

# Management System in Fish Market using Mobile Application

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**Abstract:** The management system in fish market using mobile application is a system which act as an online market platform that user can buy sea products and the seller can manage the products through the application. With the rapid development of the mobile application, digital devices such as mobile phone and the tablet have been more widely to use in daily life. But the fish markets in Sungai Rengit still use a manual filling system which is record book to handle the records in market and it is not efficiency. All the price of the products is not stated clearly and causing customer confuse on the price of products. The application is developed by using Android Studio. The JAVA and XML languages are used to develop the application with the object-oriented development methodology. The application allow seller to manage the fish market by manage the products and check the orders from customers. Besides, the application allows users to view the sea products, they can add the product to cart and make an online payment. They also can edit their profile and search the products. At the end of this project, management system in fish market application provides a good and efficiency service to the user and seller. The application is environment friendly and easily to be used.

**Keywords:** mobile application, digital devices, fish market

## 1. Introduction

Sungai Rengit is located in Pengerang in Johor. It is a small town in which agriculture is the vital source of livelihood and economy for most of its people. Besides this, seafood lovers usually visit Sungai Rengit for taste of its delicious and fresh seafood produce. The fish market operates traditionally, which means that no technology is applied to the management of fish market. The fish market uses a manual system to handle its records which is manual filing system. Further, transaction history is written in a record book and is less efficient as it is hard to arrange the record files in a systematic way.

Nowadays, mobile phones have significantly become the main communication device. The use of mobile applications in fish markets become popular during this time especially during the pandemic of coronavirus disease. Recently, fish products are often sold online through the Facebook live as a medium. Thus, it is necessary to develop an acceptable and efficient management system in the fish market using mobile application. By using this application, we can encourage fisherman or seller to

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learn the new technologies. Furthermore, many of the problems highlighted in Sungai Rengit fish market can be resolved the fish market's management will improve and become better.

The development of a system management in the fish market has never been proposed because people still enjoy the traditional market where they shun the fixed price and love to bargain for a discount. The main problem of the fish market in Sungai Rengit is the sellers are still using the manual system to handle the transaction records which is using the record book. The seller experience difficulty in finding past transactions because usually the record book is very confused and unsystematic. The record book is also easily prone to loss or damage. By using the mobile application, all the records will be saved in the application and the seller can find the transaction records easily and fast.

This project is developed to fulfill three objectives: (i) to design and analyze a management system in the fish market based on object-oriented structure; (ii) develop a management system in the fish market for Android platform with agile software development; (iii) evaluate the application using alpha and beta testing. There are several modules in the developed application in order for the system to carry out certain function, which are registration, user's profile management, log in and log out, searching management, cart management, order management, product management and sales record.

The application should be able to implement paperless environment with the mobile application. The management system in the fish market using mobile application is planned to be used for the fish markets in Sungai Rengit to replace the manual filing system. It designed to reduce the workload for the seller in fish market. It is more efficiency system compared to the existing manual filing system.

## **2. Related Work**

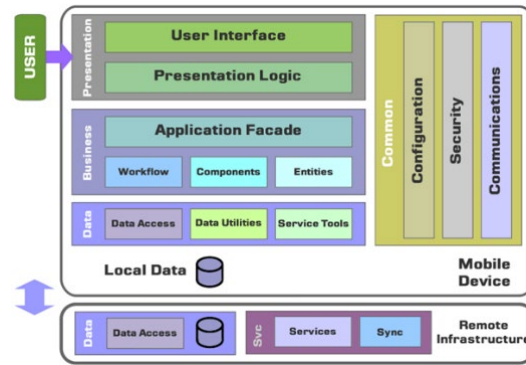
Mobile-based application is a type of application software designed to run on mobile devices such as mobile phone and tablet. A mobile application is a rapidly developing segment of communication technology and global information because of the convergence of media. A mobile application is most commonly referred to as an app. From an online app market, users can download a useful mobile application. Some of the mobile applications are free and some users have to pay to download it.

Advantages of Mobile-based Application are apps increase customer engagement. Mobile application helps to connect the people to business for communication in a convenient way. Business can use apps to improve their processes and increase the level of accessibility by customers [1]. For example, people can view the products in fish market using mobile devices and they can purchase by online payment. Next, increase productivity and save time. By using the mobile application, people can manage the fish market. For example, manage the transaction records, calculate the total amount of sales products and update the products in app.

Disadvantages of Mobile-based Application are cost. Naturally developing an app will bring a price tag, but your app could boost your bottom line by enhancing customer's requirements. Next, small screen size. Unlike in web-based system, the mobile platform is difficult to show the text and graphic clearly. Small screen size also causes inconvenient to elderly.

### **2.1 Mobile Application Architecture**

To develop a fully-structured mobile application, the mobile application architecture act as a set of technologies and models based on industry and vendor-specific standards. A good mobile application architecture ensures that components have multiple responsibility layers. Figure 1 shows the multiple layers of mobile app architecture design and the common architectural view of mobile application.



**Figure 1: Mobile architecture**

There are three main layers in the mobile application architecture which are presentation layers, business layer and data access layer. In the presentation layer, it contains user interface (UI) and presentation logic components. The function of this layer is how to present and show the app to the end-users. The developers should determine the client's requirement on the user interface. Next, the presentation layer will communicate with the business layer. In the business layer, it contains the functional capabilities which are application facade, workflow, components and entities. At this time, the common utility layer for services such as configuration, security and communications are the matters of concern [2].

## 2.2 Comparison of The Existing Systems

In this section, there are three existing applications are selected which are MyMart E-Groceries System, Online Shopping Site and Grocery management system. A comparison of existing applications and proposed system will be present in the Table 1. The features of each existing application will be discussed.

**Table 1: Comparison of Existing System**

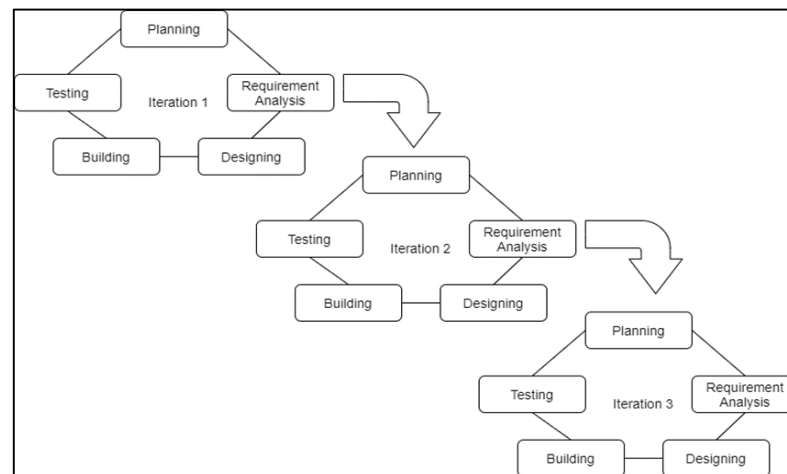
Features	MyMart E-Groceries System [3]	Online Shopping Site [4]	Grocery management system [5]	Proposed system
Payment Method	Cash on delivery	Online payment, Cash on delivery	Online payment, Cash on delivery	PayPal online payment
Delivery service	Yes	Yes	Yes	Yes
Tracking system	N/A	Yes	N/A	N/A
Classification of the products	Yes	N/A	Yes	N/A
Cart service	Yes	Yes	Yes	Yes
Member registration	Yes	Yes	Yes	Yes
Provide details of the product	Yes	Yes	N/A	Yes
Sales Record	N/A	N/A	N/A	Yes
Manage Products	N/A	N/A	N/A	Yes

**Table 1: (cont.)**

User's Profile Management	N/A	N/A	N/A	Yes
Search Products Function	Yes	Yes	Yes	Yes

### 3. Methodology/Framework

System Development Methodology is a formalized approach to implement the System Development Life Cycle (SDLC). SDLC can proceed in a much efficient way with the appropriate methodology chosen. The software methodology that chosen to develop this application is Agile Model which is a combination of the iterative and incremental process model. The figure below shows the Agile Model which has five phases in each iteration such as planning, requirements analysis, designing, building and testing [6].

**Figure 2: Agile Process Model**

#### 3.1 Planning

At the planning phase, the title of the project has been discussed with what type of system should be developed. The planning documents consists of a proposal. Besides, the project background, the problem statement of the project, objective, project scope and project significance will be discussed. The study of the existing systems and the comparison with the proposed system also will be discussed in this stage. The time taken needed to develop the system also must be a plan in this phase in order to develop the system in time. A work plan which includes the project's Gantt chart will be generated. The Gantt chart becomes a guideline to perform the tasks that scheduled to develop the system.

#### 3.2 Requirements Analysis

In this phase, the requirements for the project must define clearly before start to design the project. Requirement's analysis is a process to determine the needs or conditions to meet the new or altered product. It also determines user expectations outcome from the proposed application. There contains of functional requirements and non-functional requirements [7].

Table 2 shows the functional requirements of the proposed application while Table 3 shows the non-functional requirement of the proposed application.

**Table 2: Functional Requirements of the Proposed Application**

No.	Modules	Functionalities
1.	Login and logout Module	<ul style="list-style-type: none"> <li>• The application should allow the users to login into application using user ID and password.</li> <li>• The application should allow the user to input the valid user ID and password to be logged in as user.</li> <li>• The application should alert the user for any invalid input.</li> <li>• The application should redirect user to home page once successful login.</li> <li>• The application should allow user to change password when they forget their password by answering the security questions.</li> </ul>
2.	Registration	<ul style="list-style-type: none"> <li>• The application should allow the new user to register before login with the username, user ID and password.</li> </ul>
3.	User's profile Management Module	<ul style="list-style-type: none"> <li>• The application should allow user to edit their profile such as username, user ID, address and profile picture.</li> <li>• The application should store all the changes information.</li> <li>• The application should allow user to set the security questions for the reset password purpose.</li> </ul>
4.	Search Module	<ul style="list-style-type: none"> <li>• The application should allow user to search the desired products by enter the product's name.</li> <li>• The application should display the product details such as image, description and price.</li> </ul>
5.	Cart Management Module	<ul style="list-style-type: none"> <li>• The application should allow user to add and delete the products in the cart.</li> <li>• The application should allow user to edit the quantity of products in the cart.</li> <li>• The application should allow user to confirm their order by entering name, phone number and address.</li> <li>• The application should allow user to make payment through PayPal online payment method.</li> </ul>
6.	Order Management Module	<ul style="list-style-type: none"> <li>• The application should allow admin to check the order list from customers.</li> <li>• The application should allow user admin to check the order product from customers.</li> <li>• The order detail should provide phone number of customers to let admin inform customer when they approve the order.</li> </ul>
7.	Product Management Module	<ul style="list-style-type: none"> <li>• The application should allow admin to add, update and delete the products.</li> <li>• The application should allow admin to update the price of products daily.</li> </ul>
8.	Sales Record	<ul style="list-style-type: none"> <li>• The application should allow admin to check the latest sales record from each of customer.</li> </ul>

**Table 3: Non-functional Requirements of The Proposed Application**

No	Requirement	Description
1.	Operational	<ul style="list-style-type: none"> <li>The application should be easily updated and maintained.</li> <li>The application should be user friendly.</li> <li>The application should be work on any operating system of mobile phone.</li> </ul>
2.	Performance	<ul style="list-style-type: none"> <li>Each page in the application must load within 2 seconds.</li> <li>The interaction between the user and the application should not be more than 10 minutes.</li> </ul>
3.	Security	<ul style="list-style-type: none"> <li>The application should allow user access their account with user ID and password.</li> <li>The application only allow user to edit their profile.</li> <li>Only administrator can view the order list from user.</li> </ul>

The software and hardware requirements also will be discussed. Software and hardware requirements must be specific before develop the application. In this project, a laptop with sufficient processing power is needed because an application needed to be developed. The laptop is needed for the developer to have a project development such as coding for the mobile application and manage the database. The hardware requirements shown in Table 4 while the software requirements shown in Table 5.

**Table 4: The Hardware Requirements**

No	Hardware	Specification
1.	CPU (Central Processing Unit)	Intel® Core™ i5-10200 @ with Turbo Boost up to 2.11 GHz with 1.60 GHz speed.
2.	Installed memory RAM (Random Access Memory)	4.00 Gigabyte
3.	Hard drive	512 GB Solid State Drive (SSD)

**Table 5: The Software Requirements**

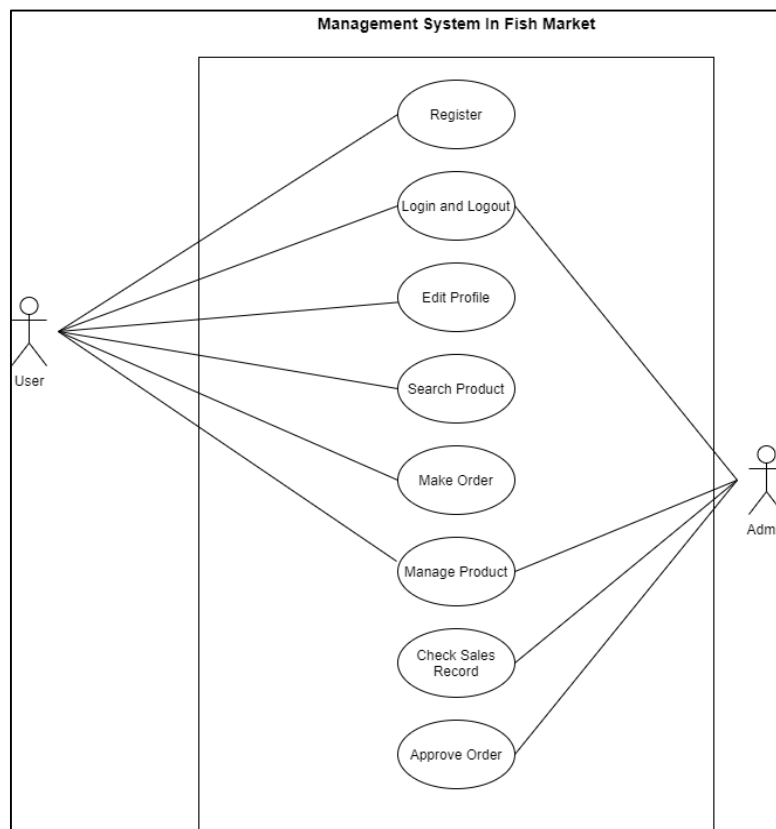
No	Software	Functionality
1.	Programming tool – Android Studio Development Kit	Develop application
2.	Programming language – JAVA and eXtensible Markup Language (XML).	Development environment for building system and components using the JAVA programming language. XML is used to design the interface in the application.
3.	Database - Firebase	Design and build a database.
4.	Design tool – Draw io	Use to draw and design the diagram such as flow chart, use case diagram, activity diagram and sequence diagram.
5.	Microsoft Project	Use to draw the Gantt chart.
6.	Operating system – Microsoft Window 10 and Android 5.0 or above	The operating systems that have been used for the development of the proposed application.

### 3.3 Design

After the requirements are gathered and define, the modules in the proposed system are specifically based on the user requirements. Besides, there are two ways to approach design in the software development which are visual design and the other is the architectural structure. The programming language such as JAVA and XML are used to develop the application with mobile-based.

During this phase, the related diagrams in order to discuss the activity and function of the proposed application are presented such as use case diagram, sequence diagram and activity diagram. Besides, the system architecture diagram also will be discussed. The user interface and database design are most important when developing the application and it is design by using Draw.io tool. A class diagram will produce to discuss the database design.

Figure 3 shows use case diagram of the proposed application. There are two (2) stakeholders involve in the application which are user and admin. It illustrates the main functions of the application. The function that provided in the proposed application are Register, Login and Logout, Edit Profile, Search Product, Make Order, Manage Product, Check Sales Record and Approve Order. User of the application can access the functions such as Register, Login and Logout, Edit Profile, Search Product, Make Order. Besides, admin can access the functions such as Login and Logout, Manage Product, Check Sales Record and Approve Order



**Figure 3: Use Case Diagram of The Proposed Application**

A database design is the organization of data according to database model and it represents the logical view of the system's database. The developer determines what data must be stored and how the data elements interrelate. Figure 4 shows the class diagram of the proposed application. There are seven (7) classes in the class diagram which are Users, Products, Admins, CartList, Orders (User), Orders (Admin) and SaleRecord.

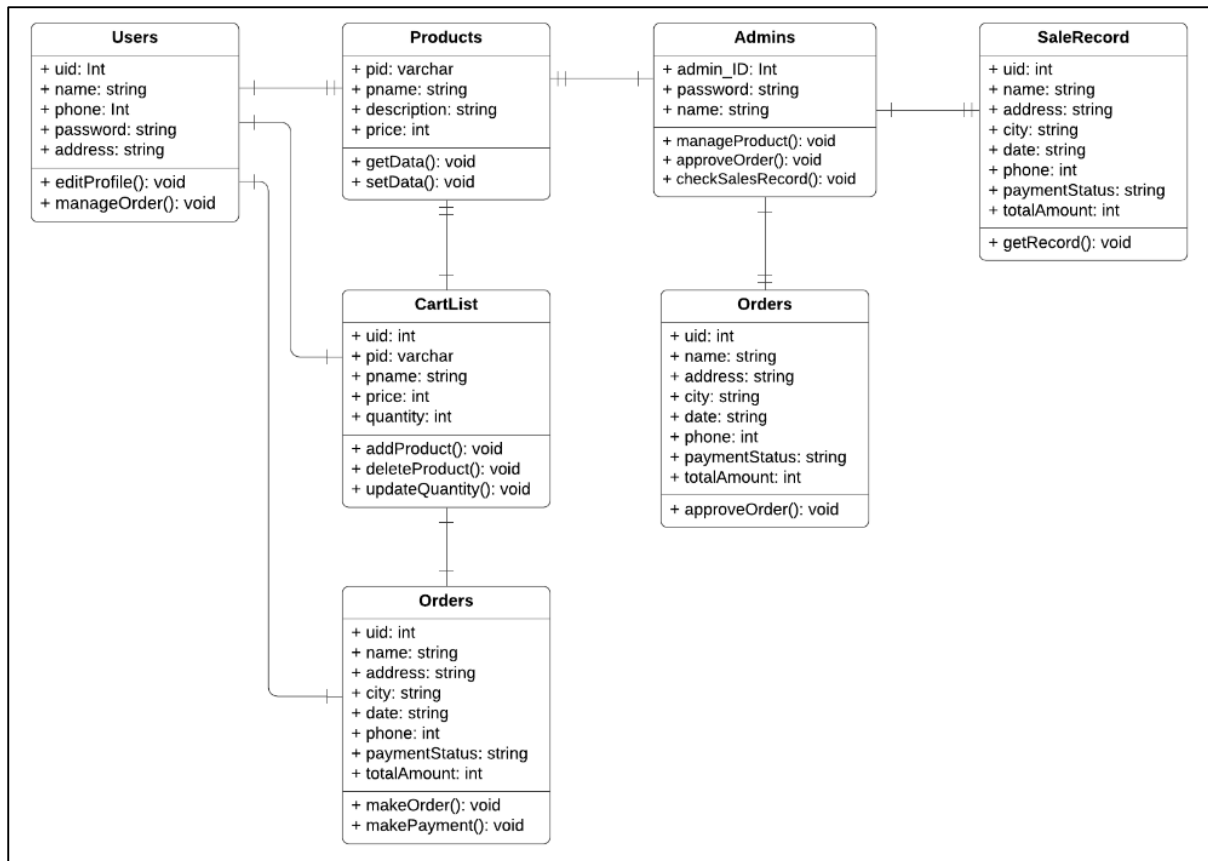


Figure 4: Class Diagram

### 3.4 Development and Coding

When the team define the requirements and design the interfaces, the development phase will begin with writing the code and converting the design documentation into the actual software within the software development process. The product will undergo many stages of improvement to make sure that the product will meet the requirements and functionality. This stage is generally the longest phase in Agile Methodology. The Fish Market application id developed by using Android Studio, Java and XML languages are used for develop the application. Firebase plays an important part in storing the user and product information. Figure 5 until Figure 8 are several screenshots of the user application interface.

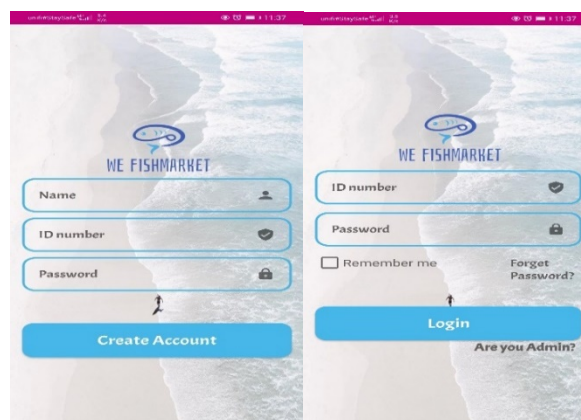


Figure 5: Register and Login Interfaces



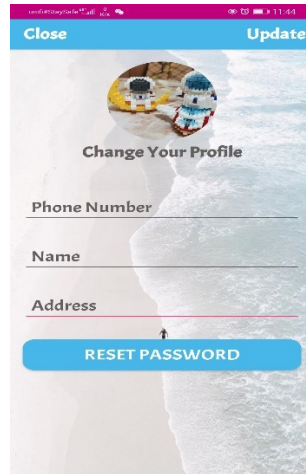


Figure 6: Settings Interface

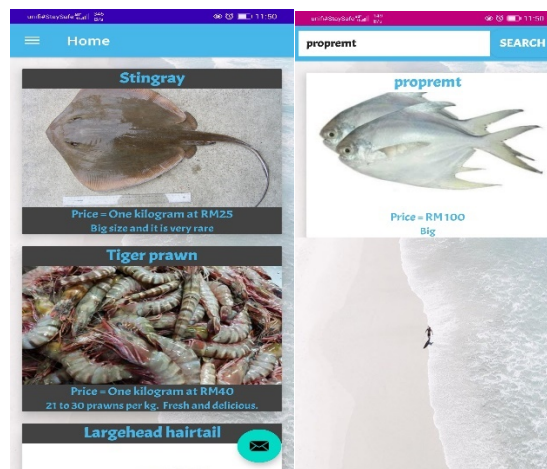


Figure 7: User Main and Searching Interfaces

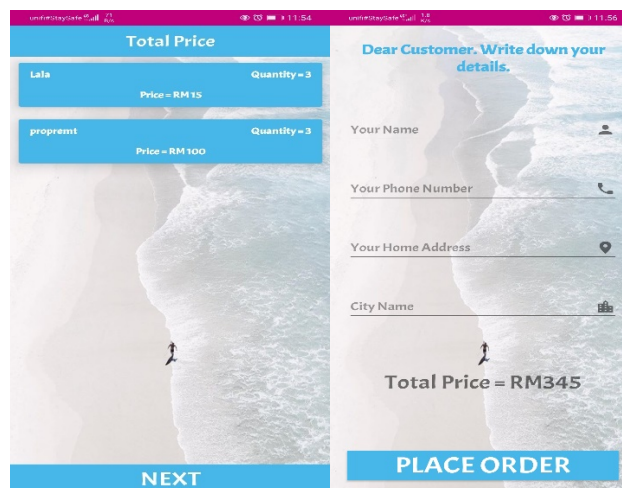
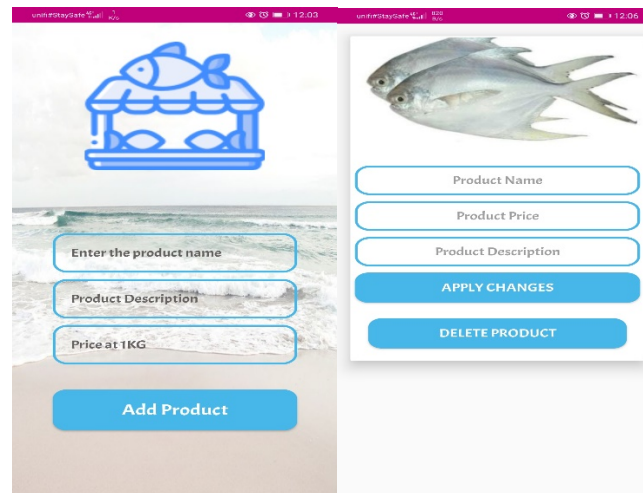
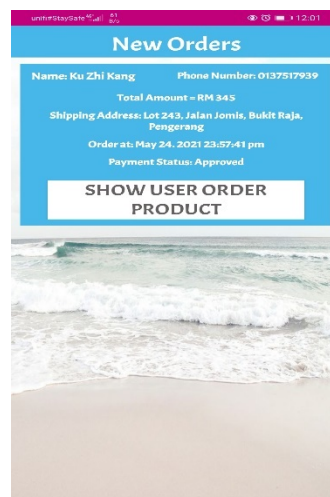


Figure 8: Cart and Confirm Order Interfaces

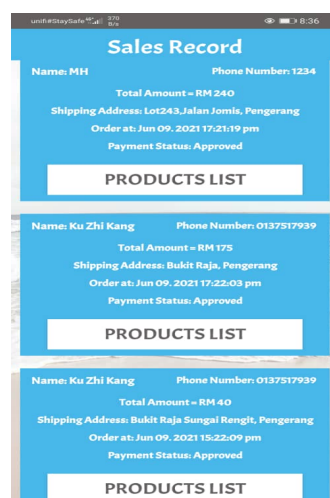
The other users of this developed application are admin. They play a role to manage the products and check the order from customer. Several screenshots of the user application interface are shown in Figure 9 to Figure 11.



**Figure 9: Add Product and Maintain Product Interfaces**



**Figure 10: Check Order Interface**



**Figure 11: Sales Record Interface**

### 3.5 Integration and Testing

After the development phase, the integration and testing phase will carry on. The alpha and beta testing will be presented in this stage. This stage is spent on making sure that the proposed application is bug-free and compatible with other applications. The product's performance will also evaluate by conducts a series of tests in order to make sure all the requirements are met. During the further iterations, system integration, interoperability and user acceptance testing also will evaluate.

### 3.6 Summary of Actual Activities and Related Outputs

Every phase in agile process model is important and it is the continuing process. Each phase will carry out some activities and produce the outputs or findings.

**Table 6: Summary of Actual Activities and Related Outputs**

No	Phases	Actual Activities/Tasks	Outputs/Findings
1.	Planning	<ul style="list-style-type: none"> <li>- Discuss the project name.</li> <li>- Discuss the proposal of project.</li> <li>- Discuss the timeline of develop the application.</li> </ul>	<ul style="list-style-type: none"> <li>- Project title.</li> <li>- Project background.</li> <li>- Objectives.</li> <li>- Problem statements.</li> <li>- Scope.</li> <li>- Project Significance.</li> <li>- Gantt Chart</li> </ul>
2.	Requirement analysis	<ul style="list-style-type: none"> <li>- Collect the requirements of proposed application.</li> <li>- Collect the hardware and software requirement to develop the proposed application.</li> </ul>	<ul style="list-style-type: none"> <li>- Interview</li> <li>- Hardware and software requirement.</li> <li>- Functional and non-functional requirement.</li> </ul>
3.	Design	<ul style="list-style-type: none"> <li>- Discuss the functions in application.</li> <li>- Design and discuss the functions of proposed application.</li> <li>- Discuss the design in application.</li> </ul>	<ul style="list-style-type: none"> <li>- Modules in proposed application.</li> <li>- Use case diagram.</li> <li>- Activity diagram.</li> <li>- Sequence diagram.</li> <li>- Class Diagram</li> <li>- Interface design</li> </ul>
4.	Development and Coding	<ul style="list-style-type: none"> <li>- Writing the code and converting design documentation in to actual software development.</li> </ul>	<ul style="list-style-type: none"> <li>- Prototype</li> </ul>
5.	Testing	<ul style="list-style-type: none"> <li>- Testing on the proposed application.</li> <li>- Make some correction on the proposed application.</li> </ul>	<ul style="list-style-type: none"> <li>- Alpha and Beta testing.</li> <li>- User Acceptance Testing</li> </ul>

## 4. Result and Discussion

Testing phase was carried out once the full application is implemented and ready to run in real world. The testing process was carried out to detect the bugs and error to ensure the application can be function well and meet the user requirements. The testing process consists of two part which are Alpha testing and Beta testing.

#### 4.1 Alpha Testing

Alpha testing is a type of acceptance testing used to make sure that each module in the application is function well and fulfil the functional requirements. The testing process involves detect and check the bugs or errors occurs in the developed application. This test is the first stage of testing and will be performed amongst the team [8]. The test plan of each module in the application will be discussed.

**Table 7: Test Plan for Login**

No.	Test Cases	Expected Output	Actual Output
1.	Complete with valid ID number and password.	Login successful and display home page based on user authentication.	Passed
2.	Incomplete data inputs	Failure message is showed and prompt users to fill in the blank.	Passed
3.	Complete but invalid ID number or password.	Failure message is showed and the login request is rejected.	Passed

**Table 8: Test Plan for Registration**

No.	Test Cases	Expected Output	Actual Output
1.	Complete with valid user registration data.	Registration successful and display login page for user to login to the application.	Passed
2.	Incomplete data inputs	Failure message is showed and prompt users to fill in the blank.	Passed
3.	Register using existing ID number	Failure message is showed and prompt users to create another ID number.	Passed

**Table 9: Test Plan for User's Profile Management**

No.	Test Cases	Expected Output	Actual Output
1.	Complete input with valid profile picture, phone number, name and address	New records are update successful and a message of update profile successfully is shown.	Passed
2.	User click "Reset Password".	User can set the security questions for the reset password purpose.	Passed
3.	Incomplete data inputs	Failure message is showed and prompt users to fill in the blank.	Passed

**Table 10: Test Plan for Cart Management**

No.	Test Cases	Expected Output	Actual Output
1.	User can add the products to the cart.	Products are added successful to the cart and a message of “Added to cart list” is shown.	Passed
2.	User can edit and delete the products in the cart.	The quantity of products is updated.	Passed
3.	User click “Next” and the confirm final order page will display.	The total price of the products will be shown.	Passed
4.	User click “confirm order” button	The system will redirect to payment method for user to pay online.	Passed
5.	Incomplete data input when confirm the order.	The system will display the failure message.	Passed

**Table 11: Test Plan for Searching Management**

No.	Test Cases	Expected Output	Actual Output
1.	Complete input with product name.	The search product is shown.	Passed
2.	Incomplete product name inputs	The search product does not display.	Passed

**Table 12: Test Plan for Order Management**

No.	Test Cases	Expected Output	Actual Output
1.	Admin click “Check New Orders”	The order details will be shown with the Name, Phone Number, Total Amount, Shipping Address, Order Time and Payment Status.	Passed
2.	Admin click “Show User Order Product”	The products that order from customer will be shown	Passed
3.	Admin click the order in the order list.	A prompt out message will be display to approve the order.	Passed

**Table 13: Test Plan for Product Management**

No.	Test Cases	Expected Output	Actual Output
1.	Admin click “Add New Product”	Admin can add the image of product and add the product name, description and price at 1 kg.	Passed

**Table 13: (cont.)**

2.	Admin click “Maintain Product”	Admin can edit the product by change the product name, description and price.	Passed
3.	Admin click “Delete Products”	The product is deleted successful and a message of delete successful will be display	Passed
4.	Complete input in add product page.	The products are added and updated successful. The successful message will be display.	Passed

**Table 14: Test Plan for Sales Record**

No.	Test Cases	Expected Output	Actual Output
1.	Admin click “Sales Record”	Latest sales record of each customer will be shown.	Passed
2.	Admin click “Product List”	The products list of that order will be shown	Passed

#### 4.2 Beta Testing

Beta testing is a type of user acceptance testing that involving the target users to interact with the application. This testing helps to test the product in user’s environment and determine the functionality and performance of the application. The feedback from user is important to provide increased quality of the application through customer validation.

For the user side, 10 respondents are involved in the user acceptance testing. A google form is provide to them to test the user interface and application feature for user. After that, the feedback from respondents are collected and the outcome are evaluated and presented in the graph. Ranking 1 is highly unsatisfied whereas Ranking 5 is very satisfied.

Table 15 shows the result based on the user interface evaluation that has been conducted by 10 respondents. Overall, there are no respondents felt unsatisfied in the interface design of the proposed application.

**Table 15: Result of User Interface Evaluation**

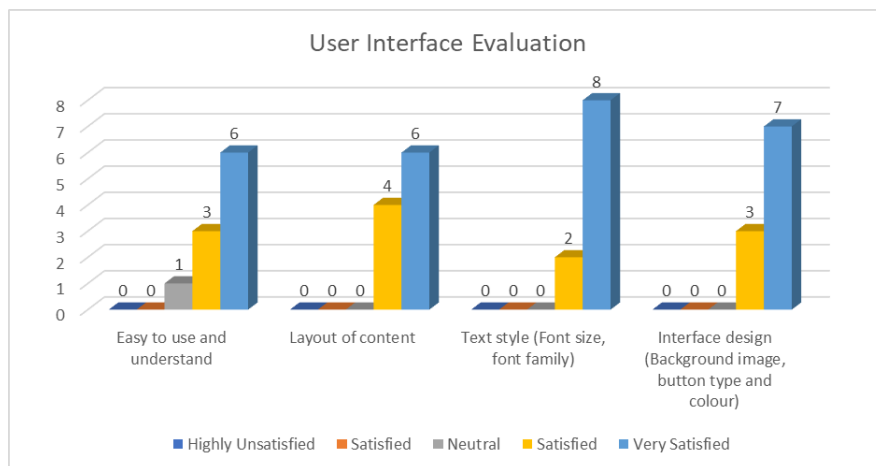
No.	Features	Ranking					Total
		1	2	3	4	5	
1	Easy to use and understand	0	0	1	3	6	10
2	Layout of content	0	0	0	4	6	10
3	Text style (Font size, font family)	0	0	0	2	8	10
4	Interface design (Background image, button type and colour)	0	0	0	3	7	10

Table 16 shows the result based on the application features that has been conducted by 10 respondents which are the users of application. Overall, there are no respondents felt unsatisfied with the function of the proposed application.

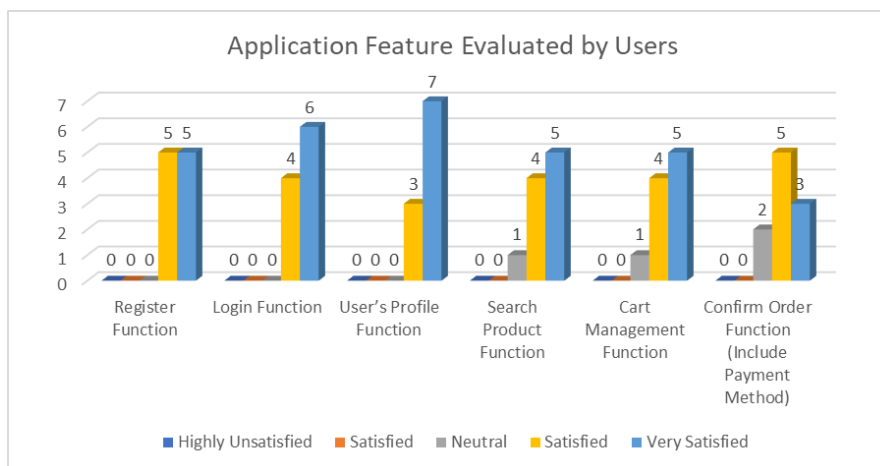
**Table 16: Result of Application Feature Evaluated by Users**

No.	Features	Ranking					Total
		1	2	3	4	5	
1	Register Function	0	0	0	5	5	10
2	Login Function	0	0	0	4	6	10
3	User's Profile Function	0	0	0	3	7	10
4	Search Product Function	0	0	1	4	5	10
5	Cart Management Function	0	0	1	4	5	10
6	Confirm Order Function (Include Payment Method)	0	0	2	5	3	10

The results obtained from Table 15 and Table 16 are presents in the form of bar chart are shows in Figure 12 and Figure 13. These figures show the user acceptance testing result based on the user interface evaluation and features of application features for user of the Management System in Fish Market using Mobile Application.



**Figure 12: Result of User Interface Evaluation**



**Figure 13: Result of Application Feature Evaluated by Users**

For the seller side, a seller involved in this testing in the user acceptance testing. A user acceptance testing form is prepared to the seller. The user acceptance testing form of Management System in Fish Market Using Mobile Application is attached in Appendix.

## 5. Conclusion

In conclusion, the Management System in Fish Market Application is an application developed specifically for the customers and sellers in Sungai Rengit community to manage the buying process in fish market. The develop application has achieved its objectives based on the system requirements and scope. The methodology used in this application is Agile methodology. For the system model, the application has been developed in obedience with the design that described in the system analysis and design. The implementation that focuses on the Android Studio with Firebase database, focus on data storing and data retrieving. After the implementation of application, the application is tested using Alpha and Beta testing. Although this application has achieved all the objectives, there are still some recommendations that can be implemented to improve the application to make the application more user friendly. There are several recommendations that can be considered for the future work in order to improve the functionalities of the application. The application needs to add the payment method for the users such as cash on delivery and FPX (Online Banking Payments). Besides, tracking number should be provided to users once the products has been shipped. Hence, users can check the order status. Next, the application can be developed and applied in all the mobile platform not only in Android Operating System. Lastly, chat feature can be implemented into the application to ease the communication between the users and sellers.

## Acknowledgement

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## Appendix A

The user acceptance testing form for seller of Management System in Fish Market Using Mobile Application.

User Acceptance Testing (UAT) for Seller/Fisherman Management System in Fish Market Using Mobile Application				
Name		: Ku Chioh Beng		
Phone Number		: 016-7123530		
Date of Birth		: 24/08/1967		
Occupation		: Seller		
No.	Acceptance Criteria	Test Result		Comments
		Pass	Fail	
1.	<b>Login Function</b>			
	a) Show the login page for login purpose.	✓		
	b) Provide option to enter the ID number and password.	✓		
2.	<b>Add Product Function</b>			
	a) Provide the add product page for add product according to category.	✓		
	b) Provide the text field to input product name, description, price and quantity.	✓		
	c) Provide the function which can add the product image.	✓		
3.	<b>Maintain Product Function</b>			
	a) Provide the maintain product page for update and delete product.	✓		
	b) Provide the text field to edit the details of the product.	✓		
	c) Provide the function which can delete the product.	✓		
4.	<b>Check Order Function</b>			
	a) Provide the order list page for check order purpose.	✓		
	b) Provide the function which can check the order product from the order.	✓		
	c) Provide the function which can approve the order.	✓		
5.	<b>Check Sales Record</b>			
	a) Provide the sales record page for check the latest sales record of each customer purpose.	✓		
	b) Provide the function which can check order product from the sales record.	✓		



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