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# Azzain Grocery Store Management System

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**Abstract;** Grocery stores play an important role in the community by providing goods and services that people need every day. Acting as intermediaries between wholesalers and customers, grocery stores facilitate the exchange of goods. Effective management is essential to the store's success, as it can help create a positive work environment, improve employee morale, and increase customer satisfaction. Therefore, a grocery store management system was developed for Azzain Grocery Store business. This system aims to streamline various business activities, including inventory management, sales transaction management, and the generation of daily sales reports. All management activities will be conducted digitally, utilizing a web-based approach. The grocery store management system utilized Vue.js for the user interface and Node.js for the backend. An iterative model was adopted, enabling continuous development and improvement. The system's implementation is expected to alleviate the burden on employees and managers, promoting smoother business management. Future work focuses on integrating customer loyalty programs, advanced data analytics for inventory forecasting, and support for online ordering and delivery services.

**Keywords:** Grocery Store, Management System, Inventory, Barcode

## 1. Introduction

A grocery store is a shop that sells a variety of small items [1]. Grocery store businesses are common among businessmen in Malaysia due to their simplicity and ease. Managing the vast amount of data and records associated with the diverse range of goods sold in grocery stores is crucial for ensuring smooth operations. Implementing technology, such as computerized systems, is necessary to alleviate the workload on employees. Utilizing a computerized system offers numerous benefits for grocery store businesses.

An effective business management system is the core of any business. It must be optimally managed to ensure seamless daily operations. Kedai Runcit Azzain has already implemented a computerized system for inventory management, allowing employees to record various aspects related to the store's inventory, including the quantity of stock items.

However, the existing system has encountered several recurring issues. One common problem is inconsistent data, where items that are still in stock are mistakenly indicated as out of stock in the system. Therefore, this study proposes the development of a system titled "Azzain Grocery Store Management System".

Several objectives have been identified to ensure the effective functioning of the system. The primary objective is to develop the "Azzain Grocery Store Management System," which aims to update and improve the existing system by addressing the identified problems. The system will be designed using an object-oriented approach, considering the specific needs of Azzain grocery stores. Utilizing digital technology, the developed system will streamline various business management activities.

This article is divided into five parts. The first part provides an overview of the project's context. The second part discusses the analysis of related works. The third section describes the process of system development, including analysis and design. The fourth section addresses the system implementation and testing methods used to validate the designed system. Finally, the fifth section presents the conclusion of the article.

## **2. Related Work**

This section describes the literature review carried out in the project. Several similar systems were also studied and compared with the system proposed in the project.

### **2.1 Inventory Management**

Typically, grocery stores sell a variety of everyday commodities, including uncooked dry foods such as rice and wheat. Compared to wholesale markets or stores, grocery stores are smaller in size. Grocery stores are often found in every town and housing estate to make shopping convenient for locals. The retailer serves as the final link in the supply chain between the manufacturer and the customer [2].

The inventory management system is a business's most valuable asset. Customers may feel dissatisfied if the goods they need are unavailable. Inventory refers to all the commodities, goods, and supplies held by a company with the expectation of selling them and making a profit. Managing inventory is an important component of any business. However, maintaining a large inventory comes with its own risks, including storage costs, potential damage to goods, and the possibility of theft. To mitigate these risks, accurate inventory management practices need to be implemented. Regularly recording stock quantities can help prevent stock errors and other issues [3].

To ensure sufficient inventory and meet customer demands or address stock shortages, the inventory management model identifies patterns and responds to them. Two types of inventory models are commonly used: Re-Order Point (ROP) and Economic Order Quantity (EOQ). In inventory management, ROP establishes a specific level at which stock should be replenished. Placing an order when there is still ample stock on hand can lead to stock dumping and increased holding costs [4]. Conversely, if an order is placed when there is no stock on hand, sales cannot be made in the store until the order is received. On the other hand, EOQ determines the appropriate stock order size for each product that the company needs to purchase [5]. While ROP addresses the question of "When to Buy?", EOQ handles the question of how much stock to buy.

### **2.2 The Technology Used**

The storage, processing and transmission of information are all performed using digital equipment and computers, collectively referred to as 'digital technology.' One branch of digital technology is web-based technology. Web-based systems are networked applications accessible through the internet, enabling individuals to connect with each other [6]. The three core languages used to build Azzain's Grocery Store Management System on the World Wide Web (WWW) are HTML, CSS, and JavaScript.

Barcodes and barcode scanners are also integral to the system being developed. A barcode is a technological tool for visually representing data in a format that computers can understand. A one-dimensional (1D) barcode consists of a series of unique numbers encoded using alternating black and white bars. It is crucial to insert the correct barcode into the packaging following established standards to ensure accurate barcode scanning by the barcode scanner [7].

An optical scanner, commonly known as a barcode scanner, can read a printed barcode and transmit the decoded data to a computer. Barcode scanners work by emitting a laser beam across the barcode and analyzing the quantity and pattern of reflections. The black bars on a barcode reflect less light than the white spaces between them [8].

### 2.3 A Study of Equivalent Systems

This section describes the study of equivalent systems. The first system is Sistem Inventori Kedai Runcit Rafeek Store [9]. This system manages inventory data in the store and helps streamline the daily sales process. The second system is Sistem Pengurusan Inventori Atas Talian Kedai Bundle [10]. The main purpose of developing Sistem Pengurusan Inventori Atas Talian Di Kedai Bundle is to record goods and important business documents. Prior to the existence of this inventory management system, Amin's bundle store relied on manual methods to store all business records and documents. The third system is Sistem Retail LIMA POS [11]. LIMA POS is a company that sells software for point-of-sale systems. This company offers various POS systems, including the Retail System and the Food and Beverage System. For the purpose of this study, the Retail System has been selected for examination and comparison with the proposed system.

Comparison between the existing system and the proposed system. All the main characteristics were compared and listed in Table 1.

**Table 1: Comparison between existing equivalent systems with system to be developed.**

System/ Characteristics	Sistem Inventori Kedai Runcit Rafeek Store	Sistem Pengurusan Inventori Atas Talian Kedai Bundle	Sistem Retail LIMA POS	Sistem Sistem Pengurusan Kedai Runcit Azzain
Technology	Web-based	Web-based	Web- based	Web-based
Registration and Login Module	Yes	Yes	No	Yes
Inventory Management Module	Yes	Yes	Yes	Yes
Register Or Update Store Debtor Information Module	No	No	Yes	No
Order Process Module	No	Yes	No	No
Sales Transaction Management Module	Yes	No	Yes	Yes
Refund Module If Customers Return Purchased Items with Problems	No	No	Yes	No

System/ Characteristics	Sistem Inventori Kedai Runcit Rafeek Store	Sistem Pengurusan Inventori Atas Talian Kedai Bundle	Sistem Retail LIMA POS	Sistem Pengurusan Kedai Runcit Azzain
Calculates daily sales revenue module	Yes	No	No	Yes

Based on the comparison table provided, all systems utilize web-based technology. Sistem Inventori Kedai Runcit Rafeek Store lacks barcode search functionality, whereas the proposed system includes it. The proposed system offers advantages such as sales transaction management and daily sales calculation when compared to Sistem Pengurusan Inventori Atas Talian Kedai Bundle. Additionally, the proposed system distinguishes itself from Sistem Retail LIMA POS with its user registration, login feature, and sales revenue calculation. The Azzain grocery store management system offers more compelling features in comparison to the other systems. Overall, the Azzain grocery store management system provides comprehensive and user-friendly features for inventory management and sales processes.

### 3. Methodology

This section describes all the necessary information about the methodology used to obtain the results of the project.

#### 3.1 Iterative Model

The Iterative Model shown in Figure 1 breaks down and divides the entire project process into several versions and series by following the order of importance of user requirements on the system to be developed. This means that the most important user requirements will be gathered in the first version and built on that version. With the aim of obtaining additional information related to user needs, when each version is implemented, the system will be given to relevant users and users will provide feedback and comments on the system. The information provided by the user will be collected, analyzed and used for improvements in the next version of the system. Evolution of the system occurs at each iteration providing improvements to the system. The process of analysis, design and implementation will be repeated on each version until the developed system is fully completed and meets all user needs.

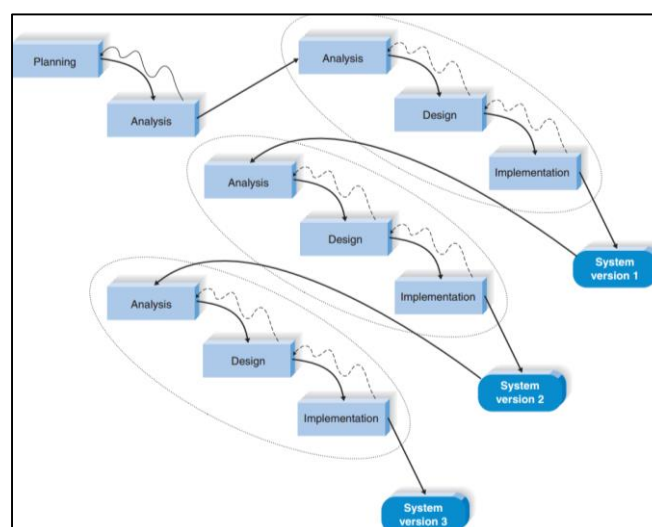


Figure 1: Iterative Model [12]

Project planning is important to create a harmonious atmosphere during project development and obtain management approval to proceed to the next phase. Project planning management is as in Table 2. Two versions of the system have been provided for this project.

**Table 2: Project planning schedule and tasks**

Phase	Activity	Deliverable
Planning	• Choose a title.	• System Proposal
	• Identify stakeholders.	• Gantt Chart
	• Schedule interview dates.	
	• Prepare a paper proposal.	
	• Submit the proposal paper.	
Analysis	• Formulate interview questions.	• Literature Review
	• Conduct interviews.	• Use Case Diagram
	• Analyze the interview results.	• Activity Diagram
	• Identify problems.	• Sequence Diagram
	• Collect data.	• Class Diagram
	• Review all requirements.	
First Version System		
Analysis	• Perform classification of system requirements • Analyze requirements with a high level of importance.	• Classification of system requirements.
Design	• Design the first version of the system.	• Component diagram
	• Design the login module.	• Package diagram
	• Design the new registry module.	• System interface sketch
	• Design the inventory management module.	
	• Design the product information search module using barcodes	
Implementation	• Perform programming based on the design done.	• First Version System
	• Conduct testing of the first version of the system.	
Second Version System		
Analysis	• Improve the system of the first version.	
Design	• Design the second version of the system.	• Component diagram
	• Design a module to manage sales transactions.	• Package diagram
	• Design a sales revenue calculation module.	

Phase	Activity	Deliverable
	<ul style="list-style-type: none"> <li>Design a daily stock display module.</li> </ul>	<ul style="list-style-type: none"> <li>System interface sketch</li> </ul>
Implementation	<ul style="list-style-type: none"> <li>Perform programming based on the design done.</li> <li>Conduct testing of the second version of the system.</li> </ul>	<ul style="list-style-type: none"> <li>Second Version System</li> </ul>

### 3.2 System Requirements

The goal of requirement analysis is to discover, record, and comprehend stakeholders' needs and expectations to design system requirements for effective software development. Table 3 displays the functional requirements for each module created for this project. Table 4 illustrates the non-functional requirements, while Table 5 presents the user requirements.

**Table 3: Functional Requirements**

No.	Module	Description
1.	User Registration	<ul style="list-style-type: none"> <li>Managers can register new accounts for new employees.</li> <li>The system can accept the input entered by the manager.</li> <li>The system will be able to save the new employee account details.</li> <li>The system can display an error message if the entered input does not meet the requirements.</li> </ul>
2.	Login	<ul style="list-style-type: none"> <li>Users need to log in to prevent unauthorized access to important business information.</li> <li>The system can authenticate users.</li> <li>The system should redirect authenticated users to their respective home pages based on their identity and role.</li> <li>The system can reset the input when the login is invalid.</li> <li>The system allows users to change to a new password.</li> </ul>
3.	Manage User Information	<ul style="list-style-type: none"> <li>The system can allow the manager to update or change the user information.</li> <li>The system can allow the manager to delete the user.</li> <li>The system displays the list of the users.</li> <li>The system shows alert message if the input filled is not fulfil the requirement needed.</li> </ul>

No.	Module	Description
4.	Inventory Management	<ul style="list-style-type: none"> <li>• Employees can add, remove, and update product inventory in grocery stores, and managers can easily add new products that are not yet in the business records.</li> <li>• The system allows users to enter barcode numbers or product names for product search purposes.</li> <li>• The system can display the product information that users are looking for.</li> <li>• The system can store product details for new products.</li> <li>• The system can update product details that have been modified.</li> <li>• The system can remove product details that have been deleted by the users.</li> <li>• The system can scan the barcode on the product.</li> </ul>
5.	Stock Management	<ul style="list-style-type: none"> <li>• Displaying information required by employees, such as product information and quantity of products, using a barcode scanner.</li> <li>• Providing reminders to managers about products with insufficient stock quantities.</li> </ul>
6.	Sales Transaction Management	<ul style="list-style-type: none"> <li>• Transactions can be done digitally, and sales records can be stored in the database.</li> <li>• The system allows users to see the total sales price.</li> <li>• The system can display a list of products purchased by customers.</li> <li>• The system allows users to remove products from the purchase list.</li> <li>• The system allows the user to choose the type of payment the customer wants to use.</li> <li>• The system can calculate the total price for all the products purchased by the customer.</li> </ul>
7.	Generate Daily Sale Report	<ul style="list-style-type: none"> <li>• The system will perform calculations for sales closing activities using the appropriate formula.</li> <li>• The system can generate daily sales reports.</li> </ul>

**Table 4: Non-Functional Requirements**

No.	Type	Description
1.	Performance	<ul style="list-style-type: none"> <li>The system must have a response time of less than 10 seconds to load the page if the internet connection is good.</li> </ul>
2.	Operational	<ul style="list-style-type: none"> <li>The system must be used in a web browser. The system supports all modern web browsers except Internet Explorer.</li> <li>This system can be accessed by all devices, even if the devices have different display sizes.</li> </ul>
3.	Security	<ul style="list-style-type: none"> <li>Users must log in first to access the system. The system requires an identification card number and password for login. This login module prevents unauthorized access to the system.</li> <li>To ensure the system's security, passwords must be longer than eight characters and include at least one uppercase letter and one lowercase letter.</li> <li>Each user in the system has a specific role with a different interface. Users can only access the interface associated with their role and cannot access interfaces of other roles.</li> </ul>
4.	Integrity	<ul style="list-style-type: none"> <li>Data in the database will be stored correctly and securely. The database will also be protected from unauthorized access.</li> <li>Passwords stored in the database will be encrypted to prevent unauthorized access.</li> </ul>
5.	Usability	<ul style="list-style-type: none"> <li>Easy to learn, new users and those familiar with similar systems find this system easy to learn and master.</li> <li>Competence in task execution, the system must efficiently perform tasks and processes to provide user satisfaction.</li> <li>Easy to remember process steps, for frequent users, every step of using this system should be easy to recall.</li> <li>Users must understand the system's achievements.</li> <li>Users must feel satisfied with the system.</li> </ul>

**Table 5: User Requirements**

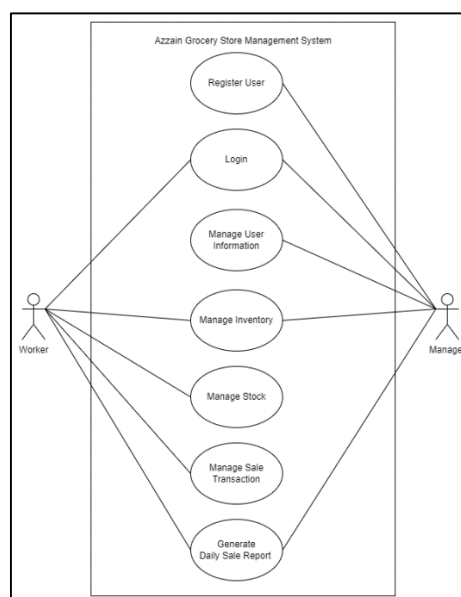
No.	User Requirement
1.	Managers can register new accounts for new employees.
2.	Users can enter their ID card number and password for login purposes.
3.	Employees can reset their passwords.

No.	User Requirement
4.	Users can log out of the system.
5.	Users can use the barcode scanner tool.
6.	Users can scan the barcode on the product.
7.	Users can enter the product name.
8.	Users can enter the barcode number of the product.
9.	Users can choose the products they want.
10.	Users can remove products from the system.
11.	Managers can add new products that are not yet in the business record.
12.	Users can update product information.
13.	Users can see the daily stock of products.
14.	Users can view product information details.
15.	Employees can manage sales transactions.
16.	Employees can see the total price of products purchased by customers.
17.	Employees can cancel products that customers do not want to buy.
18.	Employees can see daily sales results.

### 3.3 System Analysis

A use case diagram, which is a component of UML, describes how the process flows in the system and identifies its requirements. This diagram shows how the users of the system interact with each other. Use case diagrams use modules and users to show what the system does and how users use it, but they do not explain how the system works internally.

The users involved in this system are employees and managers. Figure 2 shows a use case diagram for the Azzain grocery store management system.



**Figure 2: Use Case Diagram**

One of the most helpful forms of diagrams in UML is the class diagram, which accurately represents the structure of a system by modeling its classes, properties, operations, and connections between objects. A class diagram must be constructed to define the properties and functions used in the system to be developed. In Figure 3, seven classes are identified: Manager, Worker, User, Sale, Report, ListItem, and Item. Each class has its own characteristics and operations.

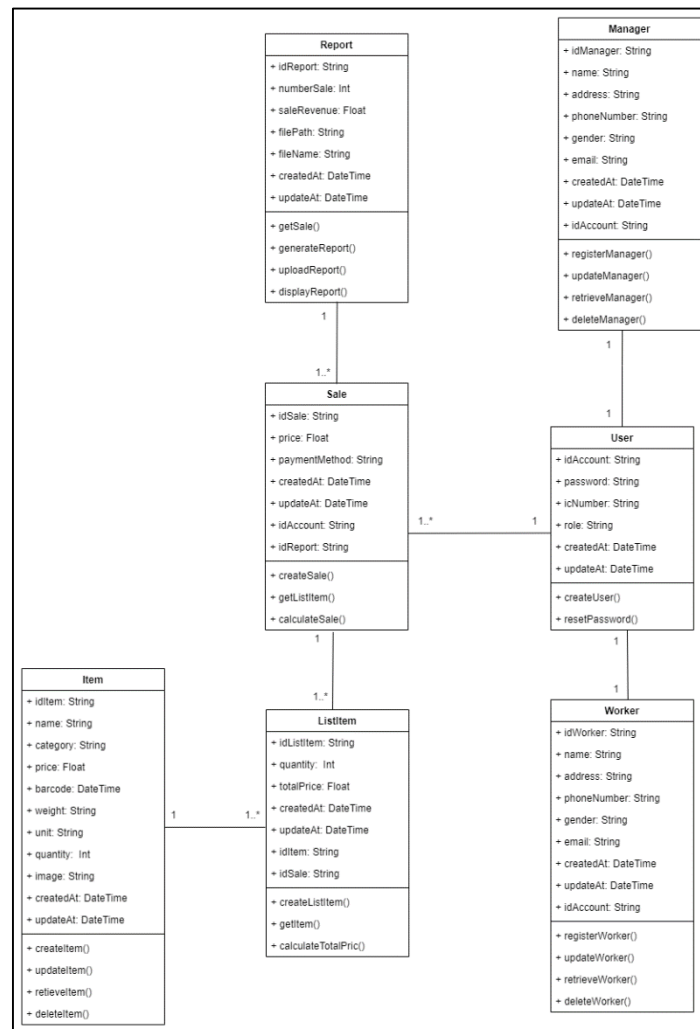


Figure 3: Domain Class Diagram

### 3.4 System Design

Once the analysis activities have been completed and all the requirements for the proposed system have been identified, the system design process begins. System design is the process of creating system components that consist of the architecture, component modules, and the various interfaces and data that reside within the system. Figure 4 shows the system architecture of the grocery store management system.

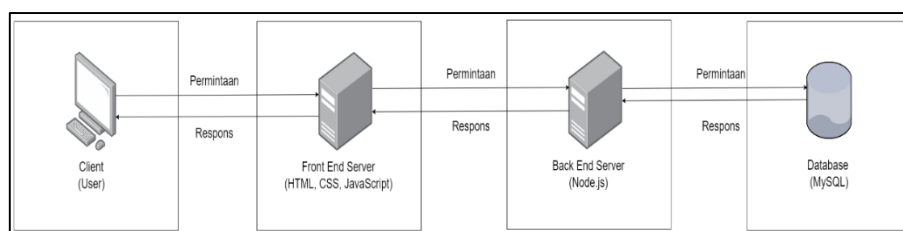


Figure 4: System Architecture

The Azzain grocery store management system is developed using a multi-tier architecture. This architecture arranges software components into levels (layers) to provide specific functions. The overall system architecture is divided into several parts in this approach, with the database server being separate from the system server. The three-tier system is commonly used in the multi-tier architecture, consisting of the data management level, application level, and customer level.

The database is intended to store and manage the system's data. The database structure, which outlines the entities that store the various data in the database, is displayed.

- i. **user**(idAccount, password, icNumber, role, createdAt, updateAt)
- ii. **manager**(idManager, name, address, phoneNumber, gender, email, createdAt, updaeAt, idAccount)
- iii. **worker**(idWorker, name, address, phoneNumber, gender, email, createdAt, updaeAt, idAccount)
- iv. **item**(idItem, name, category, price, barcode, weight, unit, quantity, image, createdAt, updateAt)
- v. **listItem**(idListItem, quantity, totalPrice, createdAt, updateAt, idItem, idSale)
- vi. **sale**(idSale, price, paymentMethod, createdAt, updateAt, idAccount, idReport)
- vii. **report**(idReport, numberSale, saleRevenue, filePath, fileName, createdAt, updateAt)

## 4. Results and Discussion

### 4.1 Implementation

The development of the Azzain grocery store management system uses three programming languages, HyperText Markup Language (HTML), Cascading Style Sheets (CSS), and JavaScript. It is divided into two parts, front-end development and back-end development. For the front-end development, this system uses the Vue.js framework combined with Tailwind CSS to create the graphical user interfaces. For the backend, the system uses Node.js within the Express.js framework, enabling JavaScript to be used as a back-end language. The main interfaces and their coding segments are shown and discussed in this subtopic.

When a new employee starts work, managers need to register their information in the employee record. By building this new register module, managers no longer need to keep physical records of employees, which consume space. Data related to employees can now be stored in the database, ensuring better security for the data. Figures 5 and 6 show the interface and code segment of the new register module.

Figure 5: Register Interface

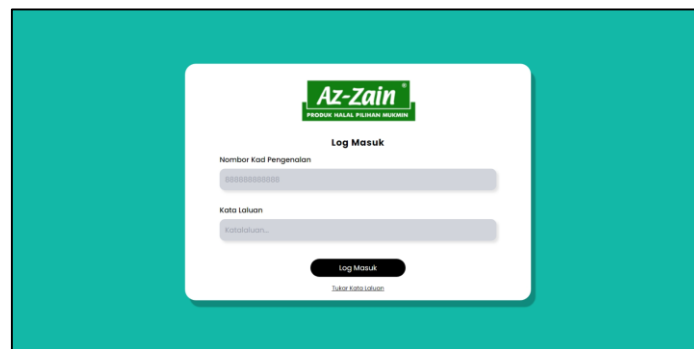
```

1  if (role === "Pengurus")
2  {
3      axios.post("https://sistemkedairuncit.onrender.com/", user)
4      .then(response=>{
5          const idAccount = response.data.idAccount
6          info.idAccount = idAccount
7
8          axios.post("https://sistemkedairuncit.onrender.com/manager", info)
9          .then(response => {console.log(response.data)})
10         .catch(error => {console.log(error)})
11     })
12     .catch(error => {console.log(error)})
13 }
14 else
15 {
16     axios.post("https://sistemkedairuncit.onrender.com/", user)
17     .then(response=>{
18         const idAccount = response.data.idAccount
19         info.idAccount = idAccount
20
21         axios.post("https://sistemkedairuncit.onrender.com/worker", info)
22         .then(response => {console.log(response.data)})
23         .catch(error => {console.log(error)})
24     })
25     .catch(error => {console.log(error)})
26 }
27 }

```

**Figure 6: Register Code Segment**

The login for this system has two important components: the input of the identification card number and the input of the password. Users need to enter both of these pieces of information before gaining access to the system. If any of this information is incorrect or not entered correctly, the system will not grant access to the user. Figure 7 and Figure 8 show the interface and code segment for the login module.



**Figure 7 : Login Interface**

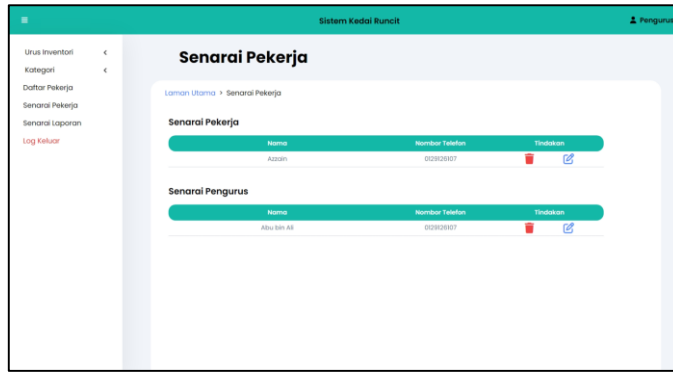
```

1  if(responseUser.data.role ==="Pekerja")
2  {
3      router.push("/home")
4  }
5  else if(responseUser.data.role === "Pengurus")
6  {
7      router.push("/manager")
8  }

```

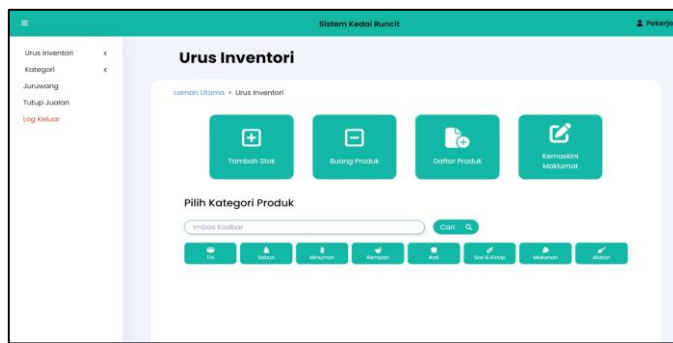
**Figure 8: Login Code Segment**

The employee information entered into the system can also be modified using the employee information management module. If an employee has stopped working at the grocery store, the manager can also delete the employee's data from this system. Figure 9 shows the interface for the module that manages employee information.



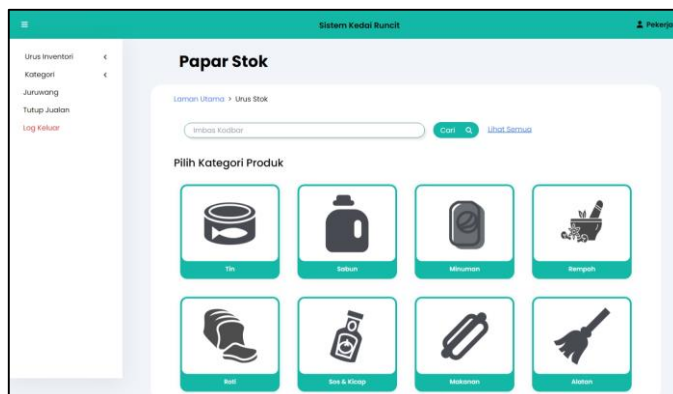
**Figure 9 : Manage User Information Interface**

There are four main activities in inventory management at Azzain grocery stores. The first activity is registering the product into the system. The second activity is increasing the stock of goods. The next activity is deleting records of products that are not available in the store. Finally, there is updating product information. Figure 10 shows the interface of the inventory management module.



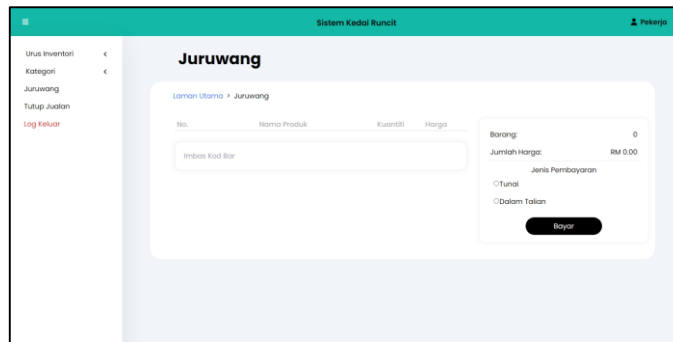
**Figure 10: Manage Inventory Interface**

The products in the grocery store are divided into eight categories: Cans, Soap, Drinks, Spices, Bread, Sauces and Soy Sauce, Food, and Tools. The stock management module allows users of this system to view the number of product stocks in the grocery store. Additionally, users can also access product information using this module. Figure 11 displays the interface for the stock management module.



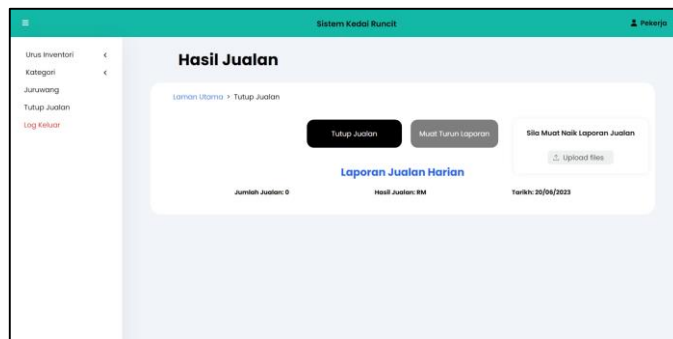
**Figure 11: Stock Management Interface**

This module allows users to manage the buying and selling process that occurs between buyers. Every purchase and sale are recorded and stored by the system in the database. Buyers can choose the type of payment transaction, either in cash or online. Figure 12 shows the interface for the sales transaction module.



**Figure 12: Sales Transaction Interface**

When the business session is over, employees need to close the sales. Closing sales involves calculating the daily sales revenue, both in cash and online. By building a sales report module, sales closing activities can be simplified and accelerated. Figure 13 shows the interface for the sales report module.



**Figure 13: Sales Report Interface**

#### 4.2 Testing

There are two types of testing being done after the completion of the development phase, functional testing and user acceptance testing. Functional testing is conducted to test the functionality of the system and confirm that it meets the required specifications. User acceptance testing is performed to ensure that the users are satisfied with the developed system. Table 6 shows the requirement traceability matrix that has been created to trace whether each test fulfills all the necessary requirements. Table 7 displays the overall test case results.

**Table 6: Requirement Traceability Matrix**

Software Requirement Specification	Test Case ID	Test Case Description	Test Result
SRS_REQ_100	Test_100	Register	
SRS_REQ_101	Test_100_001	The manager enters all the information needed and clicks the register button. Then the system displays the entered information and acknowledges the manager that the information is saved.	Pass
SRS_REQ_102			
SRS_REQ_103			

Software Requirement Specification	Test Case ID	Test Case Description	Test Result (Pass / Failed)
SRS_REQ_104	Test_100_002	If any input fields are empty, the system should display an error message.	Pass
SRS_REQ_200	Test_200	Login	
SRS_REQ_201 SRS_REQ_202 SRS_REQ_203	Test_200_001	The user enters the valid identification number and password, then the system will redirect authenticated users to their respective home pages based on their identity and role.	Pass
SRS_REQ_202 SRS_REQ_204	Test_200_002	The user enters the wrong credential and then the system displays an error message and resets the input field.	Pass
SRS_REQ_205 SRS_REQ_205	Test_200_003	The user clicks the reset password button and the system will redirect to another page and ask the user to enter their identification card number, phone number and email.	Pass
SRS_REQ_205	Test_200_004	The user enters their identification card number, phone number and email correctly and the system redirects the user to the reset password page.	Pass
SRS_REQ_205	Test_200_005	The user enters the new password and confirms the new password. Then the system will change the password and acknowledge the user that the password has been changed and redirect the user to the login page.	Pass
SRS_REQ_300	Test_300	Manage User Information	
SRS_REQ_301 SRS_REQ_303	Test_300_001	The manager updates the user information and then the system acknowledges the manager that the information has been updated.	Pass
SRS_REQ_302 SRS_REQ_303	Test_300_002	If any input fields are empty, the system should display an error message.	Pass
SRS_REQ_304	Test_300_003	The manager clicks the delete button, the system will display the user information and ask for delete confirmation from the manager. After the confirmation, the system acknowledges the manager that the user information has been deleted.	Pass
SRS_REQ_400	Test_400	Inventory Management	

Software Requirement Specification	Test Case ID	Test Case Description	Test Result (Pass / Failed)
SRS_REQ_401 SRS_REQ_403	Test_400_001	The user clicks the operation that they want and the system will display the categories of items that are available.	Pass
SRS_REQ_401 SRS_REQ_406 SRS_REQ_403	Test_400_002	The user chooses an item and clicks the delete item button, and then the system will display the item details and ask for user confirmation to delete the item. The user confirms the deletion and then the system will delete the item and acknowledge the user that the item has been deleted.	Pass
SRS_REQ_401 SRS_REQ_405 SRS_REQ_403	Test_400_003	The user updates the item details and then the system will acknowledge the user that the item has been updated.	Pass
SRS_REQ_401 SRS_REQ_404 SRS_REQ_403	Test_400_004	The user enters the item details that they want to register and the system will display the details that they enter and display a message that the item has been registered into the system.	Pass
SRS_REQ_402 SRS_REQ_403 SRS_REQ_407	Test_400_005	The user enters the barcode of the item that they want to search and the system will display the item and perform an operation based on the selected operation.	Pass
SRS_REQ_500	Test_500	Stock Management	
SRS_REQ_501	Test_500_001	The user clicks on the item they want and the system will display the details of the item.	Pass
SRS_REQ_501	Test_500_002	The user enters the barcode of a product in the search bar and the system will display the product details.	Pass
SRS_REQ_502	Test_500_003	The system will display a notification on the homepage about products with insufficient stock quantities.	Pass
SRS_REQ_600	Test_600	Sale Transaction Management	
SRS_REQ_601 SRS_REQ_602	Test_600_001	The worker scans the barcode of the product and the system will display the name, price and quantity of the product purchased by the customer.	Pass
SRS_REQ_605	Test_600_002	The worker chooses the payment method that the customer wants to use.	Pass

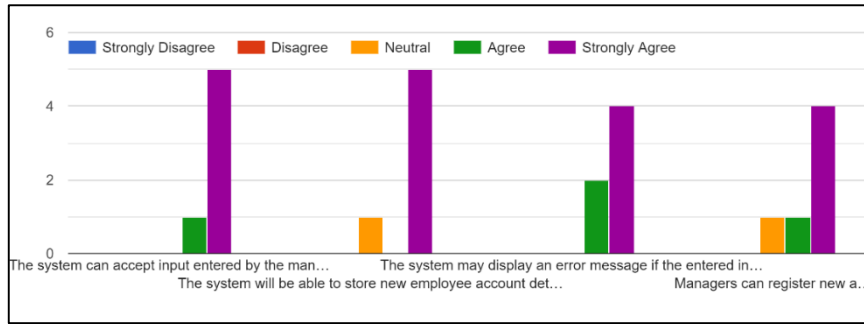
Software Requirement Specification	Test Case ID	Test Case Description	Test Result (Pass / Failed)
SRS_REQ_602 SRS_REQ_603 SRS_REQ_606	Test_600_003	The worker clicks the pay button and the system will display the list of items purchased by the customer with the total price that the customer has to pay.	Pass
SRS_REQ_604	Test_600_004	The worker clicks the cancel button and the system will delete the list of items that the customer purchased, canceling the purchase.	Pass
SRS_REQ_700	Test_700	Generate Daily Sale Report	
SRS_REQ_701	Test_700_001	The worker clicks the close sale button and the system will display the summarization of daily sales.	Pass
SRS_REQ_702	Test_700_002	The worker clicks the generate report button and the system will generate the daily sales report and display it.	Pass

**Table 7: Overall Test Case Result**

Test Case ID	Total Test Case	Total Passed
Test_100	2	2
Test_200	5	5
Test_300	3	3
Test_400	5	5
Test_500	3	3
Test_600	4	4
Test_700	2	2
Total	24	24

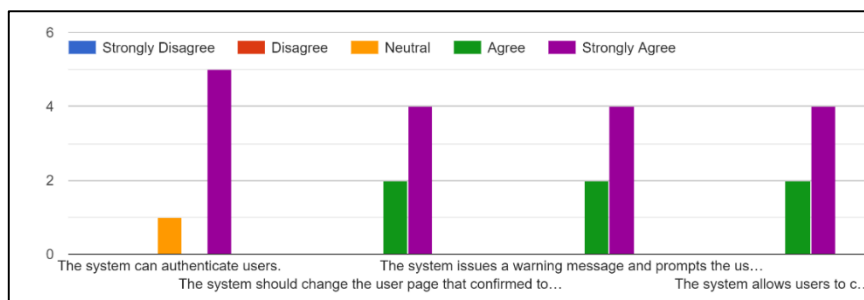
Table 7 shows that all 24 test cases have passed. This means that the developed system meets all the functionality requirements and can perform its functions smoothly.

The next phase of testing is user acceptance testing. The developed system will be given to the users to test every feature within it. For this project, there are 7 modules, so there are 7 features that need to be tested by the users, and their feedback will be recorded for further analysis. Figure 14 represents the feedback from the users regarding the register module.



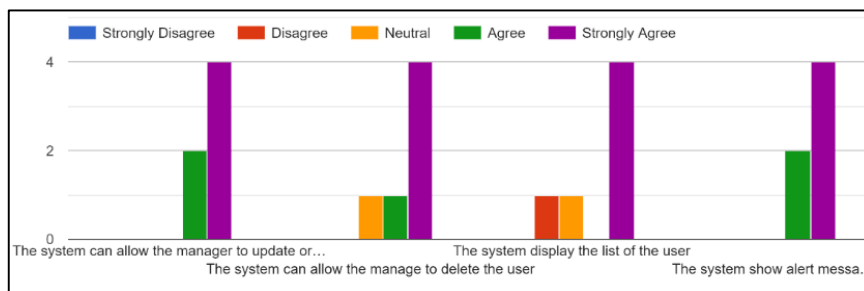
**Figure 14 : User Feedback for Register Module.**

Figure 14 shows that the majority of users who tested the register feature strongly agree that the feature functions according to their expectations, and they are satisfied with the developed feature. Figure 15 represents the feedback from the users regarding the login module.



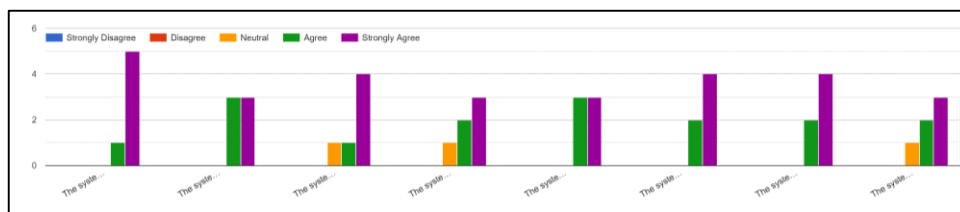
**Figure 15 : User Feedback for Login Module.**

Figure 15 shows that the majority of users who tested the login feature strongly agree that the feature functions according to their expectations, and they are satisfied with the developed feature. Figure 16 represents the feedback from the users regarding the manage user information module.



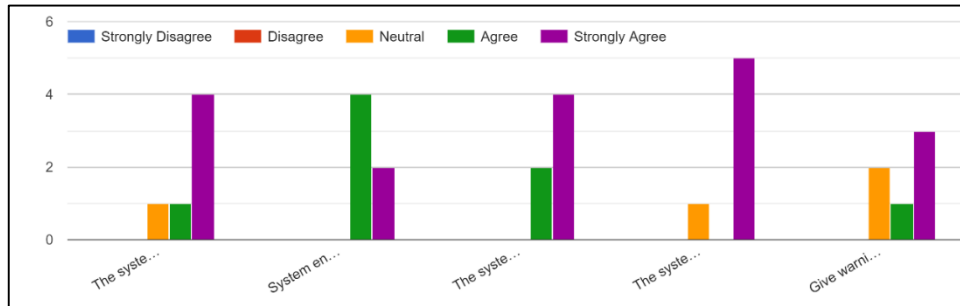
**Figure 16 : User Feedback for Manage User Information Module.**

Figure 16 shows that the majority of users who tested the manage user information feature strongly agree that the feature functions according to their expectations, and they are satisfied with the developed feature. Figure 17 represents the feedback from the users regarding the inventory management module.



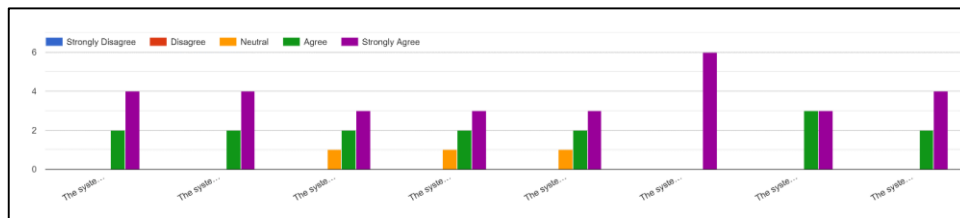
**Figure 17 : User Feedback for Inventory Management Module.**

Figure 17 shows that the majority of users who tested the inventory management feature strongly agree that the feature functions according to their expectations, and they are satisfied with the developed feature. Figure 18 represents the feedback from the users regarding the stock management module.



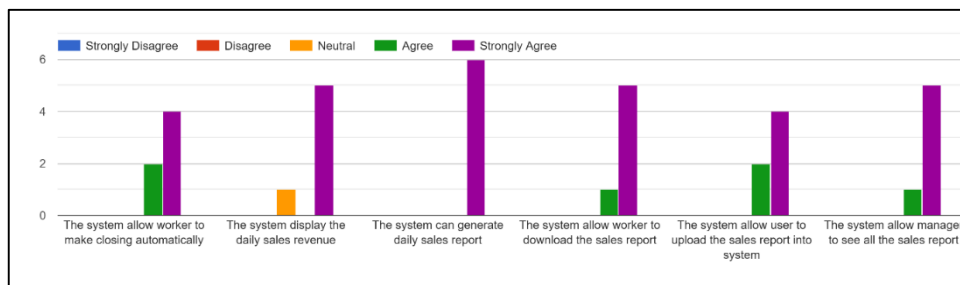
**Figure 18 : User Feedback for Stock Management Module.**

Figure 18 shows that the majority of users who tested the stock management feature strongly agree that the feature functions according to their expectations, and they are satisfied with the developed feature. Figure 19 represents the feedback from the users regarding the sales transaction management module.



**Figure 19 : User Feedback for Sales Transaction Management Module.**

Figure 19 shows that the majority of users who tested the sales transaction management feature strongly agree that the feature functions according to their expectations, and they are satisfied with the developed feature. Figure 20 represents the feedback from the users regarding the generate daily sale report module.



**Figure 20 : User Feedback for Generate Daily Sale Report Module.**

Lastly, Figure 20 shows that the majority of users who tested the 'generate daily sale report' feature strongly agree that the feature functions according to their expectations, and they are satisfied with the developed feature. Based on all the feedback given by the users who tested the system, all of them are satisfied with the developed system.

## 5. Conclusion

In conclusion, the Azzain grocery store management system has been developed to address operational challenges and enhance efficiency in business activities. By digitizing processes and ensuring secure data storage in the database, the system enables employees and managers to perform

various activities digitally, reducing time requirements and minimizing reliance on paper-based information storage. The implementation of this system alleviates the burden and pressure on workers, fostering a calmer and more harmonious work environment. Furthermore, the positive feedback received from user acceptance testing confirms that the system satisfies user expectations. To improve the system, consider adding features like bulk item registration and advanced inventory management. Integration of a customer loyalty program and analytics capabilities can also enhance functionality and decision-making.

### **Acknowledgment**

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### **References**

- [1] Pustaka, D. B. &. (2007). *Kamus Dewan Edisi keempat*. Dewan Bahasa & Pustaka.
- [2] Bhatia, S. C. (2008). Retail management. Atlantic Publishers & Dist.
- [3] Kang, Y., & Gershwin, S. B. (2005). Information inaccuracy in inventory systems: stock loss and stockout. *IIE transactions*, 37(9), 843-859. Freire Mário Marques, & Periera, M. (2008). *Encyclopedia of internet technologies and applications*. Information Science Reference.
- [4] Wong, T. (2023a, May 18). Reorder point formula and safety stock: A complete guide. inFlow Inventory. <https://www.inflowinventory.com/blog/reorder-point-formula-safety-stock/>
- [5] Adeniyi, S., & Damilola, O. (2019). Cost Implication of Inventory Management in Organised Systems. *International Journal of Engineering and Management Research*, 9.
- [6] Freire, M., & Pereira, M. (Eds.). (2007). *Encyclopedia of Internet technologies and applications*. IGI Global.
- [7] Manthou, V., & Vlachopoulou, M. (2001). Bar-code technology for inventory and marketing management systems: A model for its development and implementation. *International Journal of Production Economics*, 71(1-3), 157-164.
- [8] Lestari, N. S., Fadriani, H., Sujana, A., Herdiana, Y., & Hidayat, R. (2021, February). Design and Application Data-Based Employee Eat Barcode Scanner. In *Journal of Physics: Conference Series* (Vol. 1764, No. 1, p. 012065). IOP Publishing.
- [9] Zulkipli, M. S. N. (2019). Sistem inventori kedai runcit. *Applied Information Technology And Computer Science*, 2(2), 1799-1809
- [10] Shamsuddin, M. A. M., & Salamat, M. A. (2021). Sistem Pengurusan Inventori dalam Talian Kedai Bundle. *Applied Information Technology And Computer Science*, 2(2), 1799-1809.
- [11] Sistem Lima P.O.S Termurah – Khusus Untuk Peniaga Kecil Dan PKS. (n.d.). Dicapai pada November 28, 2022, dari <https://www.limapos.com/>
- [12] Dennis, A., Roth, R. M., & Wixom, B. H. (2012). *System Analysis and Design, Fifth Edition*. John Wiley & Sons.