SECD2613

SYSTEM ANALYSIS AND DESIGN

SECTION 03

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TITLE:

PROJECT P2

(INFORMATION SYSTEM GATHERING AND REQUIREMENT)

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1.0 OVERVIEW OF THE PROJECT

In today's fast-paced retail environment, effective inventory and sales management is crucial for small shops. Many stores still use manual methods such as writing on paper or using basic spreadsheets. This often leads to problems such as wrong stock counts, forgotten expiry dates, missed deliveries, and poor tracking of supplier items. These inefficiencies can result in financial loss, product wastage, and frustrated staff or customers.

Mrs. Salmi, a small business owner who runs a mini mart at KTDI, UTM (University Technology Malaysia) is facing several challenges with her manual-based business. We visited the mart and noticed the difficulties the staff faced in keeping track of stock and sales. They still use manual data entry, which causes mistakes between actual stock and what is recorded. Sometimes, expired items are not removed in time, and sales reports are not accurate. These problems showed us the need for a better system. Therefore, this project aims to design a suitable inventory and sales management system for Mrs. Salmi's mini mart. The system will include stock-in/stock-out tracking, expiry alerts, barcode scanning, integrated payment tracking, receipt printing and sales performance reporting.

This report includes 3 main phases. The first phase is regarding the project proposal, which we identify the problem faced by the owner and propose suitable solutions. We also defined the objectives to be achieved and the scope of this project. The planning for the project is done by using Work Breakdown Structure (WBS) and charts to ensure consistent project progress.

The second phase is about information system gathering and requirement. In order to design a suitable inventory and sales management system for the mini mart business, we conducted interviews to gather information regarding the current system and the business workflow. We also identify the functional and non-functional requirements and develop the current logical DFD to ease the analysis of the business current system later.

The third phase which is also the last phase of the project is related to the analysis of the current system and design of the new system. In this phase, we develop both logical and physical DFD for the new system and also included a system prototype based on the designed system by using Figma to perform demonstration.

2.0 PROBLEM STATEMENT

Since Mrs. Salmi's mini mart operates using a manual system, inventory tracking as well as sales recording only relies on notebooks, spreadsheets and calculators. Due to the lack of integrated inventory and sales management approach, Mrs. Salmi faces several issues in the daily operation of her mini mart. The issues are outlined below:

- **Lack of real time inventory tracking:** The activity of recording inventory updates (stock in/out) is done manually, which causes time delays in stock control and difficult to monitor stock availability.
- **Unmonitored expiry dates:** Expired products are not tracked systematically, leading to the possibility of selling expired goods to customers.
- **Inaccurate total calculations during checkout:** Manual calculations using calculator increase the risk of human error, which results in incorrect billing that affect business revenue and customer satisfaction.
- **Inaccurate sales recording:** Manual transaction recording from various sources increases the risk of missing entries and duplication resulting in inaccurate sales report.
- **No real-time visibility in sales trends:** The business is unable to determine the best-selling products and take informed actions to boost the business sales.
- **No automated receipt generation:** The business is unable to generate instantaneous digital receipts for customers and business record purpose.
- **Reduced sales during semester break:** Number of customers are reduced during semester break as students are away from campus and negatively affect business sales.

3.0 PROPOSED SOLUTIONS

To solve the current problems faced by Mrs. Salmi's business, we propose the development of a mobile application that integrates with inventory and sales management system. This mobile application will help Mrs. Salmi's business to efficiently manage the inventory and sales digitally and minimize physical workload.

The mobile application will have two main features which are the Inventory Management System and Sales Management System. For the Inventory Management System, owner and staff will be able to register the products into the system by entering the product details including name, selling price, expiry date and available quantity. The system will also include an automatic alert feature which user will be informed when restocking is needed or when the product is near the expiry date. The Inventory Management System should be able to update automatically from time to time especially after the products are scanned for checkout.

For the Sales Management System, owner and staff will be able to perform barcode scanning via the mobile application to checkout customers items. The system will automatically calculate the total amount to be paid and generate a digital receipt for customers after payment. Each transaction will be recorded in the system for sales reporting. Lastly, owner will be able to view real time sales performance for the business, identify the best-selling products and make decisions to boost the business revenue.

Technical Feasibility:

The proposed solution involves the development of a mobile application integrated with inventory and sales management system. From a technical perspective, the project is technically feasible and can be developed using available common tools and current technologies.

In terms of hardware, the system can be operated using existing smartphones that have a clear camera that support barcode scanning. For software development, the application framework can be built using React Native. This framework allows cross-platform deployment in both iOS and Android devices. Meanwhile for the data storage, there are several real-time cloud databases such as Firebase that can be used to store inventory and sales data securely. The integration of external APIs such as Touch 'n Go e-wallet API also allows digital payment within the sales management system.

With skilled developers and accessible frameworks, the proposed system is technically well-supported.

Operational Feasibility:

The proposed system is designed as a smartphone-based mobile application. From an operational perspective, the project is operationally feasible as both owner and staff can operate the system easily with guided steps.

Nowadays, public are expose and familiar with the use of smartphone and mobile applications, making our proposed system accessible and convenient for the business daily operation. The system interface will be user-friendly to ensure the ease of use. As the business only involves small number of staff, training can be conducted easily to ensure owner and staff are familiar with the use and features of the system.

With sufficient training and support, the proposed system can be implemented smoothly into the business operation. Therefore, the proposed system is said to be operationally feasible.

Economic Feasibility:

Since the proposed system can be operated using existing smartphones, no additional hardware costs are required. The development of the mobile application also can be achieved using low-cost development tools such as React Native and Firebase for data storage. Therefore, the proposed system is said to be economically feasible as the system requires only minimal development and maintenance expenses and it helps to reduce losses cause by human errors and provide insights to boost sales performance.

Overall, the inventory and sales management system for Mrs. Salmi mini mart is feasible in terms of technical, operational and economic.

4.0 INFORMATION GATHERING PROCESS

To truly understand Mrs. Salmi's business existing manual workflow and gain more information in order to design a digital system that is suitable and meets the needs of Mrs. Salmi's mini mart, we conducted both interactive and unobtrusive method to identify problems, understand the current business process, and gathered both functional and non-functional requirements for the proposed system.

4.1 Method Used:

1) Interview (Interactive Method)

To gain necessary information regarding the business, we decided to conduct an interview session with the mini mart owner, Mrs. Salmi. Before the interview session, we made preparations by designing and arranging necessary questions in order to obtain important information related to the current system challenges and business operational routine. These questions consist of open-ended questions and closed questions to smoothen the interview process. Some examples of the interview questions are listed as below:

- How do you keep track and manage the products in your store?
- How do you monitor products expiry date?
- What are the challenges you faced during customer checkout?
- How do you trace every transaction?
- What are the other problems that affect your business daily operation and sales?
- Would it be helpful to know the best-selling products?
- Would you prefer an automated digital inventory and sales management system to replace the current manual system?

2) Observation (Unobtrusive Method)

To identify hidden issues that may not be expressed or explained by Mrs. Salmi during interview, we decided to visit the mini mart and observe the mini mart operations without interrupting the business process. We observed how the management of the inventory and sales are conducted manually and the process during customer checkout. This method allowed us to identify inefficiencies that are not mentioned in the interview before.

4.2 Summary From Method Used:

1) Summary from Interview

Based on the interview conducted with the mini mart owner, Mrs. Salmi, we can conclude that Mrs. Salmi is open to have an automated digital inventory and sales management system to replace the current manual system. The current manual system has several flaws as products availability and expiry date need to be checked physically every 2 to 3 days. For customer checkout, the cashier has to remember all the item price and calculate the total payment using a calculator. Name and quantity for checkout items are also not recorded for every transaction making the tracking of the products and calculations of the total sales difficult. Lack of integrated sales system makes the owner have to sum up all the received sales amount by referring to various sources such as Touch n' Go account, bank account and cash. All these manual operations not just time consuming, but also lack of efficiency and accuracy for both business operation and sales. Some examples of the interview questions replies are provided as below:

- How do you monitor products expiry date?
  (We don't have a system that tracks products expiry date. Therefore, we have to consistently check items manually especially items that have a fast expiry date such as breads to prevent selling expired products to customers.)

- How do you trace every transaction?
  (All total amounts for customer checkout are only calculated using a calculator. Then, customers will either pay by cash, or transfer it into the mini mart's Touch n' Go account or bank account. At the end of the day, I have to refer to the accounts and cash received to calculate the total amount received for the day.)

- Would it be helpful to know the best-selling products?
  (Yes. Since our mini mart primary customers are university students, the best-selling products are always changing from time to time. There is definitely a need to identify the best-selling products for the current time so that we can order the products more and increase our business sales.)

2) Summary from Observation

Based on our visit to Mrs. Salmi mini mart and the observations we conducted, we can notice that some manually conducted business operation are inefficient especially the inventory and sales management. For the inventory registration and updating, staff still manually count and write down the details of the products in a book. Staff also need to consistently check the items everyday to determine low stock products to be restocked and expired products to be removed. Apart from that, we noticed that customer checkout is slow as the cashier uses calculator to sum up the price of customer chosen items. The checkout becomes slower when the cashier forgot the item price and have to check the price manually. There are also no physical or digital receipts generate for every transaction, making the tracking of the transaction difficult and unable to know the total of transaction as well as number of each item sold for each day.

5.0 REQUIREMENT ANALYSIS

5.1 Current Business Process:

1) Scenario 1: Inventory Management

New products and restocked products are manually recorded in a book, including product name, price and quantity. After that, restocking will be done after manually checking the shelves. If the product is on low stock, owner will refer to the supplier contact book and contact the supplier to order more stocks. If the product is expired, the staff will remove the product from the shelves and replace it with other unexpired product.

2) Scenario 2: Sales Management

During customer checkout, owner or staff have to remember all the items price and calculates the total prices for customer chosen items using a calculator. Then, customer can pay for their items using cash or transfer it into the mini mart's e-wallet or bank account. After payment, customers do not receipt receipts and can exit the mart with their b.0 ought items.

3) Scenario 3: Sales Reporting

After the closing of the mini mart for each day, owner will have to sum up all the received money by referring to various sources such as the mini mart's Touch n' Go account, bank account and cash to obtain the total sales for each day. The total sales for each day is not enough and accurate to show the business performance as the total sales is only the total money receive for the day, and not the gross revenue for the sales.

5.2 Functional Requirement:

Function	Input	Process	Output
Product Registration	Product details such as name, price, quantity, expiry date and supplier information	Store product data into the system	Product is added into the system and can be referred to
Real-Time Stock Updating	Quantity sold or restocked	Automatically increase or reduce product quantity	Updated stock level
Expiry Alert	Expiry date of the products	Always monitor the expiry date from the current time	Alert notifications for items that is near the expiry date
Sales Checkout	Product barcode	Scan barcode, add items into transaction details and calculate the total	Display total amount and quantity of items scanned
Receipt Generation	Completed transaction	Format the transaction data into receipt	Generate digital receipt
Transaction Recording	Completed transaction	Store transaction with its details into the system	Customer transaction details are recorded into the transaction history and can be referred to
Sales Report Generation	Transaction records	Analyse sales from time to time	Generate sales report and show best-selling items

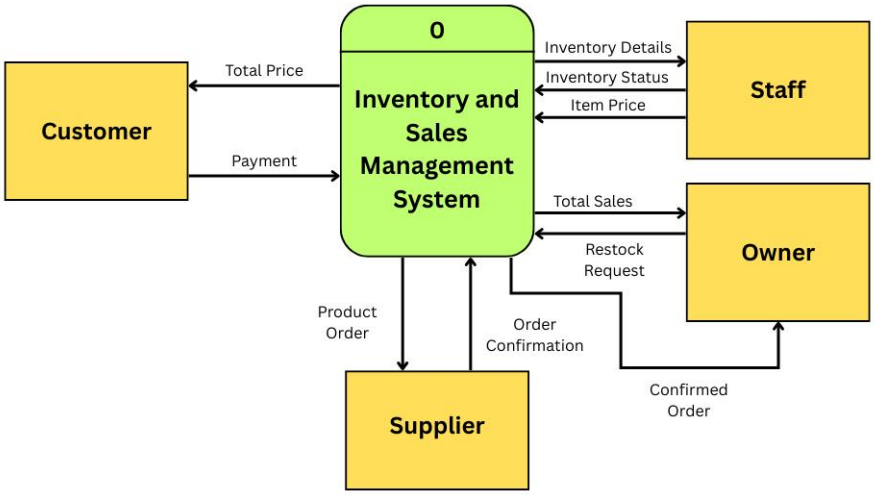
5.3 Non-Functional Requirement:

Performance Requirements	- The system must respond within 3 seconds after barcode scans - Inventory and sales data are updated within 5 minutes after transaction - System are able to handle more than 100 transactions per day smoothly
Control Requirements	**-** Only authorized owner and staff can access to the system - All data should be stored securely in the cloud - System should be available during the operational hours

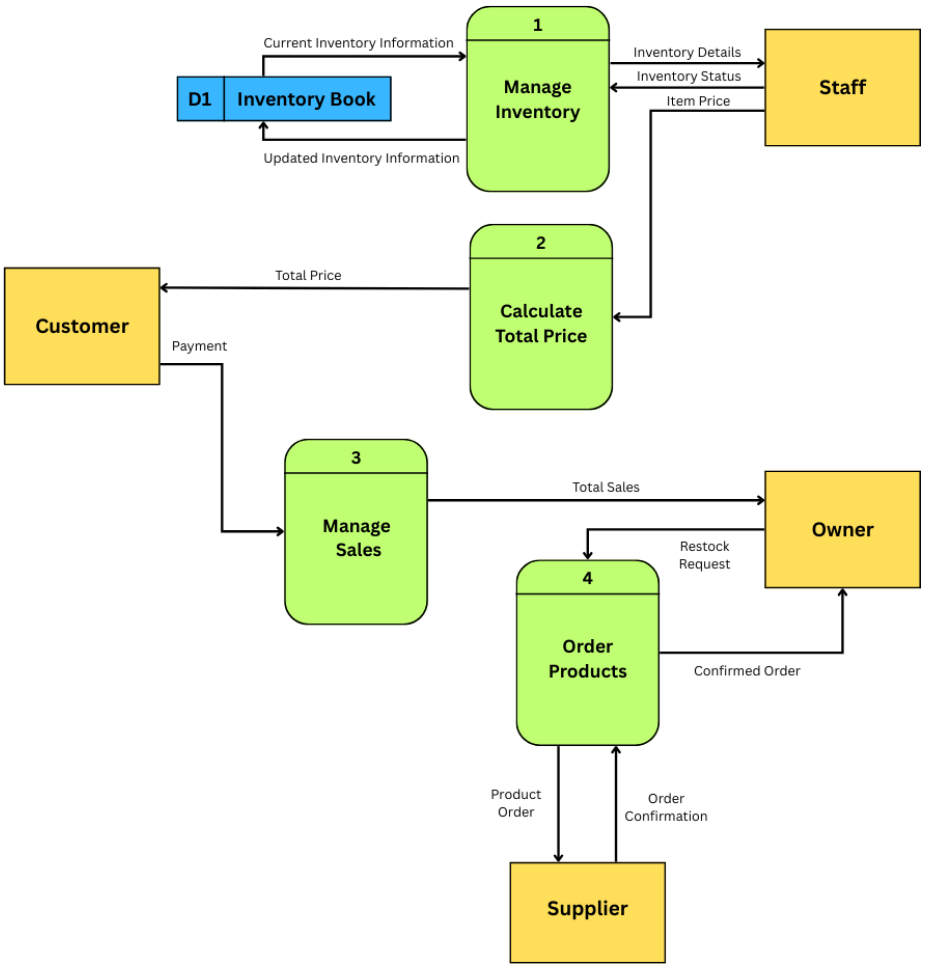
5.4 Logical DFD AS-IS System:

Since Mrs. Salmi's current business process does not involves digital system, therefore, the DFD diagrams will be based on manual workflow only.

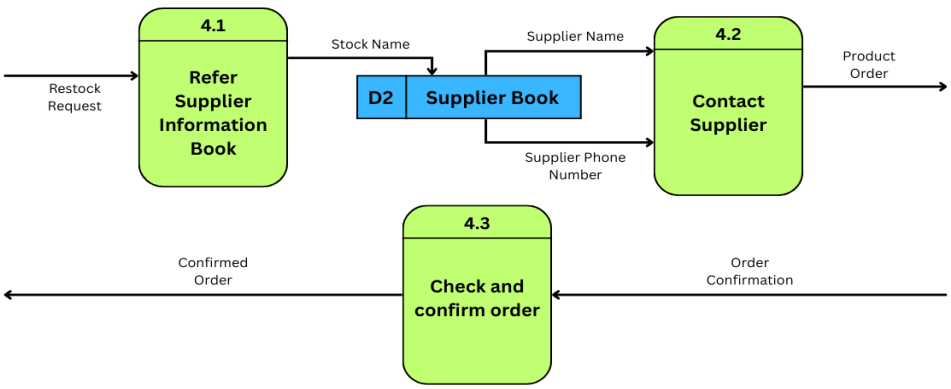
1) Context Diagram



2) Diagram 0



3) Child Diagram: Order Products



6.0 SUMMARY OF REQUIREMENT ANALYSIS PROCESS

The requirement analysis process began with an investigation into Mrs. Salmi's current business operations using both interviews and direct observation. This helped us gain a deeper understanding of the manual workflow at the mini mart, including how inventory is tracked, sales are recorded, and daily reports are generated. These findings revealed inefficiencies such as frequent manual stock checks, the absence of transaction receipts, and delayed identification of expired products, leading to potential losses and poor customer experience.

From the analysis, we identified key functional requirements for the proposed system. These include the ability to register products with full details, such as name, price, quantity, expiry date, and supplier, automate real-time stock updates, generate alerts for low stock and expiring items, and allow barcode scanning for fast, accurate checkout. The system must also generate digital receipts, record all transactions for future reference, and provide sales performance reporting, including best-selling items and daily sales summaries.

In terms of non-functional requirements, the system should be fast, secure, and reliable. It must respond to barcode scans within 3 seconds, update inventory within 5 minutes of any transaction, and support more than 100 transactions per day without lag. Only authorized users should have access, with all data securely stored in the cloud. These requirements ensure the system remains efficient, secure, and operational during business hours, addressing the current challenges faced by the mini mart.