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Food Ordering System in the School Canteen for Teachers

Dina Safiah Abdul Rahman[1], Muhaini Othman[1]*

[1] *Faculty of Computer Science and Information Technology,*
University Tun Hussein Onn Malaysia, Parit Raja, Batu Pahat, 86400, MALAYSIA

*Corresponding Author: muhaini@uthm.edu.my
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Food Ordering System, School Canteen, Software Prototyping Model, Web-Based System

Abstract

The Food Ordering System in the School Canteen for Teachers is a web-based digital platform designed to streamline food ordering, addressing the inefficiencies of manual processes and limited menu options, and enhancing teacher satisfaction and productivity. Through a user-friendly online platform, it offers easy access to menus, streamlined orders, and flexible payment options, aiming to revolutionize the manual and walk-in food ordering process within canteen operations at Sekolah Menengah Kebangsaan Tengku Ampuan Jemaah. Developed using the Software Prototyping Model, this system was developed using Visual Studio Code and a database managed by Laragon. It promises to modernize the ordering experience, offering a more efficient and satisfying ordering experience, ultimately benefiting both teachers and canteen management.

1. Introduction

The efficiency of daily operations is essential in the ever-changing environment of educational institutions for the overall satisfaction and productivity of their customers [1]. Recognizing the difficulties teachers face in the manual and walk-in food ordering processes, a revolutionary initiative is currently being implemented at 'Sekolah Menengah Kebangsaan Tengku Ampuan Jemaah.' The "Food Ordering System in the School Canteen for Teachers" is a lifesaving digital platform designed to transform the teacher's traditional food ordering experience. This innovative system addresses the current inefficiencies and limitations of manual ordering by introducing a user-friendly system. Teachers will now have the convenience of accessing an up-to-date menu, placing orders, and making payments through various methods, all to streamline the ordering process and enhance their overall experience.

The existing food ordering process, characterized by manual orders and walk-ins, poses challenges such as inefficiency if the food is not available or runs out, long waiting times, and limited food options for teachers. These challenges can impede the productivity and satisfaction of teachers, creating a need for a comprehensive solution. Therefore, to address the challenges, the development of a school canteen food ordering system for teachers is set to improve the way teachers order food during their busy schedule. It aims to simplify the ordering process with the features available in the system to order food instead of the current method, which is manual ordering.

This project's significance extends beyond the immediate benefits to teachers, impacting the canteen management as well. By incorporating web-based technology, the system aims to simplify the ordering process, offer a varied, availability updated and detailed menu, and provide easy and secure payment options to ensure its effectiveness. To sum up, this system encompasses both teachers and canteen management, ensuring secure registration and login processes, menu management, order placement, product management, and payment processing. The system's expected results include a streamlined food ordering experience, reduced waiting times, improved canteen management, and enhanced overall satisfaction for teachers.

The following section discusses the related studies, which compare the three systems related to the developed system. Section Three discusses the methodology used in this study, and Section Four focuses on developing the Food Ordering System in the School Canteen for Teachers. The results of the system development were discussed in Section Five, followed by the conclusion in the last section.

2. Literature Review

The food ordering system is the process of ordering food from a website [2]. In the context of this project, a comprehensive related of the food ordering process has been conducted which targets teachers who want to order their food lunch. Three existing web-based systems have been examined to gather and collect more useful information for the proposed system development. The systems studied were FoodPanda online ordering system, EZ lunch school system and SchoolCafe' system.

2.1 FoodPanda Online Ordering System

FoodPanda is a popular food delivery service in Malaysia for ordering food and groceries [3]. It is developed as a web-based system and mobile application. Therefore, the customer can download the application of Foodpanda to make the order. Foodpanda offers cuisines from not less than 115,100 restaurants and premises consisting of various types of cultural food such as halal-certified food to attract [4]. Users can browse various menus and place orders to deliver the best price using simple platforms. With a few clicks on their smart devices, food lovers can order a wide variety of mouth-watering and delicious food online.

2.2 EZ Lunch School System

In the lunch process ordering of EZ Lunch School System, canteen staff will update the menu, employees and parents can place orders and pay online, and will get reports of the orders. Parents and employees also can easily preorder lunch online using the calendar-based system, complete a payment, and review their transaction history. Admins can set up automatic email alerts and forget about chasing after negative balances. This system allows the choice of specific dates employees and parents can preorder meals to avoid last-minute orders by setting a preorder cut-off time. Reliable and secure food management and ordering solution for the school ordering process offers user-friendly and handle updating menu, school calendar, homeroom management, and sales reporting.

2.3 SchoolCafe' System

SchoolCafé gives students and parents a quick and easy way to stay on top of their nutrition. Macros, ingredients, and allergies are displayed for meals. It is developed as a web-based system and mobile application that offers various functions related to school food service management. Therefore, the users can download the application of SchoolCafé to make the order. SchoolCafe' is a real-world school nutrition management and payment system developed by Heartland Payment Systems, which is now a part of the Global Payments Inc. family [5]. It offers a range of functions and features related to managing school meal programs and payments. SchoolCafe' primarily focuses on managing school meal programs and ordering systems with payments while a food ordering system. Parents can manage their child's cafeteria account. Apply for free or reduced meals. Make payments, view purchase history, receive low balance alerts, and view school menus containing nutritional and allergen information for items. For convenience, set automatic payments to replenish your child's cafeteria.

2.4 Food Ordering System in the School Canteen for Teachers

The proposed school canteen food ordering system for teachers aims to streamline the process through a user-friendly digital platform. Leveraging modern technologies, it enables teachers to browse menus, place orders, and make secure payments, reducing waiting times and enhancing efficiency. The system addresses challenges of manual ordering, aligns with digital trends, and is facilitated by internet connectivity. Factors such as easy reorder options, queue elimination, and improved order accuracy contribute to its significance. Key roles include administrators managing menus and sales reporting, while teachers can access the system, place orders, and make payments using personal credentials. This digital solution offers a more efficient and pleasant food ordering experience for teachers [6].

2.5 Comparison with the Existing Systems

Table 1 summarises the comparison of 3 existing systems with the proposed system. Three existing web-based systems have been examined to gather and collect more useful information for the proposed system development. The systems studied were the FoodPanda online ordering system, the Ez lunch school system, and SchoolCafe' system.

Table 1 *Comparison with the Existing Systems*

Features/System	Foodpanda Online Food Ordering System	EZ School Lunch System	SchoolCafe' System	Food Ordering System in the School Canteen for Teachers
Login	√	√	√	√
Food Ordering	√	√	√	√
Menu Management	√	√	√	√
Order Status	√	X	X	√
Report Sales	X	√	√	√
Logout	√	√	√	√

3. Methodology/Framework

The methodology used to build this project is Prototype Model. The prototype model is a working model of the software product that can be used to gather feedback, identify issues, and refine the design and functionality of a product before the final product is developed. It allows to visualize and interact with the product in a tangible way. The prototyping model is a technique for quickly gathering information about the user's information needs that focuses on aspects of the software that will be visible to the customer or user. [7]. Table 2 shows the prototyping model phases.

Table 2 *Prototyping Model Phases*

Phase	Task	Output
Requirements Gathering and Analysis	• Proposed the project. • Identify the objectives to be developed • Identify the problems faced by users • Identify the scope and modules involved	• Project proposal. • Develop a Gantt chart. • System requirements findings • Analysis of user needs • Flowcharts, dataflow diagrams and entity diagrams
Quick Design	• Design Database • Design system module and functions • Design Interface	• Interface of the system based on the gathered requirements is created (Wireframe) • Database framework is created • System Architecture • Relational Schema and Data Dictionary
Prototype Development	• Identify and choose the appropriate use of programming language • Identify each function in the system • Develop the system	• Project developed
Initial User Evaluation	• Test Final Product • Collecting evaluation from users	• Receive feedback from users • Prototype improvement
Refining Prototype	• Refine the prototype • Identify error and bug	• Big issues and errors solved
Phase	Task	Output

Implement Product and Maintain	• Test final product • Ensure system configuration	• User evaluation • Final implement and maintain

4. Analysis and Design

System analysis and design (SAD) is a systematic process that consists of several stages, such as planning, analyzing requirements, development, design, and testing. [8] The goal of system analysis is to gain an understanding of the needs of users and the system in use, while the goal of system design is to create a design that meets these needs. During this phase, the complex activity of system development is divided into several smaller sub-activities that work together to achieve the overall goal of system development [9]. System analysis describes the overall structure and flow of the system, including all of its functions. It also makes it easier to convert the functionality of the proposed system into a graphical representation that is aligned with specific requirements. The system design will be explained using the application module system, which will generate Context Diagram, Data Flow Diagrams (DFD), Entity Relationship Diagrams (ERD), and User Interface Designs using a structured-oriented approach.

4.1 Context Diagram

Context diagrams present an overview of the interaction between the system and its users which are teachers and administrators. Context diagrams also show the input and output from its user and system. Figure 1 shows the context diagram of the developed system.

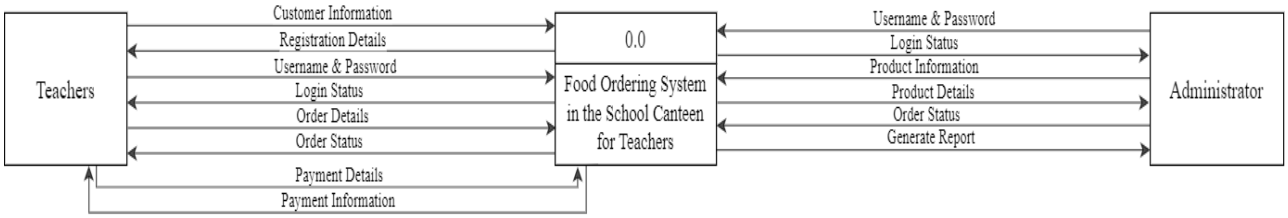


Figure 1 *Context Diagram Food Ordering System in the School Canteen for Teachers*

4.2 Data Flow Diagram Level 0 (DFD)

The Level 0 Data Flow Diagram (DFD 0) illustrates a streamlined flow of data and interactions of each input from an entity through a process, which then generates output either to another entity or stored in data storage. DFD highlights efficient functionality of the flow of data or input from an entity and process. Yourdon introduces Data Flow Diagrams as a tool for structured design that is presented as a way to visualize the flow of data within a system, highlighting the processes, data stores, and data flows [10]. Figure 2 shows the developed system's Data Flow Diagram.

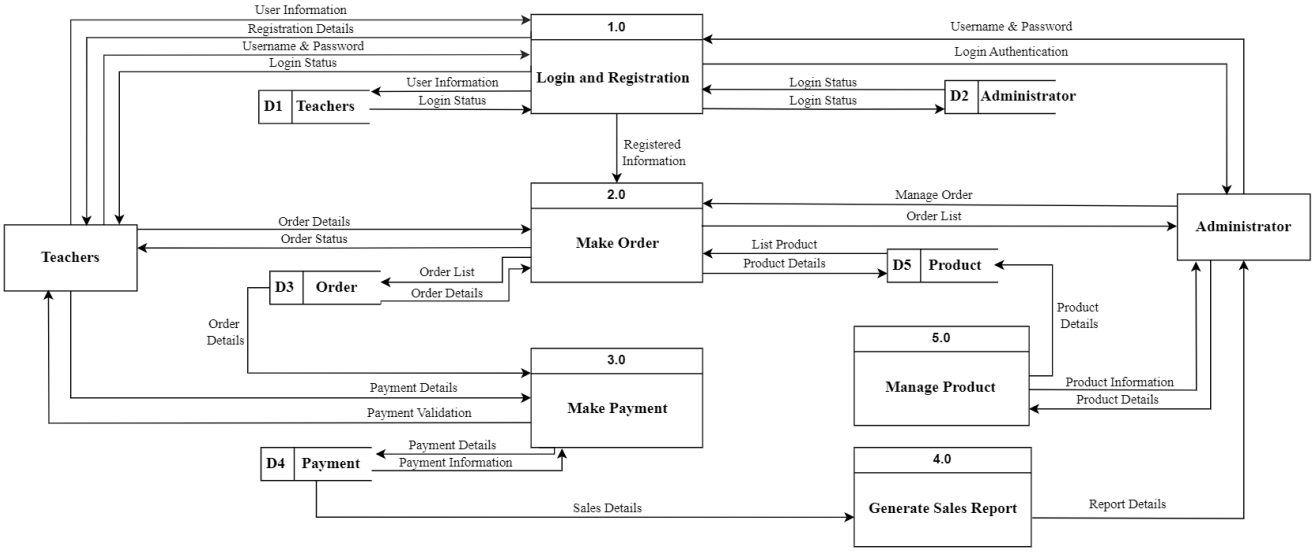


Figure 2 *DFD for Food Ordering System in the School Canteen for Teachers*

4.3 Entity Relationship Diagram (ERD)

Figure 3 shows The Entity-Relationship Diagram (ERD) for the food ordering system of the relationships between key entities. The ERD diagram outlines the structure of the database, including the entities and their attributes. It provides a visual representation of how the different components of the database are connected and interact with each other to manage food ordering system setting.

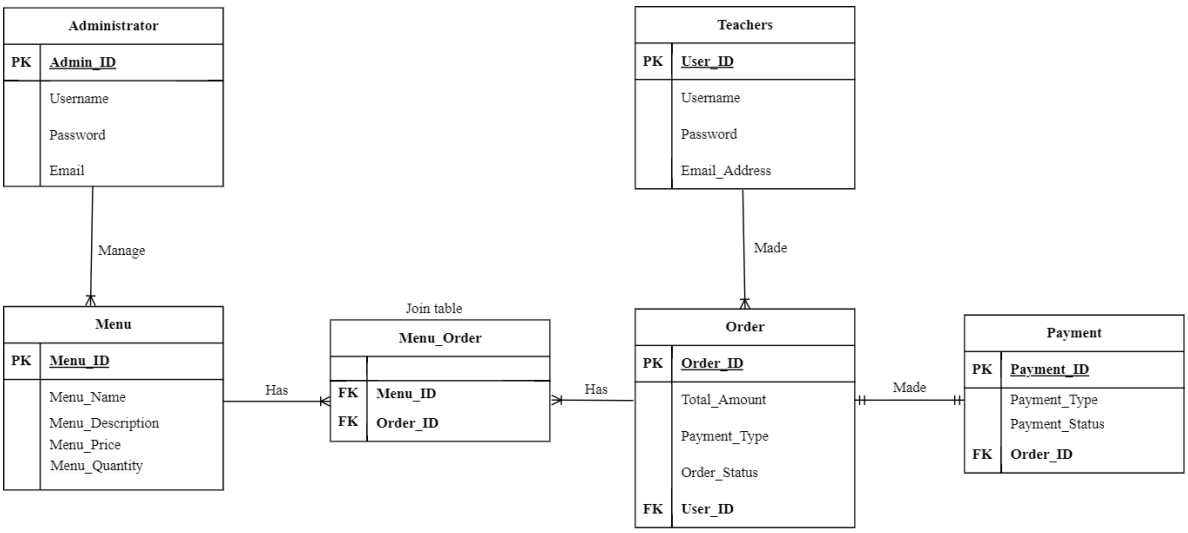
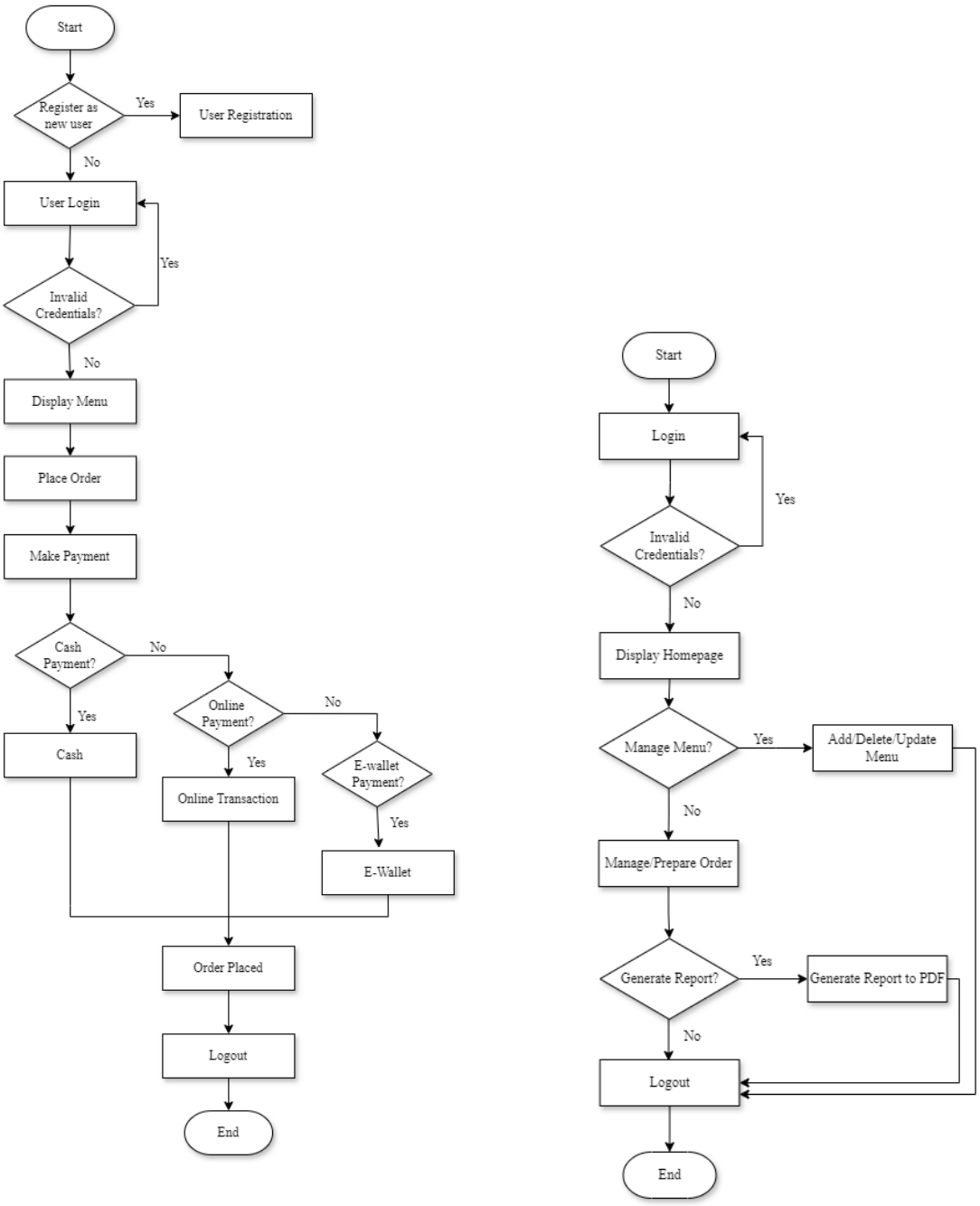


Figure 3 *ERD for Food Ordering System in the School Canteen for Teachers*

4.4 Flowchart

A flowchart diagram is a visual representation of a process or algorithm to illustrate the steps or actions involved. In this project, flowcharts are used to explain the system design and provide a clear and structured way to depict the flow of information or activities within a system. Figure 4 shows the flowchart diagram of the developed new system. Figure 4 (a) shows a flowchart diagram for the school canteen food ordering system for teachers which is the users, the process begins with the teacher make registration then logging into the system and selecting desired items from the display menu and proceed to make payment with the payment method selection to place order. Figure 4 (b) shows the flowchart diagram progresses for administrator.

Applied Information Technology and Computer Science Vol. 5 No. 2 (2024) p. 1430-1443



(a) **(b)**

Figure 4*(a) Flowchart Diagram for Teachers (b) Flowchart Diagram for Administrator*

4.5 System Architecture

Figure 5 shows the system architecture of the Food Ordering System in the School Canteen for Teachers. This graphical representation provides an overview of the software, hardware, and networks plan supporting current and future business activities. The system supports two user roles: administrators and teachers. Teachers can log in, register if needed, select food from the menu, add items to their cart, and complete orders with payment. Administrators, who are pre-registered, manage menus, process orders, and generate sales reports. Both roles interact with a user-friendly interface with dedicated pages for each function. The system integrates with a database page for seamless data transmission and retrieval, ensuring efficient information storage and updates.

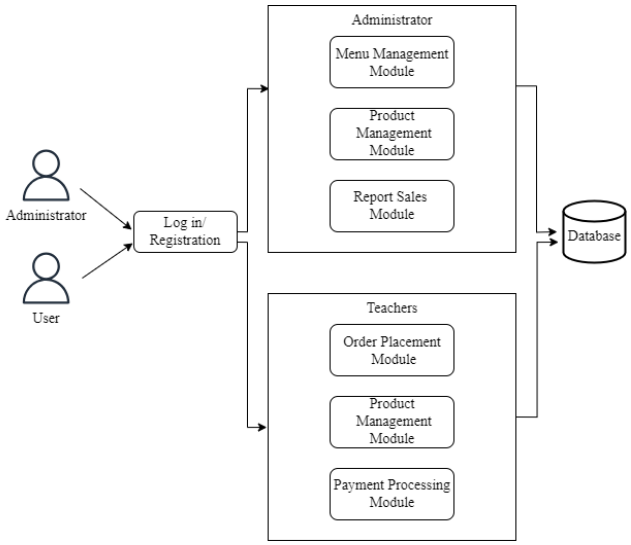


Figure 5 *System Architecture*

4.6 User Interface Design

The user interface design involves illustrating the outline of the modules for the food ordering system in the school canteen for teachers, focusing on the creation of a user-friendly interface. Moreover, using wireframes is a practical approach to establish the application's initial design before progressing to the actual interface design [11]. For example, Figures 6 to 8 illustrate the outline user interface design using wireframes.

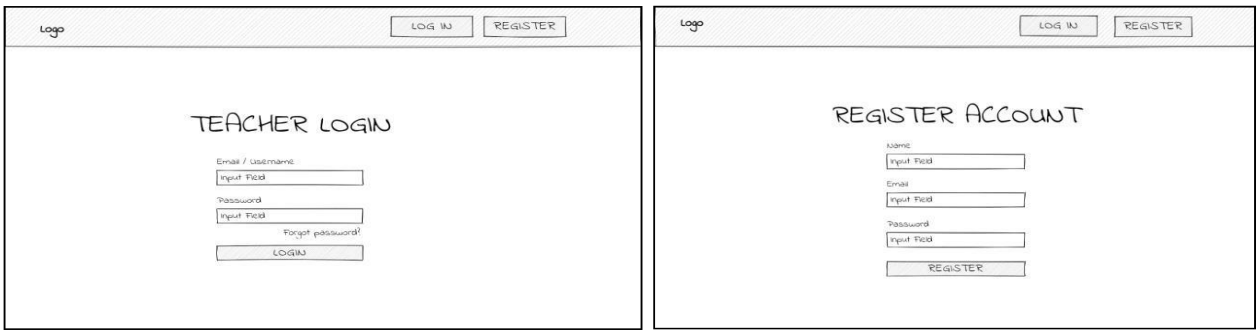


Figure 6 *User Interface Design for Login and Registration*

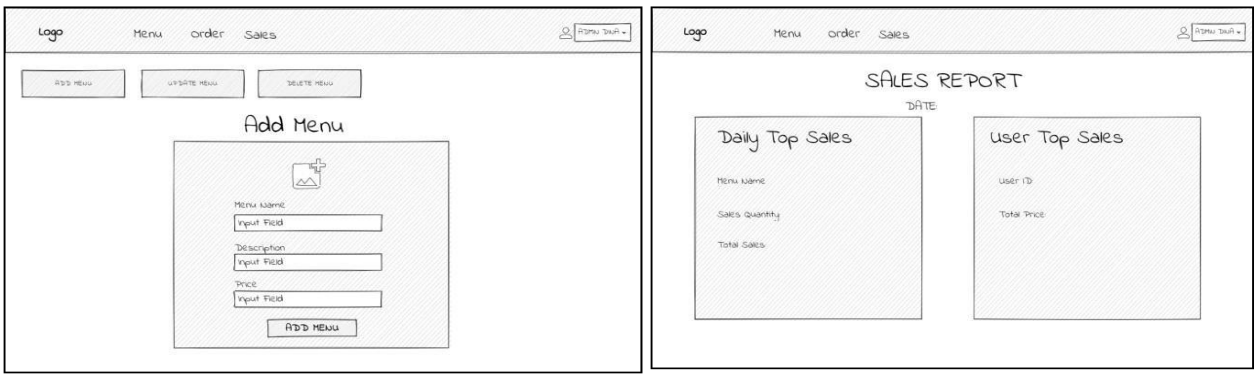


Figure 7 *User Interface Design for Administrator*

Applied Information Technology and Computer Science Vol. 5 No. 2 (2024) p. 1430-1443

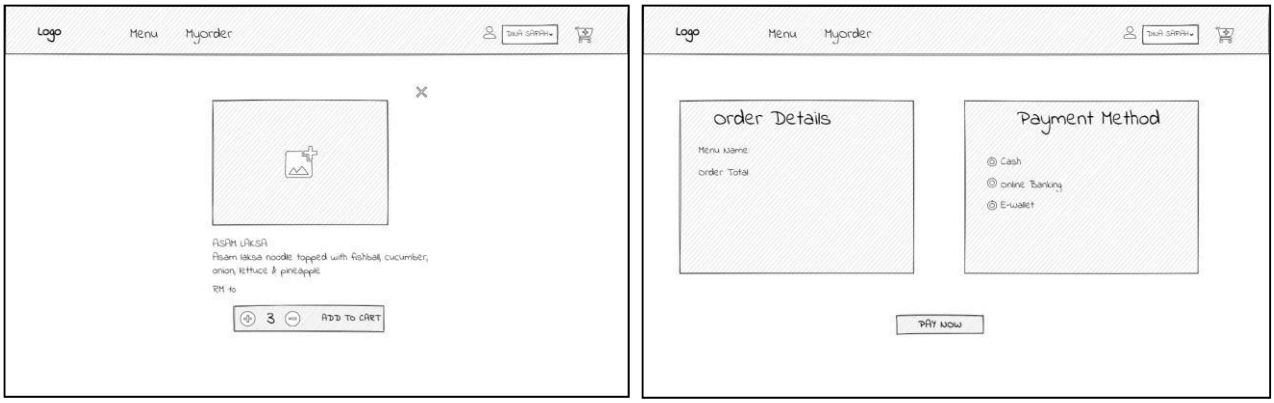


Figure 8 *User Interface Design for Administrator*

5. Result and Discussion

The result and discussion section describes the implementation phase follows the specifications and designs from the analysis and design stages. It aims to identify each function and system specification. Testing is the process of reviewing the system that has been implemented. In this phase, there are 2 types of testing that need to be carried out, namely outcomes of system testing and user acceptance testing which receive the feedback from the users. The goal is to test the functionality of the system and ensure that the system operates correctly within the defined scope.

5.1 System Implementation

The food ordering system in the school canteen for teachers designed for administrators and teachers, ensures efficient and reliable service through dynamic content handling, secure transactions, and seamless operation. With comprehensive testing covering all key modules, the system effectively meets user needs, streamlining the ordering process and enhancing the canteen experience. User interface design involves illustrating the outline of the modules system, focusing on the creation of a user-friendly interface. Based on the study, a detailed set of recommendations that address various aspects of UI design, such as color, navigation, input control, and information components. These recommendations aim to ensure that digital solutions which the system are accessible and user-friendly for diverse user groups and contexts [12]. Figures 9 to 12 show the outline user interface design based on the module from the proposed system for teachers (user) while figures 13 to 15 show the user interface design for administrator.

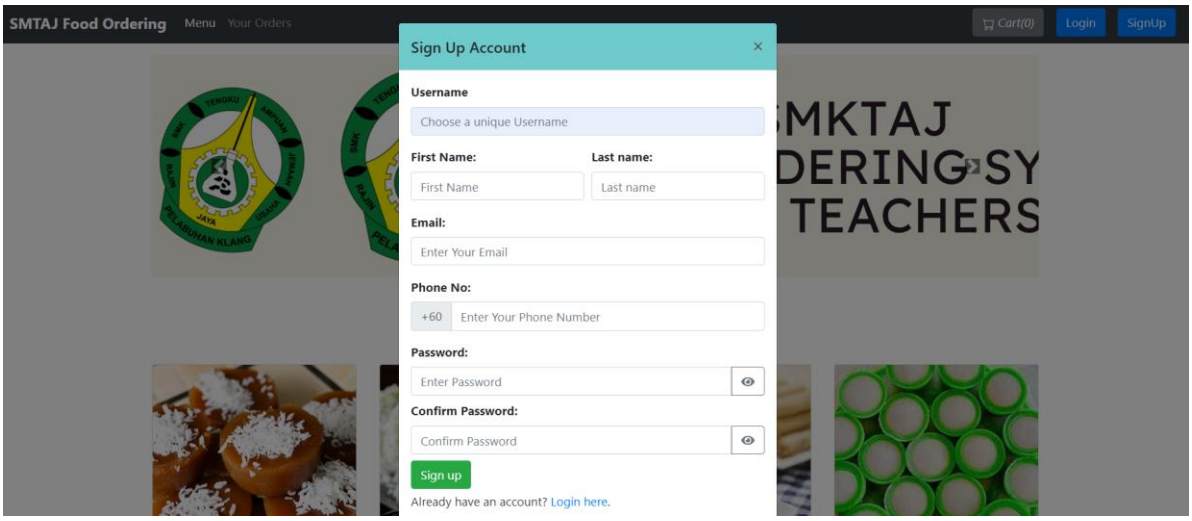


Figure 9 *User Interface Design for Teachers Registration*

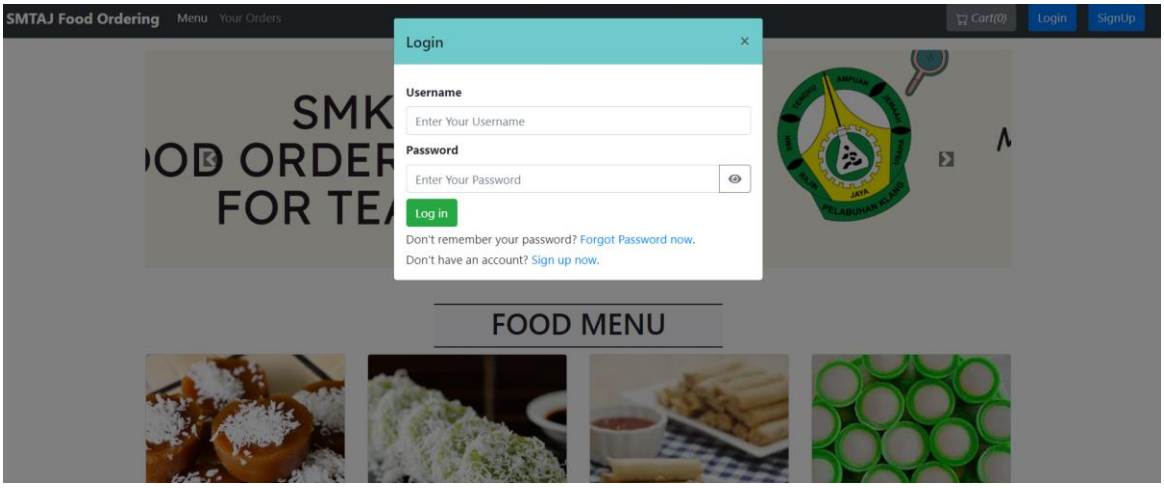


Figure 10 *User Interface Design for Login*

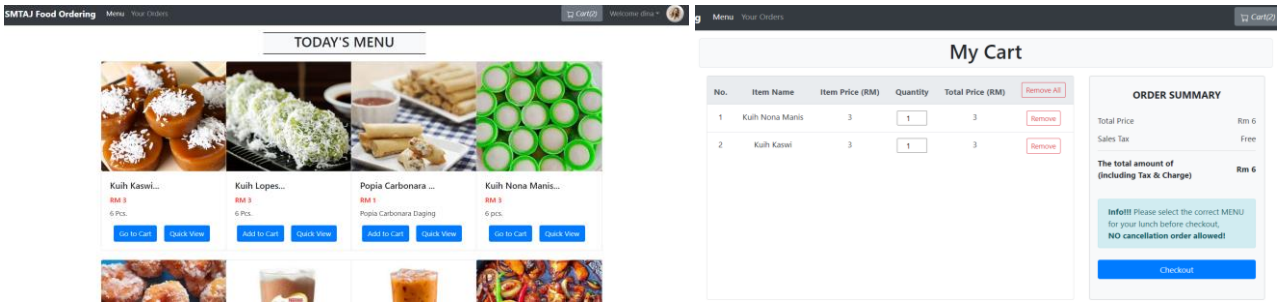


Figure 11 *User Interface Design for Order Placement*

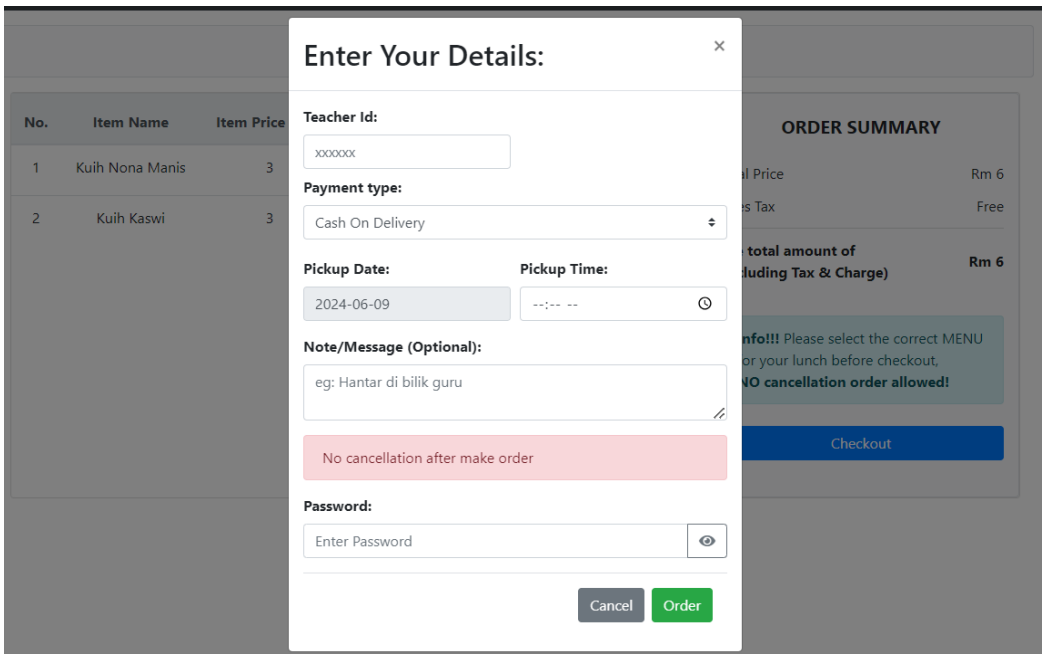


Figure 12 *User Interface Design for Payment Processing*

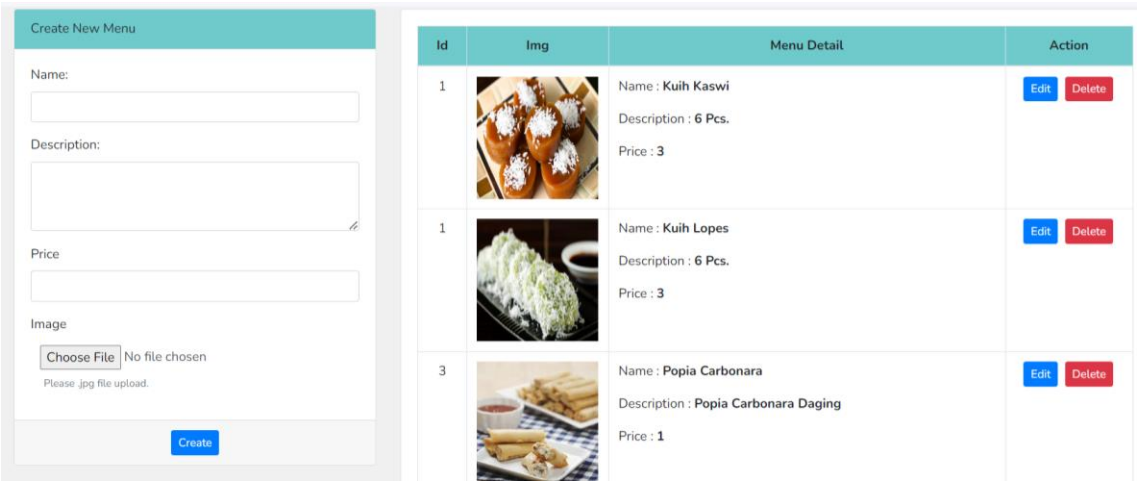


Figure 13 *User Interface Design for Menu Management (Administrator)*

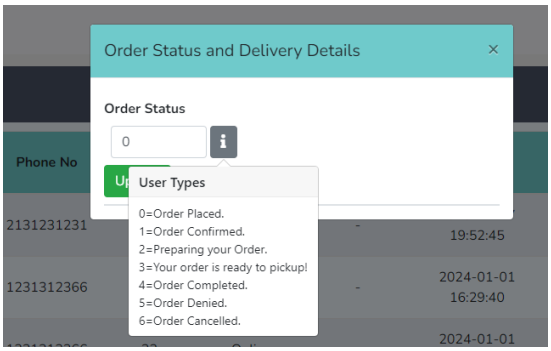


Figure 14 *User Interface Design for Product Management*

Figure 15 *User Interface Design for Reporting Sales*

5.2 Functional Testing System

System testing is crucial in development, identifying errors and weaknesses early so that it can be fixed at an early stage to avoid errors when using this system. This process ensures that all the problems are addressed promptly, guaranteeing the system meets users' needs effectively. Evaluation and testing are essential to confirm the system's reliability and functionality [13]. Functional testing is an effective way to ensure that the developed system meets all modules and user requirements, identifying and addressing errors early. This testing is being tested in six primary modules: login and registration, menu management, order placement, payment processing, product management, and sales reporting module. The functionality testing of every system module is displayed in Table 3 through 8.

Table 3 *Functional Testing System for Login and Registration Module*

Bil	Module	Functional Testing Details	Expected Result	Result
i.	Login and Registration	System displays login form	User can see the login form	PASS
		User can enter a valid username and password	User can log into the system	PASS
		System displays an error message if username and wrong password entered.	User can see an error message if the wrong username and password are entered.	PASS
		System displays the registration form	User can see the registration form	PASS
		User can enter a valid information for register	User can register an accounts into the system.	PASS
		Users can click the Sign In button	User can register an account into the system.	PASS
		User can click the Log In button	User can log into the system.	PASS

Table 4 *Functional Testing System for Menu Management Module*

Bil	Module	Functional Testing Details	Expected Result	Result
ii.	Menu Management	System displays create new menu form	Admin can fill the form for create new menu	PASS
		Admin can click the Create button	New menu will appear	PASS
		Admin can click the Edit button for change menu name, description, price or image	New menu will be edited	PASS
		Admin can click the Delete button for delete the menu	The existing menu will be deleted	PASS

Table 5 *Functional Testing System for Ordering Placement Module*

Bil	Module	Functional Testing Details	Expected Result	Result
iii.	Order Placement	System displays the food menu	Users allow to view menu	PASS
		User allow to order food	User can order the food they want	PASS
		User can click Quick View button for view the menu in more details	User can continue to make order or choose another menu	PASS

Table 6 *Functional Testing System for Payment Processing Module*

Bil	Module	Functional Testing Details	Expected Result	Result
iv.	Payment Processing	System displays order summary (total price)	User can view the total amount for their food	PASS
		User can click Checkout Button to proceed order	User can view the checkout form	PASS
		System displays checkout form	User can fill the form to make order	PASS
		System displays an error message if any details wrong entered	User can see an error message if the wrong details are entered.	PASS
		Users can click the Order button	User can receive the order Id	PASS
		User can click the Cancel button	User can view the order summary to update their cart	PASS

Table 7 *Functional Testing System for Product Management Module*

Bil	Module	Functional Testing Details	Expected Result	Result
v.	Product Management	User view of available product (menu)	User can see the menu available at canteen	PASS
		User can add to cart the available product only	User can see the cart will updated	PASS
		Allow admin receive orders from customer	Admin can receive orders details from users	PASS
		Admin can update the order status	Admin can update the order types (prepare, complete or cancel)	PASS
		Admin can click Update button	User can view their order status	PASS

Table 8 *Functional Testing System for Reporting Sales Module*

Bil	Module	Functional Testing Details	Expected Result	Result
vi.	Reporting Sales Module	System displays sales dashboard	Admin can view the sales dashboard	PASS
		System display all the order details from customer	Admin can print the order details to PDF	PASS

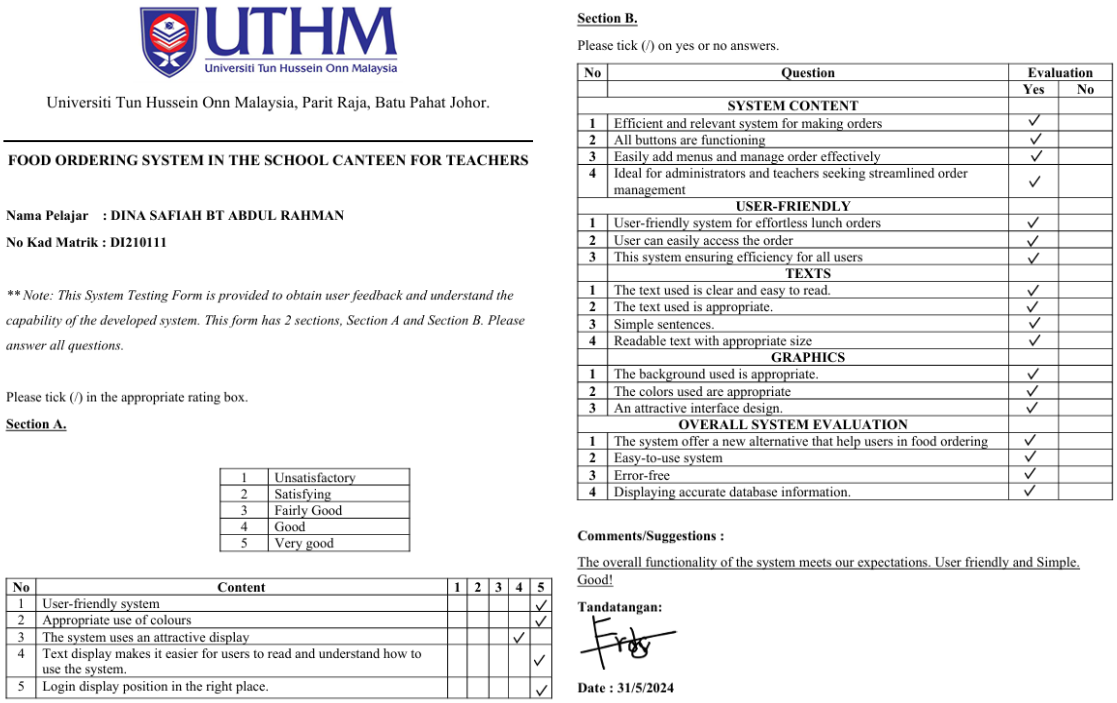
Applied Information Technology and Computer Science Vol. 5 No. 2 (2024) p. 1430-1443

5.3 User Acceptance Testing

Testing the system with actual users is a way to gauge how effective the system has been designed. The purpose of user acceptance testing was to find out how satisfied users would be with the system. Administrators Mr Firdaus, the canteen's owner, and other tester evaluated the system during testing. Table 9 displays the comments from the system testing form regarding the user testing outcomes. Ten users were found to be satisfied with the system's functioning and content during the testing phase. The owner's UAT form, which is displayed in Figure 16 was utilised during in-person interactions to collect and evaluate instructor input on the creation of the food ordering system in the school canteen for teachers.

Table 9 *User Acceptance Testing Result*

No	Content	Scale					Total Result
		1	2	3	4	5	
1	User-friendly system					10	10
2	Appropriate use of colours					10	10
3	The system uses an attractive display				1	9	10
4	Text display makes it easier for users to read and understand how to use the system					10	10
5	Login display position in the right place					10	10



Universiti Tun Hussein Onn Malaysia, Parit Raja, Batu Pahat Johor.

FOOD ORDERING SYSTEM IN THE SCHOOL CANTEEN FOR TEACHERS

Nama Pelajar : DINA SAFIAH BT ABDUL RAHMAN

No Kad Matrik : DI210111

*** Note: This System Testing Form is provided to obtain user feedback and understand the capability of the developed system. This form has 2 sections, Section A and Section B. Please answer all questions.*

Please tick (/) in the appropriate rating box.

Section A.

1	Unsatisfactory
2	Satisfying
3	Fairly Good
4	Good
5	Very good

No	Content	1	2	3	4	5
1	User-friendly system					✓
2	Appropriate use of colours					✓
3	The system uses an attractive display				✓	
4	Text display makes it easier for users to read and understand how to use the system.					✓
5	Login display position in the right place.					✓

Section B.

Please tick (/) on yes or no answers.

No	Question	Evaluation	
		Yes	No
	SYSTEM CONTENT		
1	Efficient and relevant system for making orders	✓	
2	All buttons are functioning	✓	
3	Easily add menus and manage order effectively	✓	
4	Ideal for administrators and teachers seeking streamlined order management	✓	
	USER-FRIENDLY		
1	User-friendly system for effortless lunch orders	✓	
2	User can easily access the order	✓	
3	This system ensuring efficiency for all users	✓	
	TEXTS		
1	The text used is clear and easy to read.	✓	
2	The text used is appropriate.	✓	
3	Simple sentences.	✓	
4	Readable text with appropriate size	✓	
	GRAPHICS		
1	The background used is appropriate.	✓	
2	The colors used are appropriate	✓	
3	An attractive interface design.	✓	
	OVERALL SYSTEM EVALUATION		
1	The system offer a new alternative that help users in food ordering	✓	
2	Easy-to-use system	✓	
3	Error-free	✓	
4	Displaying accurate database information.	✓	

Comments/Suggestions :

The overall functionality of the system meets our expectations. User friendly and Simple. Good!

Tandatangan:

Date : 31/5/2024

Figure 16 *User Acceptance Testing (Owner)*

6. Conclusion

In conclusion, the way teachers order and have lunch at the school canteen has been changed by the new food ordering system. Teachers can quickly explore the menu, place orders, and make payments using this user-friendly platform, which addresses concerns like order mistakes, delays, and limited access to real-time menu information. Through the use of technology, the system improves overall canteen management efficiency, expedites the ordering process, and provide advantages such as precise record-keeping, financial responsibility, and better service. In line with contemporary demands for effectiveness and convenience, the food ordering system makes ordering food for teachers more efficient, convenient and pleasurable.

Even if system has already been developed, there are still flaws and limitation that could be fixed in the future. For instance, a more engaging user interface, a range of online payment options and real-time order completion notifications can all entice teachers to utilize the system. As of right now, it greatly benefits the school's canteen owner as well as every employee, meeting the demands of contemporary efficiency and convenience. This project promises significant advantages for all users and represents a step forward in improving the overall dining experience.

Acknowledgement

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Conflict of Interest

Authors declare that there is no conflict of interests regarding the publication of the paper.

Author Contribution

This journal requires that all authors take public responsibility for the content of the work submitted for review. The contributions of all authors must be described in the following manner:

The authors confirm contribution to the paper as follows: ***study conception and design:*** *Dina Safiah Abdul Rahman, Muhaini Othman;* ***data collection:*** *Dina Safiah Abdul Rahman;* ***analysis and interpretation of results:*** *Dina Safiah Abdul Rahman, Muhaini Othman;* ***draft manuscript preparation:*** *Dina Safiah Abdul Rahman. All authors reviewed the results and approved the final version of the manuscript.*

An author name can appear multiple times, and each author name must appear at least once. For single authors, use the following wording:

The author confirms sole responsibility for the following: study conception and design, data collection, analysis and interpretation of results, and manuscript preparation.

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