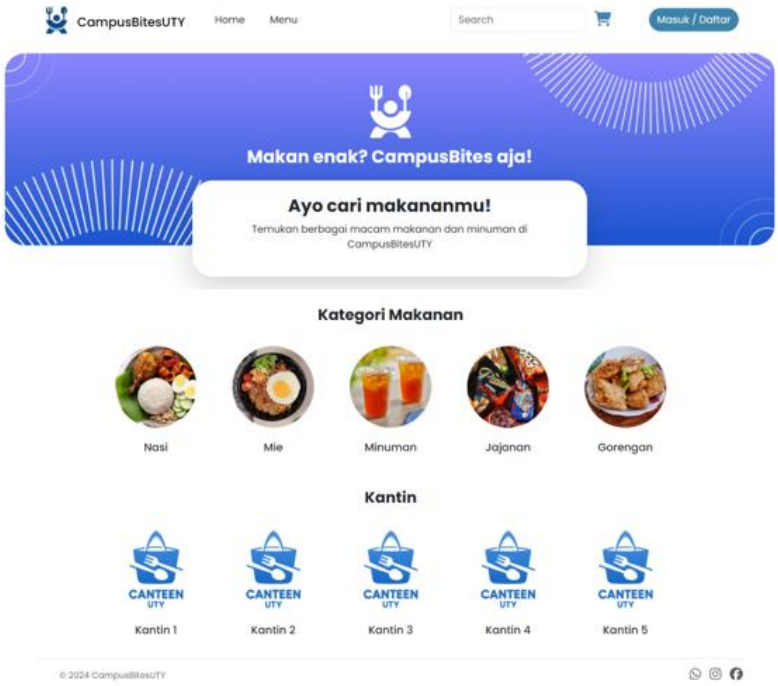

Figure 4 Home Page

The main page was designed with a focus on ease of navigation and a simple yet informative look, so that users can easily find the menu they want and access other key features. The following view provides a visual overview of the elements presented on the main page, such as the menu list, canteen and ordering options.

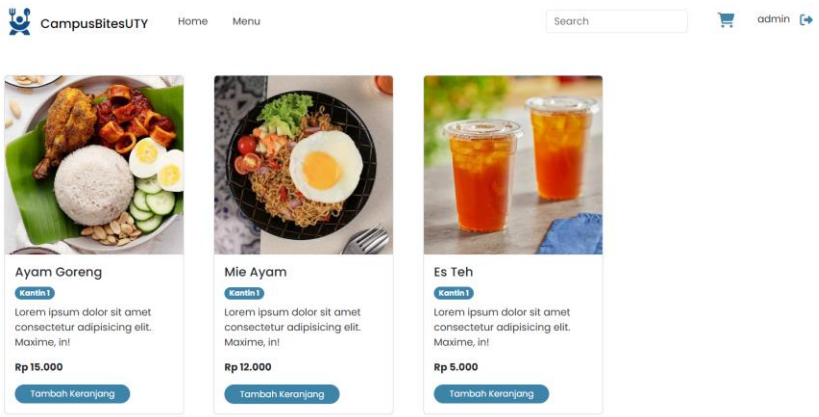

Figure 5 Menu Page

The image is on the menu page. This page displays a list of available food and beverages, complete with descriptions, prices, and images for each item. This menu page is designed so that users can easily browse the various food options, search for the desired item, and add it to the order cart. On the menu page there is a menu category feature on this web-based food ordering system designed to make it easier for users to explore the various food and beverage categories available, such as rice, noodles, drinks, and snacks. With an organized and clear display, users can quickly select the desired category and view the relevant items in it.

There is also a canteen page in the web-based food ordering system. This page provides detailed information about the canteen in question, including a brief description of the types of food offered, the atmosphere of the canteen, and the hours of operation. In addition, this page also displays a list of menus available at the canteen, complete with prices and food photos, as shown in the following figure.

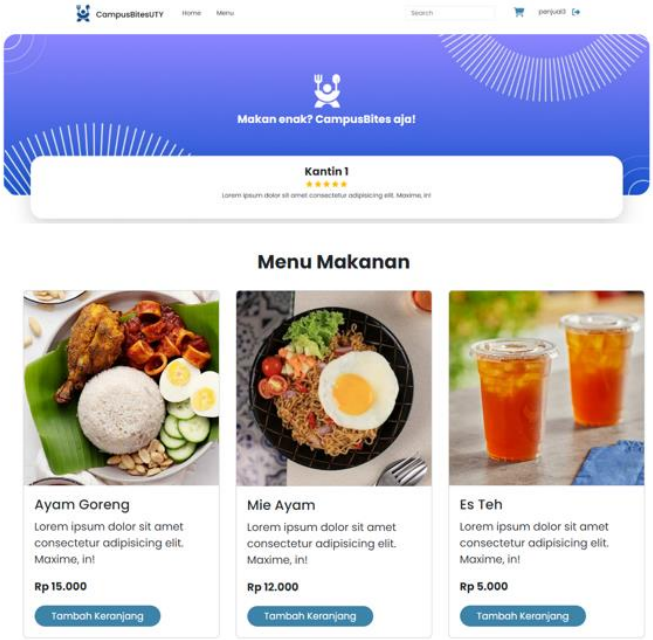

Figure 6 Canteen Page

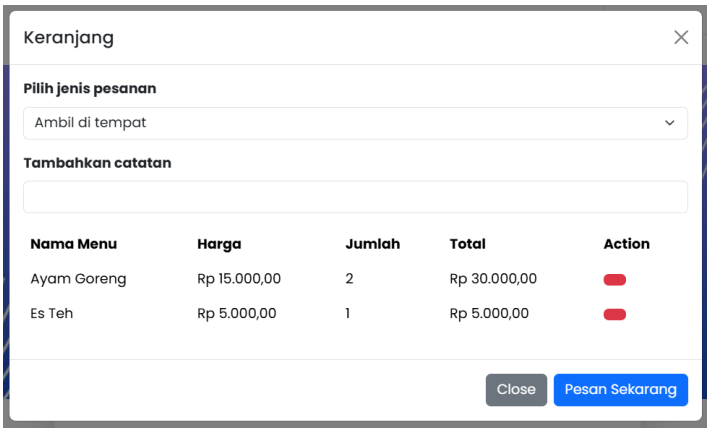

Figure 7 Cart Page

Figure 7 above is a view of the order cart with details of the order type (such as "Pick up on the spot"), a notes field for additional instructions, and a list of selected menus. Each item on the list shows the menu name, unit price, quantity ordered, total per item, as well as the option to delete items if any need to be corrected. Once the user is satisfied with the cart contents, they can click the "Order Now" button to proceed to the next stage.

Once the checkout is confirmed, the view changes to the "Order Details" page which shows complete information about the order that was just created as shown in Figure 8 below. This page displays the unique order number, buyer's name, and a list of the menu items ordered complete with price per item, quantity, and subtotal.

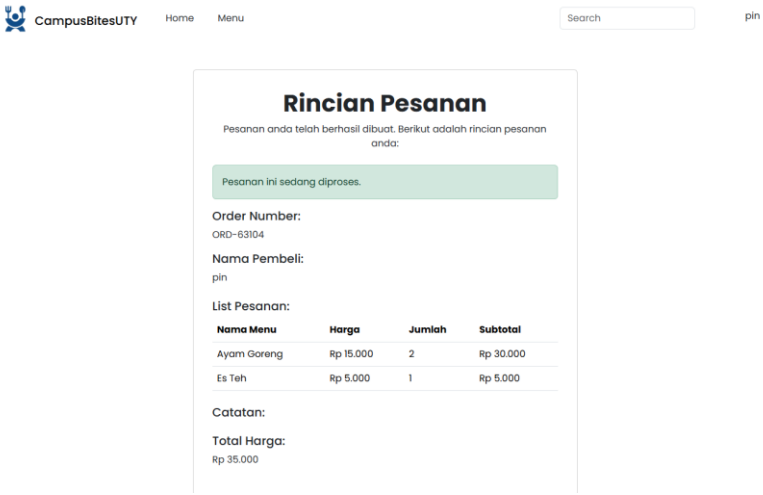

Figure 8 Order Details

The admin dashboard page in this web-based food ordering system is designed specifically for the admin. It aims to give the admin full access to manage users and food categories. In this dashboard, the admin can add, update, or delete user accounts, as well as manage available menu categories. The following image is a view of the admin dashboard page.

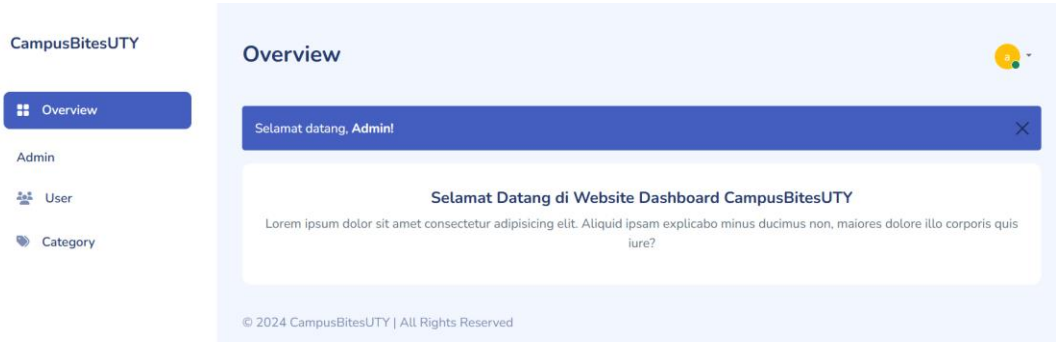

Figure 9 Admin Dashboard

The seller dashboard page in the web-based food ordering system is designed to give sellers easy access to manage their menu and incoming orders. In this dashboard, sellers can add, edit, or delete menu items as well as monitor the status of orders from users, as shown in Figure 17 below.

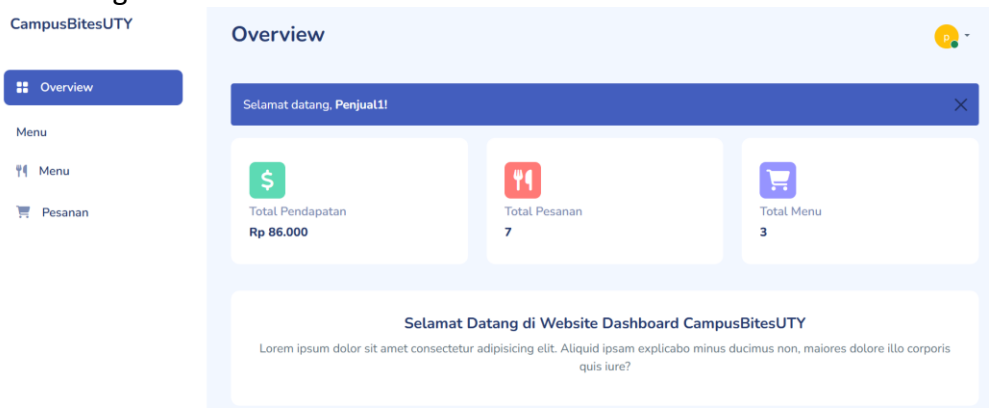

Figure 10 Canteen Owner Page

4. Testing

System testing is carried out to ensure that the functionality and quality are in accordance with the needs and expectations of users. Testing is carried out using two methods, namely Black Box Testing and Usability Testing. Black Box testing includes 17 important scenarios such as user registration and login, menu selection, ordering, and payment completion. The results obtained from testing each scenario show complete success without any errors, so it can be stated that the system has passed the Black Box test.

Table 2 Blackbox Testing

No	Model	Test Case	Expected Result	Status
1	User Login	Email admin filled in “admin@gmail.com, password filled in ‘12345678’ then press the ‘Login’ button	The system accepts, then redirects to the admin dashboard page	Valid
2	Menu Page	Buyer places an order by	The system accepts	Valid

		pressing the “add cart” button	and the cart page displays the purchased menu.	
3	Add Cart Feature	Buyer places an order by pressing the “add cart” button.	The system accepts and on my cart page displays the purchased menu.	Valid
4	Checkout Feature	Buyers checkout the cart by pressing the button “Order” button	The system accepts and displays the order details	Valid
5	Seller Confirms The Order	Seller confirms the order taken by pressing the finish button on the order menu.	The system accepts, then displays the time the order has been taken	Valid

Usability Testing involves students, lecturers, employees and canteen owners. Users are asked to perform various tasks such as placing an order to complete the order. After testing is done, users are asked to provide feedback through a form regarding the ease and satisfaction of using the system. Based on the results of the assessment of the system that has been developed by 30 respondents, the results can be seen in table 2 below.

Table 3 System Usability Scale

Resp	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	Total	SUS Score
1	4	5	3	5	4	5	4	3	3	3	9	22,5
2	3	5	4	5	4	3	4	5	4	5	42	105
3	5	3	3	4	3	3	3	4	5	3	36	90
4	4	4	5	3	4	3	4	3	3	4	37	92,5
5	5	4	4	3	3	5	3	3	5	4	39	97,5
6	5	4	5	4	5	4	5	3	5	3	43	107,5
7	4	4	3	5	4	3	5	4	4	3	39	97,5
8	3	3	5	4	5	5	4	5	3	5	42	105
9	5	4	4	5	5	3	3	5	3	4	41	102,5
10	3	4	5	5	3	4	4	5	3	4	40	100
11	3	4	3	3	3	4	4	4	3	4	35	87,5
12	5	3	5	5	4	5	3	5	5	3	43	107,5
13	4	3	4	5	5	5	4	4	3	4	41	102,5
14	4	3	5	5	5	3	4	4	4	4	41	102,5
15	4	4	5	4	5	5	3	3	4	3	40	100
16	5	3	5	3	4	4	5	4	3	3	39	97,5
17	4	3	3	3	4	5	4	3	5	4	38	95
18	3	5	4	3	5	4	4	4	4	4	40	100
19	3	3	3	3	3	5	4	3	5	5	37	92,5

20	5	3	5	3	3	4	4	5	4	5	41	102,5
21	3	4	4	4	5	3	4	5	5	5	42	105
22	4	5	4	4	3	5	3	4	3	4	39	97,5
23	5	5	3	5	5	5	5	4	4	4	45	112,5
24	3	5	5	4	3	5	4	3	5	4	41	102,5
25	4	3	5	3	4	4	4	4	5	4	40	100
26	5	4	5	3	5	3	3	5	5	4	42	105
27	3	4	5	3	4	3	4	5	3	4	38	95
28	4	5	4	4	3	4	4	3	5	5	41	102,5
29	3	3	5	3	4	4	5	5	5	3	40	100
30	3	5	3	3	3	5	5	5	3	5	40	100
Average												**97,58**

Based on this table, the total SUS score is 2927.5 with a resulting average value of 97.58. Based on this average value, it is included in the *Excellent* or *Grade A* category, which indicates a very high level of user acceptance and satisfaction with this system.

CONCLUSION

The conclusion of this research shows that the web-based food ordering system designed for the Yogyakarta University of Technology canteen using the Laravel framework, successfully provides convenience for students, lecturers, and employees in ordering food online. With this system, users no longer need to queue directly, which has an impact on reducing congestion and speeding up service in the canteen, especially during peak hours. For canteen owners, this system makes it easier to manage orders more efficiently, so that the risk of errors and delays in ordering can be reduced. The results of functionality testing using Black Box Testing show that all the main features of the system function as expected without any problems. In addition, the average System Usability Scale (SUS) value of 97.58 indicates a very high level of user satisfaction, with the category “Excellent” or Grade A, which indicates that this system is well received and very helpful in meeting the needs of ordering food in the campus environment.

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