UTM

UNIVERSITI TEKNOLOGI MALAYSIA

System Analysis and Design (SECD2613)
Phase 2- Information System Gathering and Requirements

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APPENDIX

1.0 Overview of the project

The Pet Inventory Management System is designed to streamline and automate the inventory management processes in pet stores, veterinary clinics, and pet shelters. Our system needs to efficiently track various pet-related products, including food, accessories, and toys, by monitoring stock levels in real-time when items are nearing expiration.

Additionally, the system should handle supplier and purchase order management, maintaining a database of suppliers, tracking orders, and managing incoming stock.It should integrate with POS systems for seamless sales transactions and update inventory in real-time. Our system must provide the sales reporting, highlighting sales performance and manage customer records, including purchase history.

Reporting and analytics capabilities are crucial, as the system needs to generate detailed inventory reports, track stock movements, and analyze sales data to identify trends. Notifications and alerts must keep staff informed about stock levels and order statuses. User management features should ensure secure access with role-based permissions and maintain audit logs for accountability.

Overall, The project involves several key phases. First, we will gather requirements to thoroughly understand the current system, data flow, and information needs. Next, we will design the new system using technologies like Django for the backend, Vue.js for the frontend, and databases like MySQL .Then we will develop, test, and ensure the system functions correctly. After that, we will migrate data from the old system, deploy the new system and train staff. Finally, we will provide ongoing support and continuously optimize the system for performance and user satisfaction.

2.0 Problem Statement

1. Manual Inventory Management: The shop owner said their pet store often relies on manual methods for inventory management, leading to errors, inefficiencies, and discrepancies between actual stock levels and recorded inventory.

2. Limited integration of technology: The shop owner does not satisfy with the manual system, and he needs an inventory management system would be one that works smoothly with our current workflows, updates stock levels in real time, sends out reorder reminders on its own, and provides detailed sales analytics to assist predict demand and cut down on waste.

3. Resource Constraints and Training Challenges: The shop owner doesn't have the resources and expertise to implement advanced inventory management systems effectively. They highlighted that to guarantee the smooth implementation and use of the new technology, user-friendly interfaces and extensive staff training are essential. The process of training staff to use new technologies and overcoming resistance to change can be time-consuming and challenging.

4. Inefficient Order Fulfillment: Without real-time visibility into stock levels and automated ordering processes, pet supply stores may struggle to fulfill orders accurately and in a timely manner, leading to customer dissatisfaction and lost sales.

3.0 Propose Solution

Pet Inventory Management System is a system that implements an automated inventory management system that tracks stock levels in real-time. The system will use barcoding technology to ensure accurate and efficient inventory tracking. Each item will be tagged and scanned, reducing manual entry errors and discrepancies.

Besides, this system will automatically update stock levels with every transaction and send out automated reorder alerts based on predefined thresholds by developing a system that seamlessly integrates with existing workflows and point-of-sale (POS) systems.
Other than that, the Pet Inventory Management System will create a user-friendly interface that is intuitive and easy to navigate and provide comprehensive training programs and resources to ensure staff are familiar with using the new system. The system also offers ongoing support and troubleshooting assistance to make sure the system runs smoothly.

Lastly, the system also implements real-time visibility into stock levels and automates the ordering process to ensure timely and accurate order fulfillment. The system will track stock movements and notify staff when low stock levels, ensuring orders are placed before items run out.

4.0 Information gathering process

4.1 Method used

We used several methods to collect information in order to make sure our solution improves business operations in an effective way. In particular, we used the pyramid structure method for conducting interviews and using Google Forms questionnaires to collect information from customers' view.

Google Forms Questionnaires
We sent Google Forms to 10 pet owners in order to gather their thoughts and experiences. Understanding their requirements, preferences, and problems related to product availability and in-store services was the goal. These questionnaires provided data that allowed us to identify common problems and opportunities for advancement. The surveys asked about the following topics:

- The frequency of store visits
- Satisfaction with product accessibility
- Experiences of products that out of stock
- Opinions on the products qualities and expiry dates
- Suggestions for enhancing order fulfillment and inventory management

Interview by using Pyramid structure
We spoke with the store manager in-person to learn more about the difficulties they have in carrying out their daily tasks. The pyramid structure approach was used in these interviews, which began with narrow, closed-ended questions and moved to more general, open-ended ones. This strategy assisted in rapport-building and comprehensive data collection. The structure of the interview consisted of:

- **Close-Ended Questions (Narrow Focus)**
    - How frequently do you conduct inventory counts?
    - Do you currently use any technology for inventory management? (Yes/No)
    - Have you experienced stockouts in the last month? (Yes/No)
    - Are expired products a recurring issue in your store? (Yes/No)

- **Intermediate Questions (Moderate Focus)**
  - How do you track product expiration dates?
  - What are the main challenges you face with your current inventory management system?
  - How often do you need to manually adjust inventory records?

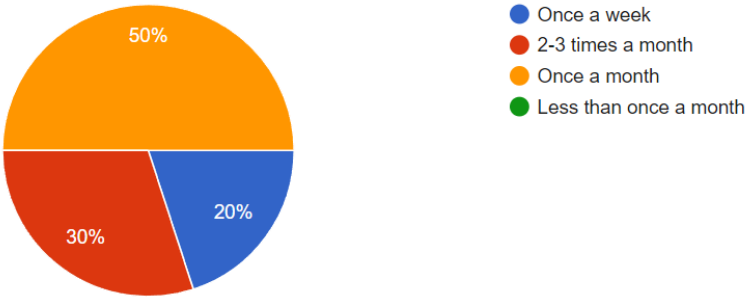
- **Open-Ended Questions (Broad Focus)**
  - Can you describe a typical day in managing store inventory?
  - What improvements would you like to see in your inventory management process?
  - How do you think integrating barcode scanning and real-time tracking could impact your operations?
  - What kind of support and training do you believe would be necessary for your staff to adapt to a new system?

4.2 Summary from method used

These are the information that we collected from:

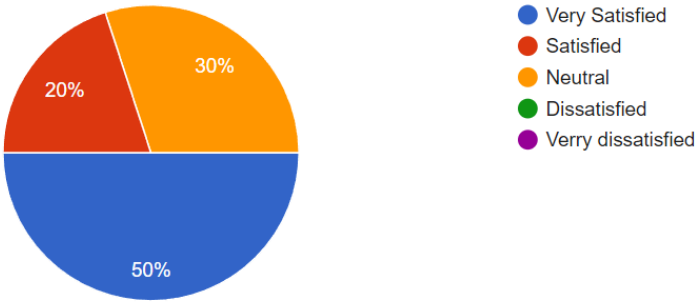
➔ Google Form Questionnaires

How frequently do you shop for pet supplies?



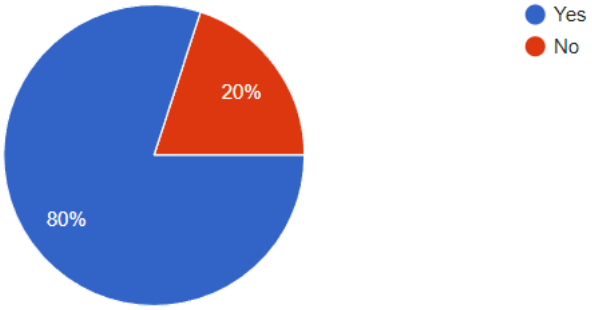
From here we learned that 50% of respondents shop for pet supplies once a month, 30% shop 2-3 times a month, and 20% shop more frequently. Thus it shows that most of the customers have a regular shopping habits. This shows that a consistent product availability is important.

How satisfied are you with the variety of products in the pet store you shop?



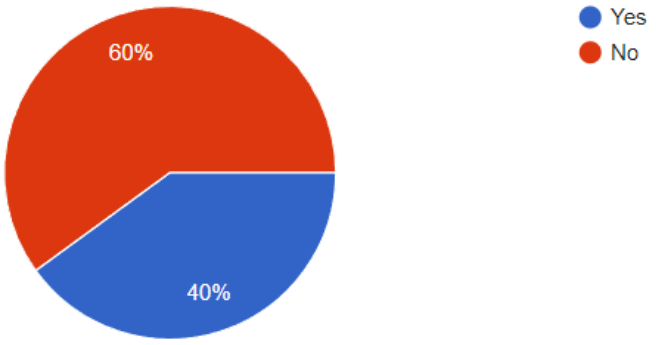
From this question, we know that 50% of the customers are very satisfied with the variety of products in the stores, 20% of the customers are satisfied, and 30% of the customers are neutral with the variety of products. This shows that a majority are happy with the variety, but there's room for improvement to increase overall satisfaction.

Have you ever experienced difficulties finding a specific product?



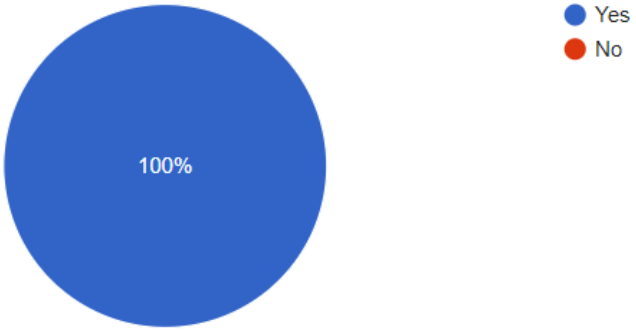
From this question, we know that the majority of the customers have difficulties in finding a specific product. Improved inventory management could enhance product location and availability.

Have you ever experienced that the things you wanted to buy from the store are out of stock?



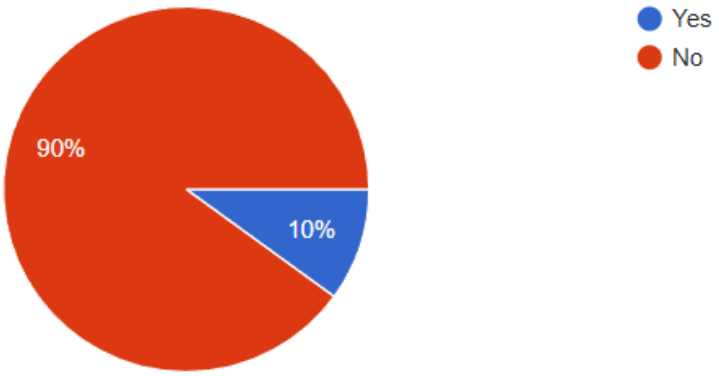
From this question, we know that 40% of the customers have experienced that the things that they wanted to buy from the store are out of stock.Real-time inventory tracking and automated reorder processes could mitigate this issue.

Do you prefer shopping at stores that offer real-time inventory tracking?



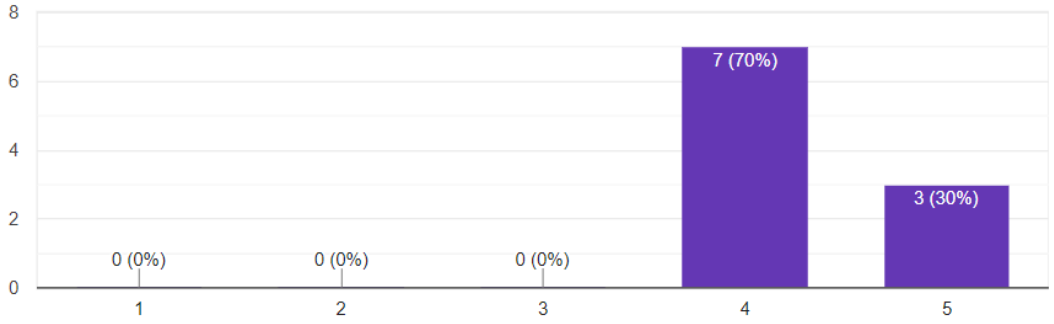
In the survey, all of them voted yes on this question. This shows that implementing this feature is critical to meet customer expectations and improve shopping experience.

Have you ever purchased a product from a pet store that was expired or close to expired?



From this question, we know that 10% of the customers surveyed have purchased with an expiry or close to expiry product. Although it's a small portion, we should take this problem into consideration. Automated expiration date monitoring can prevent such occurrences, protecting customer health and store reputation.

How would you rate the importance of technology-driven solutions in improving the shopping experience at pet supply stores?



Lastly, we surveyed that most of the customers rated that technology-driven solutions are important in improving their shopping experience.Thus integrating advanced technology is essential to meet customer expectations and improve operational efficiency.

➔ Interview

We have visit a pet shop owner at ⌾ SM PET HOTEL

SM Pet Hotel

Interviews were conducted with the owner to get knowledge about difficulties they've encountered, and also how their system's working.

Picture of interviewing with the owner

Shop owner interview form

These are the responses that we collected from the interview :

1. Do you currently use any technology solutions for inventory management in your pet supply store?

   No

2. If yes, please specify the technology solutions you use (e.g., barcode scanning, inventory software).

   N/A

3. How satisfied are you with the effectiveness of your current inventory management system?

   Dissatisfied

4. Have you encountered any challenges or difficulties with your current inventory management system?

   Yes

5. If yes, please describe the main challenges you have faced.

   Sometimes, it’s hard for me to determine which products need to be ordered more, leading to wastage because I'm not able to sell them all.

6. Would you say that integrating technology solutions with your inventory management processes is important for the success of your pet supply store?

   Yes

7. What specific features or capabilities do you believe would improve your inventory management processes and overall business operations?

   A system that can assist our store in managing the inventory process, such as determining stock quantities and tracking sales on specific products.

8. How do you envision the ideal inventory management system for your pet supply store?

My dream inventory management system would be one that works smoothly with our current workflows, updates stock levels in real

time, sends out reorder reminders on its own, and provides detailed sales analytics to assist predict demand and cut down on waste.

9. In your opinion, what are the key benefits of implementing advanced inventory management systems in pet supply stores?

   The key benefits include better inventory tracking accuracy, less waste, higher product availability, improved demand forecasting capability, and overall more effective business operations.

10. Is there anything else you would like to share or discuss regarding inventory management challenges and solutions in pet supply stores?

    In order to ensure that new systems are adopted smoothly, I would emphasize the importance of user-friendly interfaces and comprehensive training for personnel. It would also be quite helpful to have assistance troubleshooting any problems that may come up during regular operations.

From this interview, we can conclude that the shop owner is not satisfied with the manual system in place and does not currently use any technology solutions for inventory management. The owner mentions issues with the manual method, including difficulties evaluating reorder needs and consequently causing wastage. The owner believes in an ideal system that offers real-time updates, automated reorder alerts, and comprehensive sales data and feels that using technology is essential for success. In order to ensure seamless operations and efficient inventory management, the owner highlighted the importance of features that can track sales and manage stock numbers. User-friendly interfaces, thorough staff training, and ongoing support were also emphasized.

5.0 Requirement Analysis

5.1 Current business process

In a pet supply business, the standard workflow entails multiple manual procedures. Using simple instruments like pens and paper or spreadsheets, staff members determine reorders and occasionally count inventory levels. Suppliers are contacted via phone or email to make orders, and purchase orders are manually compared against arriving shipments. Basic POS systems handle sales transactions, customers receive receipts, and sales data is manually assembled into reports. Direct help is provided for customer service, special orders are manually tracked. Data management is done by hand, which makes it labor-intensive and error-prone throughout the entire process, including record-keeping and analysis.

Process Workflow

- Staffs / employees

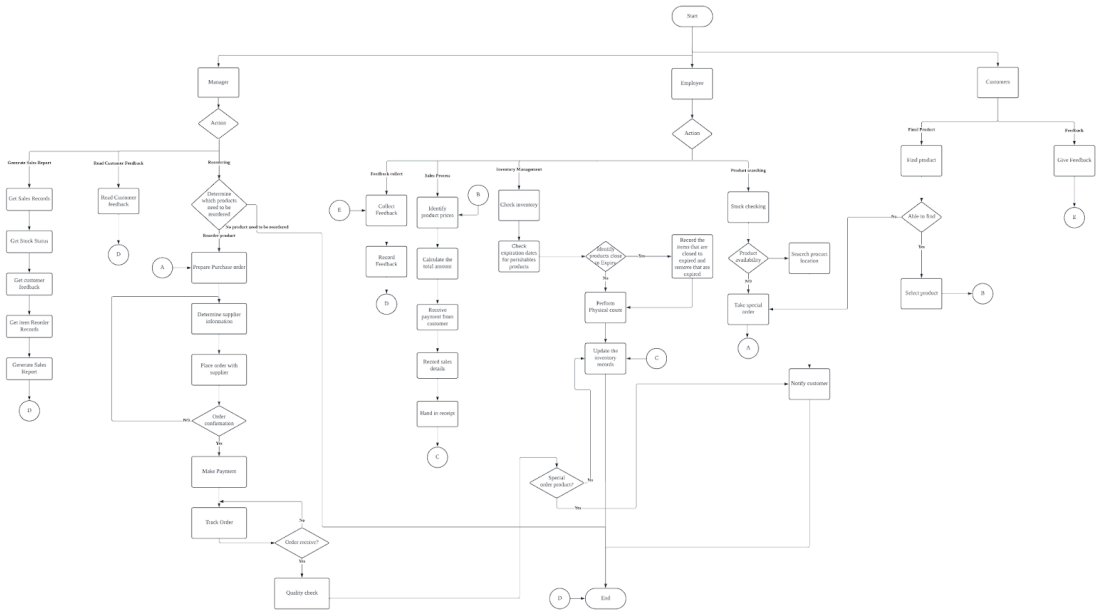
1. Select actions that wanted to be performed
2. Inventory Management
    - 2.1. Check inventory
    - 2.2. Check expiry dates for perishable items
    - 2.3. Identify product expired or close to expiry dates
        - 2.3.1. Record the items that are closed to expired and remove items that are expired
    - 2.4. Update inventory records
3. Stock Checking
    - 3.1. Identify product
    - 3.2. Check for the product availability
    - 3.3. If no, proceed to special order
4. Sales Process
    - 4.1. Identify product prices
    - 4.2. Calculate the total amount
    - 4.3. Receive payment from customer
    - 4.4. Record sales details
    - 4.5. Hand in receipt to customer
    - 4.6. Update inventory record

❖ Customers

1. Select action
2. Find product that want to purchase
    2.1. If able to find
        2.1.1. Select product
        2.1.2. Continue with the payment process
    2.2. Else
        2.2.1. Searching for help with employee
        2.2.2. Get notified the location of the product if available
    2.3. End if
3. Feedback
    3.1. Give Feedback about the product or store performance to the employee
    3.2. Employee will record the feedback

❖ Manager

1. Select action
2. Reordering Stock
    2.1. Determine which products need to be reordered
    2.2. Prepare purchase order
    2.3. Determine supplier information
    2.4. Place order
    2.5. Order confirmation
    2.6. Track order status
    2.7. Check order received
    2.8. Ask employee to update inventory records
3. Read feedback from customer
    3.1. Get customer feedback
4. Generate sales report
    4.1. Get sales records
    4.2. Get stock status
    4.3. Get customer feedback
    4.4. Get item reorder records
    4.5. Generate sales report



flowchart for the process

5.2 Functional Requirement

5.2.1 Context Diagram

5.2.1.1 Customer

Input	Process	Output
➢ Purchase Requests ➢ Purchasement ➢ Enquiries ➢ Feedback	Pet inventory Management System	➢ Receipts for Purchases ➢ Customer service response

5.2.1.2 Suppliers

Input	Process	Output
➢ Delivery of ordered inventory ➢ Invoices for delivered goods ➢ Order rejection notice	Pet inventory Management System	➢ Purchase orders lists ➢ Payment for invoices ➢ Order payment

5.2.1.3 Store Staff

Input	Process	Output
➢ Inventory counts ➢ Price calculation ➢ Customer assistance	Pet inventory Management System	-

5.2.1.4 Store Manager

Input	Process	Output
➢ Stock reorder decision ➢ Payments for stock reorder	Pet inventory Management System	➢ Customer feedback lists ➢ Sales Report ➢ Inventory Status ➢ Items reorder lists and receipt

5.2.2 Level 0 Diagram

Input	Process	Output
➢ Purchasement Requests ➢ Purchasement Methods ➢ Price Calculation ➢ Item Price	Process Customer Sales	➢ Receipts ➢ Sales Data ➢ Sold Items Counts
➢ Sold Items Counts ➢ Inventory Counts ➢ Inventory Delivery	Manage Inventory	➢ Inventory Status ➢ Updated Inventory Logs
➢ Stock Reorder Decision ➢ Reorder Payments ➢ Supplier Information ➢ Invoice for Delivery Goods ➢ Order Rejection Notice	Reorder Stock	➢ Order Purchase Lists ➢ Item Reorder Lists and Receipts ➢ Order Payment ➢ Items Restocking History
➢ Customer Assistance ➢ Feedback ➢ Enquiries ➢ Product Availability	Handle Customer Service	➢ Customer Service Response ➢ Customer Feedback Data
➢ Customer Feedback ➢ Sales Data ➢ Item Reorder Data ➢ Stock Condition	Generate sales report	➢ Sales Report

5.2.3 Child Diagram

5.2.3.1 Process 1.0

Input	Process	Output
➢ Purchasement requests	Summarize product purchasement	➢ Purchasement Lists
➢ Purchasement Lists ➢ Item Price ➢ Price Calculation	Calculate Total Price	➢ Total Price
➢ Purchasement method	Identify Payment Method	➢ Payment
➢ Receipt information	Count sold items	➢ Sold items counts
➢ Total Price ➢ Payment	Generate Receipt	➢ Receipt information ➢ Receipt
➢ Receipt information	Record Sales Information	➢ Sales Data

5.2.3.2 Process 2.0

Input	Process	Output
➢ Inventory delivery	Check product quality	➢ Qualified inventory
➢ Inventory counts	Count the stock	➢ Stock data
➢ Sold items counts	Record sold items	➢ Sold item lists
➢ Qualified inventory	Record new Items	➢ New item lists
➢ Stock data	Check expiry dates	➢ Product expiry date lists ➢ Expired product lists

➢ Sold item lists ➢ New item lists	Update inventory	➢ Inventory status ➢ Updated inventory logs
➢ Product expiry date lists	Note down close to expired product	➢ Close expiry products
➢ Expired product lists	Remove expired product	➢ Removed product lists

5.2.3.3 Process 3.0

Input	Process	Output
➢ Stock order decision	Determine products that are needed to reorder	➢ Product reorder lists ➢ Type of product needed to be reorder
➢ Order rejection notice ➢ Supplier information ➢ Type of product needed to be reorder	Select supplier	➢ Selected supplier
➢ Invoice for delivery goods	Summarize invoice	➢ Total price of product reordered
➢ Product reorder lists ➢ Selected supplier	Make order	➢ Order purchase lists ➢ Item reorder lists and receipts ➢ Order details
➢ Order details ➢ Payment details	Summarize order purchasement history	➢ Item restocking history
➢ Total price of product reordered ➢ Reorder payments	Make payment	➢ Payment details ➢ Order payment

5.2.3.4 Process 4.0

Input	Process	Output
➢ Customer assistance ➢ Customer enquiries	Assist customer	➢ Product availability check ➢ Product recommendation
➢ Feedback ➢ Enquiries	Interpret customer feedback and enquiries	➢ Customer feedback ➢ Customer enquiries
➢ Customer feedback	Summarize customer feedback	➢ Customer feedback data
➢ Product availability ➢ Product availability check	Check inventory	➢ Available products ➢
➢ Available products ➢ Recommended products	Response to customer	➢ Customer service response
➢ Product recommendation	Recommend product	➢ Recommended products

5.2.3.5 Process 5.0

Input	Process	Output
➢ Customer feedback data	Analyze customer feedback data based on items	➢ Feedback on bad review items ➢ Feedback of most selling items
➢ Sales data	Analyze sales data	➢ Lowest sales products ➢ Highest sales products ➢ Total sales
➢ Item restocking data	Analyze restocking data	➢ Total expenses on restocking
➢ Stock condition	Analyze stock condition	➢ Analyzed stock condition
➢ Feedback on bad review items ➢ Feedback of most selling items	Determine bad review items	➢ Bad review item lists
➢ Feedback of most selling items ➢ Highest sales products	Determine potential items	➢ Potential item lists
➢ Total sales ➢ Total expenses on restocking	Calculate profit for the month	➢ Monthly profit
➢ Bad review item lists ➢ Potential item list ➢ Monthly profit ➢ Analyzed stock condition	Generate sales report	➢ Sales report

5.3 Non-functional Requirement

When determining the efficiency and efficacy of a typical pet supply store's manual system, it is critical to analyze not only the precise functions it performs, but also its performance and quality characteristics. These non-functional criteria are crucial because they ensure the system's general dependability, usefulness, and maintainability. By resolving these issues, we can ensure that the manual procedures in place today are quite complicated to perform. In order to have a better understanding for system analysis and design in the following phase, we highlight some non-functional requirements, with an emphasis on performance and control, to provide a thorough framework for analyzing and enhancing the traditional pet supply shop system.

1.Performance requirements

- Response Time: To ensure customer satisfaction, the manual process of resolving customer requests, inventory checks, and creating receipts must be performed in a fair amount of time. Typical response times would be 5-10 minutes per transaction.
- Scalability: The typical system should be able to withstand increases in client volume, inventory quantity, and order frequency without significantly degrading performance.
- Reliability: Manual operations should continuously produce accurate and dependable outcomes. Errors in inventory counts, sales statistics, and customer service encounters should be reduced.
- Availability: The store's operations should be accessible during all business hours. Any downtime, such as inventory counts or product reordering, should be scheduled during off-peak hours to reduce interruption.

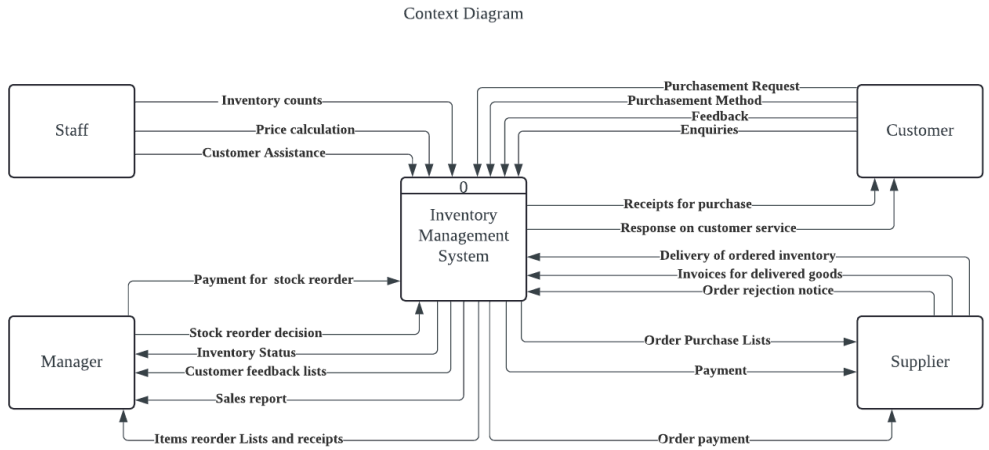
2. Control requirements.

- Security: Sensitive information, such as customer purchase history and supplier information, should be kept safe to avoid unwanted access. Physical security measures should be implemented to safeguard manual records.
- Compliance: The system should adhere to applicable local rules and regulations, such as those governing retail operations, data protection, and client privacy.
- Data Accuracy: Regular audits and verification methods should be used to assure the accuracy of manual data entries, such as inventory levels and sales records.

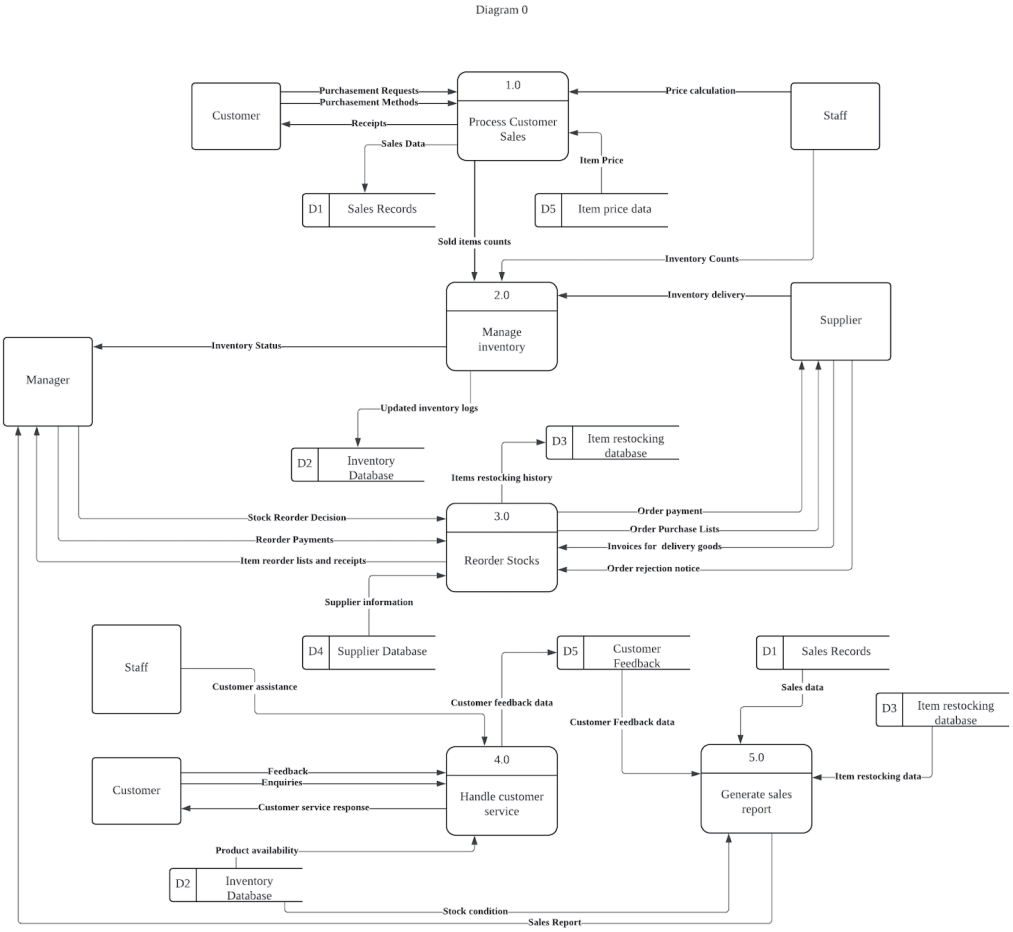
Auditability: All transactions and inventory movements should be
- manually documented and auditable. There should be comprehensive documentation indicating who did each activity and when it was completed.
- Maintainability: The manual system should be simple to manage. The procedures for updating records, rectifying errors, and resolving exceptions should be well-documented and simple.
- Backup and recovery: A manual backup strategy for vital information, including business sales records and inventory logs, should be in place. There should be a defined recovery plan in place in the event of data loss to ensure accurate records are restored.
- User Training: Employees should receive proper training to complete manual tasks correctly. Regular training sessions should be held to ensure that employees are up to date on procedures and best practices.
- Operational Transparency: Processes should be visible for easier monitoring and evaluation. Management should be able to conduct regular operational reviews in order to detect any problems.

5.4 Logical DFD AS-IS system

5.4.1 Context Diagram



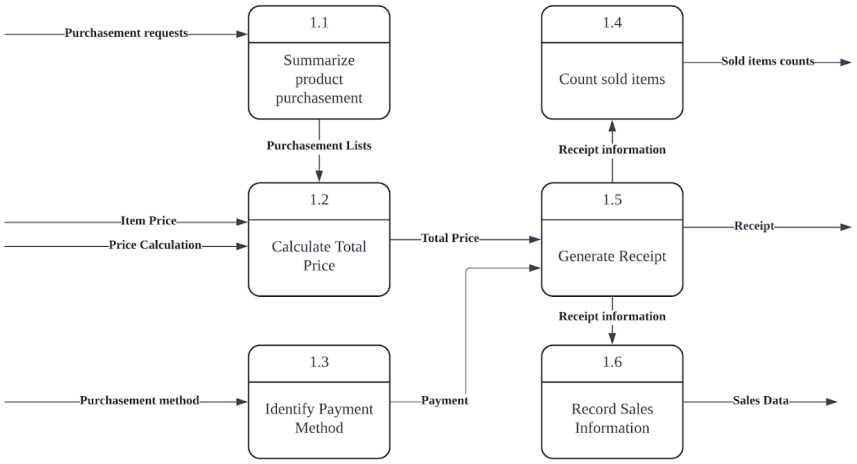
5.4.2 Diagram 0



5.4.3 Child Diagram

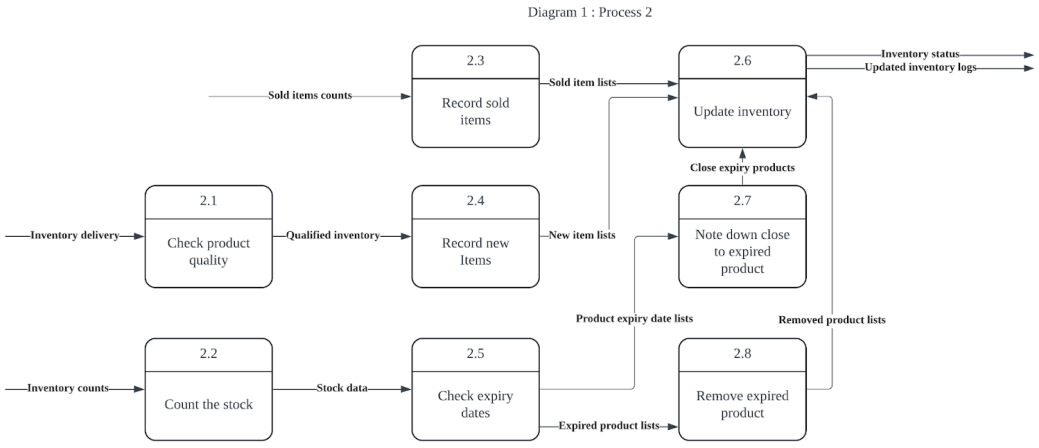
5.4.3.1 Process 1.0

Diagram 1 : Process 1



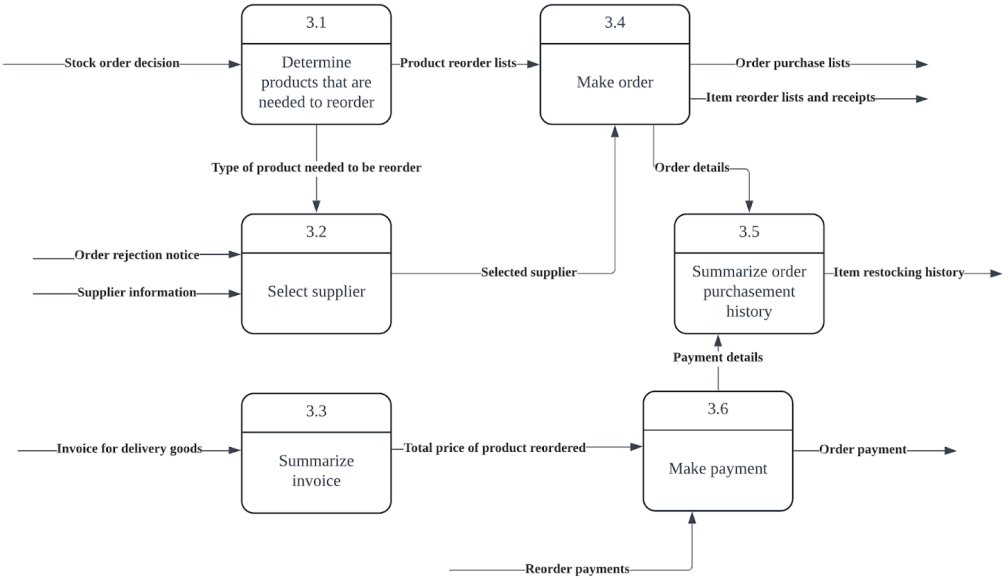
5.4.3.2 Process 2.0

Diagram 1 : Process 2



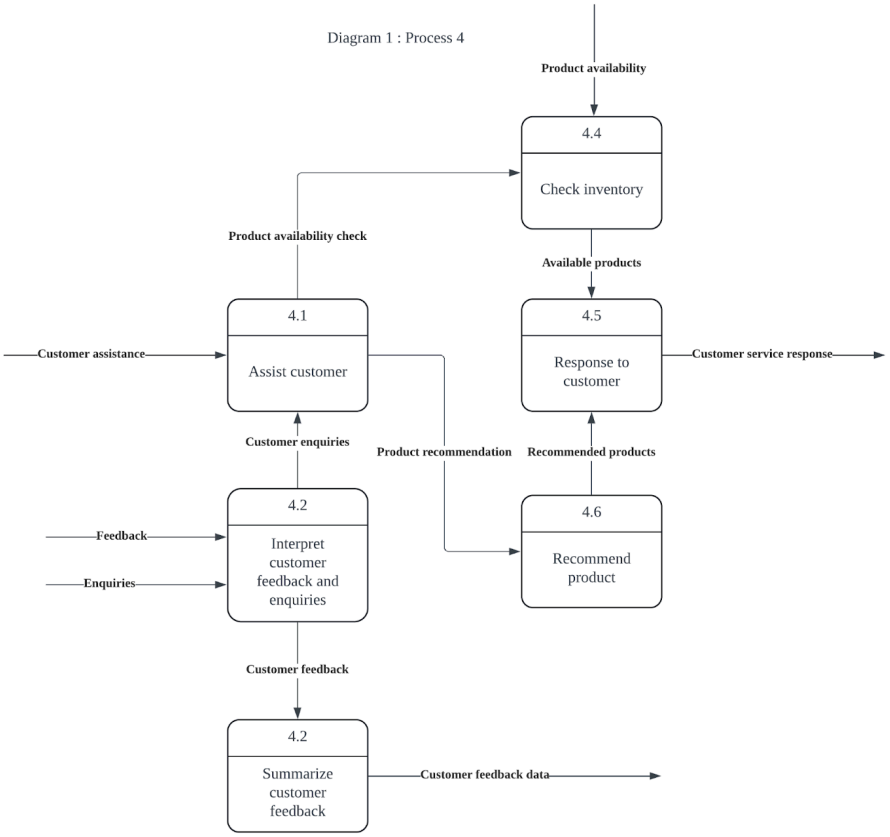
5.4.3.3 Process 3.0

Diagram 1 : Process 3



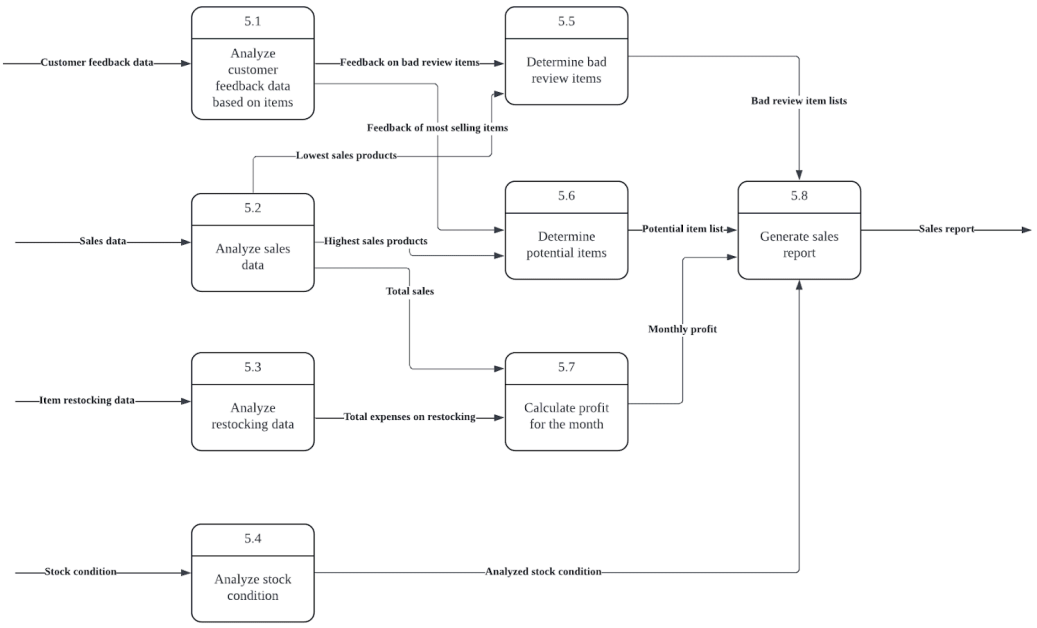
5.4.3.4 Process 4.0

Diagram 1 : Process 4



5.4.3.5 Process 5.0

Diagram 1 : Process 5



6.0 Summary of Requirement Analysis Process

1. Overview of the Project

The Pet Inventory Management System aims to modernize and automate inventory management in pet stores, veterinary clinics, and pet shelters. It tracks stock levels in real-time, integrates with POS systems, manages suppliers and purchase orders, and provides comprehensive sales reporting and analytics. The system includes notifications and alerts, user management with role-based permissions, and audit logs to ensure secure and accountable operations. The project involves phases of requirement gathering, system design, development, testing, data migration, deployment, staff training, and ongoing support.

2. Problem Statement

Current manual inventory management in pet stores leads to errors, inefficiencies, and discrepancies. Limited integration with technology affects stock updates, reorder reminders, and sales analytics. Resource constraints and training challenges hinder effective implementation of advanced systems. Inefficient order fulfillment due to lack of real-time stock visibility leads to customer dissatisfaction and lost sales.

3. Proposed Solution

The Pet Inventory Management System offers automated inventory tracking with barcoding, real-time stock updates, and automated reorder alerts. It integrates seamlessly with existing workflows and POS systems, features a user-friendly interface, and provides comprehensive training programs and ongoing support. Real-time visibility into stock levels and automated ordering processes improve order fulfillment and overall efficiency.

4. Information Gathering Process

Two methods were used to gather information:

i. Google Forms Questionnaires: Sent to pet owners to understand their requirements, preferences, and problems. Key findings include regular shopping habits, satisfaction with product variety, difficulties in finding products, and a strong preference for real-time inventory tracking.

ii. Pyramid Structure Interviews: Conducted with a store manager to understand challenges in daily tasks and requirements for an ideal inventory management system. The manager highlighted issues with the manual system, including difficulties in determining reorder needs and wastage, and emphasized the need for user-friendly interfaces and comprehensive training.

5. Requirement Analysis

5.1 Current Business Process

Manual processes dominate pet supply business operations, involving inventory counts, reorder decisions, and sales transactions. The manual system is labor-intensive and error-prone, affecting efficiency and accuracy.

5.2 Functional Requirements

Context Diagram:

- **Customers:** Input purchase requests and feedback, receive receipts and service responses.
- **Suppliers:** Deliver inventory, receive payments and purchase orders.
- **Store Staff:** Perform inventory counts, price calculations, and customer assistance.
- **Store Manager:** Make stock reorder decisions, manage feedback, and generate sales reports.

Level 0 Diagram: Describes high-level processes such as processing customer sales, managing inventory, reordering stock, handling customer service, and generating sales reports.

Child Diagrams: Detail processes including summarizing purchase requests, checking product quality, updating inventory, determining reorder needs, assisting customers, and analyzing sales and feedback data.

5.3 Non-functional Requirements

Performance Requirements:

- Response Time: Quick processing of transactions.
- Scalability: Handle increased volumes without performance degradation.

- Reliability: Consistent accuracy in inventory and sales data.
- Availability: Operational during business hours.

Control Requirements:

- Security: Protect sensitive information.
- Compliance: Adhere to local regulations.
- Data Accuracy: Regular audits and verification.
- Auditability: Document all transactions and inventory movements.
- Maintainability: Easy to manage with clear procedures.
- Backup and Recovery: Manual backup strategy with a defined recovery plan.
- User Training: Proper training for staff on manual tasks.
- Operational Transparency: Visibility for monitoring and evaluation.

5.4 Logical DFD AS-IS System

Diagrams illustrate the current manual system, showing the flow of information and processes involved in managing inventory, sales, and customer service.

Context Diagram: Depicts interactions between the system and external entities.

Diagram 0: Shows detailed breakdowns of primary processes.

Child Diagrams: Detail specific sub-processes for inventory management, customer service, and sales reporting.

Overall, the project aims to replace the error-prone and inefficient manual system with an automated, integrated solution that enhances operational efficiency, accuracy, and customer satisfaction while providing comprehensive support and training to ensure successful implementation.