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SYSTEM ANALYSIS AND DESIGN

Group Project 2- Group 3

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1.0 Overview

XIANG EN Hamper Trading is a small and medium-sized enterprise (SME) specializing in designing and selling personalized festive hampers. The company was founded in 2008 by Ms Crystal Ooi, the business initially operated from a small stall in Jelutong, Penang. With creative design and customized packaging, the company quickly gained popularity especially during Chinese New Year season.However the COVID-19 pandemic and enforcement of the Movement Control Order (MCO) in Malaysia forced the company to pivot toward online channels. XIANG EN began using social media platforms such as Facebook and Instagram to promote and receive orders.

While the company's entry into digital space, its core operations including order processing, stock management and internal coordination remain manual and unstructured. Currently, orders are handled through private messages, with details manually recorded and passed to the production team via screenshots. Inventory tracking is using physical stock counts. These manual processes are prone to miscommunication, inefficiencies and stock inaccuracies, especially during peak festive periods. This project aims to design and propose a web-based system tailored to streamline the company operations. The proposed system will use automation and digital tracking in place to enhance efficiency, reduce operational errors, and support the company's ongoing digital transformation.

2.0 Problem Statement

Despite having an online presence on platforms such as Facebook and Instagram, several key challenges in business operation has faced by XIANG EN Hamper Trading:

1. Inexperience in Managing Online Business Operations:
   The company is relatively new to digital business management and lacks appropriate tools and systems to effectively handle online transactions, communication with customers and the internal workflows. This resulted in operational inefficiencies and delays in responding to customer needs.

2. Manual and Time-Consuming Order Processing:

Orders are currently taken through private messages on social media platforms. These orders are manually recorded and tracked, making the process slow and highly prone to human error. This method increases the risk of missed or mishandled orders due to the high volume of inquiries during the peak season.

3. Unstructured Workflow Between Sales and Production Terms:
   This is no formal platform or system for communication between the sales and production teams. Order updates or customizations of products are often conveyed through verbal instruction, phone calling or screenshots. These ways are leading to miscommunication. Incorrect product packaging and delayed deliveries have resulted.

4. Lack of Real-Time Inventory Management:
   The company relies on periodic manual stock inventory. This outdated method makes it difficult to track stock availability in real time. As a result, the business faces frequent issues with overstocking or understocking, which affects both cost control and customer satisfaction. These operational bottlenecks have indicated the urgent need for a centralized and automated digital system. This system would provide a streamline business processes, reduce communication errors and enhance both internal coordination and external customer experience.

3.0 Proposed Solution

To address the above challenges, a centralized and web-based digital system is proposed consisting of the following modules:

1. Create a User-friendly Online System

The system will be designed with a neat, user-friendly interface without any technical knowledge requirement. Built-in automation features will reduce the need for repeating manual actions and works, allowing staff to focus on higher-level tasks. Furthermore, an AI-powered chatbot will be integrated to assist customers in navigating the system, placing orders and answering frequently asked questions. This 24/7 AI-powered will reduce the administrative burden and improve customer support.

2. Create a centralized Online Order Management Module

Customers will place orders through a standardized online form accessible via the official website. Submitted orders will be stored in a centralized database. The admin team will manage orders via a secure dashboard, where they can view, edit and monitor order status. Any change made by a customer will be reflected in real-time, also the customer will receive automatic updates on their order status. This system reduces human error and eliminates the inefficiencies of manual tracking via social media messages.

3. Implement a Workflow Tracking Module

Administrators will be able to assign orders directly to the production team within the system. The production team can update the progress using status labels such as “Pending”, “In Production”, “Completed” and “Delivered”. All updates are synchronized and displayed on the admin dashboard, enabling better coordination between teams and clearer tracking of order fulfilment stages.

4. Design a Real-Time Inventory Management

The inventory module will automatically update stock levels as new orders are placed and items are restocked. When inventory drops below the preset, the system will trigger low-stock alerts to prompt timely restocking. Therefore, admins can easily add, remove or update product records. All purchase orders will be recorded including details such as quantity, prices and transaction information, which support better purchasing decisions and reduce stock related issues.

4.0 Information Gathering Process

4.1 Method Used

To collect requirements and information from stakeholders for system design, several interactive and unobtrusive information gathering methods are used. Firstly, interviews were conducted as one of the most direct and effective ways to understand and identify the problems faced by stakeholders. Our team interviewed Ms. Yeoh, the Admin of the current system at Xiang En Hamper Enterprise. Prior to the interview, we prepared a set of open-ended and closed-ended questions aimed at gaining a deeper understanding of the current workflow issues and user requirements. Pyramid structure was applied during the interview, beginning with specific closed-ended questions like "How does the current workflow operate?", ended by broader open-ended questions like "What are your expectations for the new system". This approach helped us to understand users requirements and ensured that the final system could fulfill the actual needs of the users.

Additionally, questionnaires were distributed to collect feedback from multiple organizational layers, including stakeholders, administrative staff, production team and sales team. The questionnaire contained a mix of open-ended and closed-ended questions. The open-ended questions focused on identifying weaknesses in the current manual system workflow, while the closed-ended questions addressed specific problems encountered in each department. Some closed-ended items used interval scale measurements to classify the frequency of the issues. These methods help to identify the existing manual system's limitations and the expectations for the improved computational system.

4.2 Summary from Method Used

To understand the core operational issues faced by Xiang En Hamper Trading, both interviews and questionnaires were conducted as part of the requirement gathering phase.

An interview was conducted with Ms. Yeoh, the administrator of the business, using a semi-structured format based on the pyramid questioning technique. The discussion began with specific closed-ended questions to identify existing practices and systems, followed by broader open-ended questions that explored challenges and improvement opportunities from the stakeholder's perspective.

Key insights from the interview include:

1. **Manual Order Handling**: Orders are received through Facebook and Instagram messages. These are manually recorded in notebooks or Excel sheets, which leads to disorganization and a high risk of missed or duplicated orders, especially during peak seasons.

2. **No Inventory Management System**: Inventory is managed through manual stock checks and informal notes. This results in delayed detection of low stock, leading to overstocking or understocking problems.

3. **Frequent Communication Errors**: Communication between sales and production teams is done via WhatsApp, verbal instructions or screenshots. This informal method causes frequent errors, such as incorrect packaging and missed customizations.

4. **High Peak Season Stress**: During festive periods, the high order volume becomes overwhelming due to lack of automation, increasing the likelihood of mistakes and reducing customer satisfaction.

5. **Need for a Centralized System**: The interviewee strongly emphasized the need for an integrated digital system where customers can place orders directly and the system automatically updates inventory and notifies relevant teams in real time.

In addition to the interview, questionnaires were distributed to staff members across departments. The responses further validated the issues raised in the interview, confirming that delays in order processing, poor stock tracking and miscommunications are widespread problems.

The findings from both methods highlight the urgent need for a centralized digital system that can automate order processing, streamline communication and enable real-time inventory management. These insights will directly inform the design and functional requirements of the proposed business system.

Xiang En Hamper Trading – Business Process Feedback Questionnaire

Name: _____
Department: _____
Position: _____
Date: _____

Part A: Closed-Ended Questions (Tick One)

1. How often do you encounter delays in order processing?
   ☐ Never ☐ Rarely ☐ Sometimes ☐ Often ☐ Always

2. How effectively is stock availability tracked in your department?
   ☐ Very Poor ☐ Poor ☐ Average ☐ Good ☐ Excellent

3. How frequently do miscommunications occur between sales and production?
   ☐ Never ☐ Rarely ☐ Sometimes ☐ Often ☐ Always

4. How confident are you that customer orders are processed accurately?
   ☐ Not Confident ☐ Slightly Confident ☐ Neutral ☐ Confident ☐ Very Confident

5. How would you rate the current method of recording customer orders?
   ☐ Very Poor ☐ Poor ☐ Average ☐ Good ☐ Excellent

Part B: Open-Ended Questions

1. What are the main problems you face with the current manual workflow?
   _____

2. What improvements would you suggest for communication between departments?
   _____

3. What system features do you think are important for managing inventory and customer orders?
   _____

4. Share any past experience where a miscommunication or manual error caused a serious issue.
   _____

**Your responses will be kept confidential and used solely for the purpose of improving the business system.*

Figure 1: Sample Business Process Feedback Questionnaire for Xiang En Hamper Trading Staff

Project Title: Digital Business System for XIANG EN Hamper Trading
Interviewee: Ms. Yeoh
Position: Admin of XIANG EN Hamper Trading
Date: 01/06/2025
Location: Google Meet
Interviewers:

1. Abralyn Hoo Weng Yan
2. Chan Siew Ching
3. Phang Souh Xin
4. Ung Yii Jia
5. Yan Jia Rong
6. Yeoh Huey Ting

Interview Type: Pyramid-structured (closed-ended to open-ended)

Purpose of Interview:
This interview aims to gather information about the current business workflow and identify the challenges that are currently faced by XIANG EN Hamper Trading. The response collected will help to design a digital system that improves operations and meets user needs.

Closed-ended Questions:

1. **Q: How do you currently receive and track customer orders?**

   A (Ms. Yeoh):
   "Most of the time, we **get orders through Facebook or Instagram messages**. Customers just message us what they want and we **reply manually**. I usually write everything down in a notebook or sometimes on Excel if I have time. But it's very messy and easy to lose track, especially when a lot of messages come in."

2. **Q: Do you use any software or system for inventory management?**

   A (Ms. Yeoh):
   "**No, we don't use any system** for that yet. I just **check the stock physically** and update a list every few days. If something is running low, I'll usually notice when packing. But sometimes we realize it too late and we **either overstock or don't have enough** to fulfill orders."

3. **Q: How frequently do communication errors occur between sales and production?**

   A (Ms. Yeoh):
   "Hmm, **quite often** actually, especially during peak seasons. Sometimes the **sales team promises certain customizations or dates** to customers, but they **forget to inform the production team**. We usually **pass info through WhatsApp or verbally** and sometimes just by screenshots. So yes, a lot of confusion happens like wrong hampers packed or missed orders."

Figure 2.1: Sample Interview Transcript with Ms. Yeoh, Admin of Xiang En Hamper Trading

Open-ended Questions:

4. **Q: What are the biggest challenges you face during peak seasons?**

   A (Ms. Yeoh):
   "During Chinese New Year or Raya, the orders come in like crazy. It's **hard to keep track of everything** when messages keep flooding in and we have to answer each customer one by one. Then we need to write down the orders, make sure the right items are packed, and update the team. It's very stressful and mistakes happen a lot. Sometimes customers complain about delays or wrong items."

5. **Q: How do you think a digital system could improve your current operations?**

   A (Ms. Yeoh):
   "I think if we had a system where **customers could order directly**, like on a website or app, that would help a lot. And if the **orders go straight to a system** that updates inventory automatically, we **don't have to manually count** or worry about overselling. Also, it'd be great if the **sales and production teams could see the same updates**, like **in real time**. That would really reduce miscommunication."

6. **Q: Can you describe your ideal workflow for order processing and inventory management?**

   A (Ms. Yeoh):
   "Ideally, **customers place their order online** and the **order goes into our system right away**. Then **both the sales and production teams can see the order details** like what hampers, what custom message and when it needs to be delivered. The stock should automatically reduce when the item is sold. If it's low, the system should alert us. Everything should be recorded properly so **I don't need to do it manually anymore**."

Figure 2.2: Sample Interview Transcript with Ms. Yeoh, Admin of Xiang En Hamper Trading

Figure 2.3: Interview Session with Ms. Yeoh Conducted via Google Meet

5.0 Requirement Analysis (based on AS-IS analysis)

5.1 Current Business Process

To order from Xiang En Hamper Trading, a customer can look for the hampers type through the platform provided by Xiang En Hamper Trading, which are Facebook and Instagram. When the customer wants to make an order, they contact the trading through calls or messages. The staff will check for the availability. Once the availability is verified, the staff will manually record the customer's details and orders. The customer can choose to pay through several methods, either cash, online transfer or cheque. The staff will later update the inventory level, which is the count of items in the store. After that, the staff will pass the order information to the production team. The production team will prepare the hampers based on the order type. If there are any changes, the customer service team will update the changes to the production team. After the hamper is done being prepared, the customer can choose to pick up the hamper at the physical shop or through courier service.

5.2 Functional Requirements

User Requirement Definition

A user requirement definition was conducted to explain the services and operational constraints of the system to the customer.

1. The system shall display the available hamper types time by time.
2. The system shall allow customers to place orders through an application.
3. The system shall provide payment methods such as by card or online transfer.
4. The system shall provide hamper delivery options or just allow the customers to pick up.
5. The system shall enable the customer to modify their orders.
6. The system shall display real-time order status such as "Pending" , "In Production", "Complete" and "Delivered" to the customer.
7. The system shall provide AI chatbot assistance for FAQs and order placement.

System Requirement Specification

Other than that, system requirements specification was prepared to provide the details of the system such as the system's functions and services as well as limitation to operation of the system. It is written in a formal way for client and contractor to avoid any misunderstanding and for consistency.

Order Processing Requirements

1.1 The system shall have a database that can display the hamper types in real-time.

1.2 The system shall deploy a database that stores the current inventory level.

1.3 The system shall automatically verify the availability of the inventory before allowing the customers to place an order.

1.4 The system shall have an interface to allow the staff to interact with the customers.

1.5 The system shall update the inventory level automatically after customer's orders are confirmed.

1.6 The system shall allow the staff to modify the orders.

1.7 The system shall have a database that stores the order.

Payment Processing Requirement

2.1 The system shall record payment methods for each transaction.

2.2 The system shall verify the payment done by card or online transfer.

2.3 The system shall automatically generate payment receipts once the customer has completed their transactions.

Production Processing Requirement

3.1 The system shall transfer the confirmed order information to the production team.

3.2 The system shall directly update and highlight the change of orders received from customers to the production team.

3.3 The system shall allow the production team to update their order status such as "Pending" , "In Production", "Complete" and "Delivered" to the customer order in real time.

Delivery Management Requirement

4.1 The system shall record customer delivery preference.

4.2 The system shall generate shipping labels that consist of customer information.

4.3 The system shall calculate the shipping fee according to the journey and sum it with the orders.

Report Requirement

5.1 The system shall display the total number of orders for staff's management.

5.2 The system shall record the customer orders information as well as modification done.

5.3 The system shall display low-stock alerts on the admin dashboard when inventory levels are very low.

5.4 The system shall record the purchase orders in terms of their quantities, prices and specific transactions.

5.3 Non-functional Requirement

Non-functional requirements describe how the system should behave or perform rather than detailing what features it must include. They focus on the system's quality attributes, performance constraints, and operational rules to prevent issues such as slow response times, frequent crashes, and poor user experience. The following elements must be considered to ensure a reliable and satisfying system for both clients and customers:

Product Requirements

- ➢ The ordering system shall be available during business hours (Mon-Fri, 8.30a.m. - 5.30 p.m.). Downtime within normal working hours shall not exceed five seconds in any one day.
- ➢ The system shall be capable of processing and displaying order data within 3 seconds of user interaction on a device with at least 16GB RAM and SSD storage for faster data retrieval.
- ➢ The system shall successfully complete all daily transactions without failure.
- ➢ The system shall maintain 99% uptime during business hours by using a stable fibre internet connection to maintain a smooth performance.
- ➢ The database of the system shall have automatic backup and recovery functions to reduce data loss with a recovery time less than 20 minutes.
- ➢ The failure rate of the system's database shall be less than 1% per 100 transactions.
- ➢ The restart time after system failure shall not exceed 10 minutes.
- ➢ The system shall include a short cut of interactive help guide with FAQs.
- ➢ The system shall be operable on Windows, macOS and other mobile OS to allow accessibility on both desktop and mobile platforms to ensure the portability of the system.
- ➢ The system shall have a mean time to failure (MTTF) of at least 200 hours to ensure long-term reliability.
- ➢ The system shall support up to 30 current users without any performance degradation during peak hours.
- ➢ The response time of the system by AI assistant chat box shall be within 5 seconds during business hours.

Organizational Requirement

- ➢ The admin shall have their own username and password for authentication before login.
- ➢ The organization shall provide at least one week of training for employees to ensure proper usage of the system.
- ➢ The organization shall provide an online guide or tutorial for customers to ease the transition to the digital ordering system.
- ➢ The staff shall respond to customer messages within 10 minutes during business hours to improve customer interactions.

External Requirement

- ➢ The system shall implement data protection standards to secure the customer personal information and payment details.
- ➢ The system shall support multiple secure payment methods, including card, online banking, and Touch 'n Go eWallet, by integrating with their official APIs.
- ➢ The system shall integrate with shipping service providers such as Pos Laju and J&T Express to automatically calculate shipping fees and tracking number for the customers.
- ➢ The system synchronizes hamper product listings with Facebook and Instagram to ensure consistency and efficiency in terms of pricing, product availability, quality and description.

5.4 Logical DFD AS-IS system (Context Diagram, Diagram 0, Child Diagram)

Context Diagram

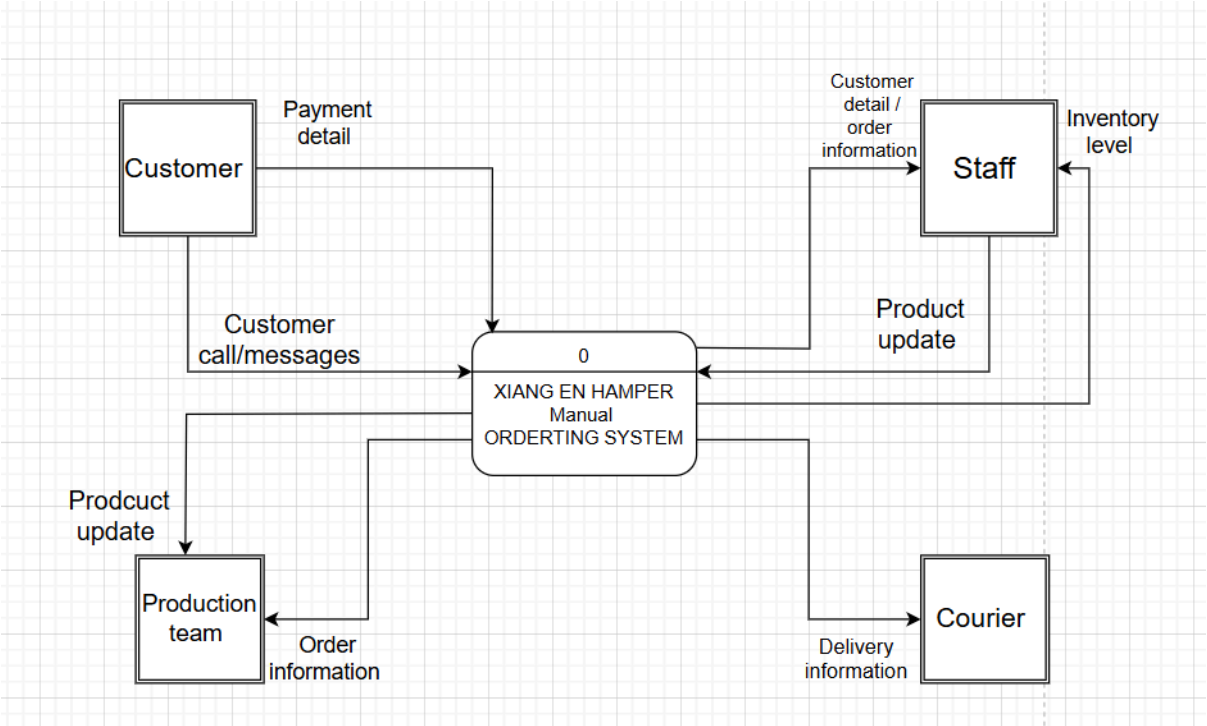
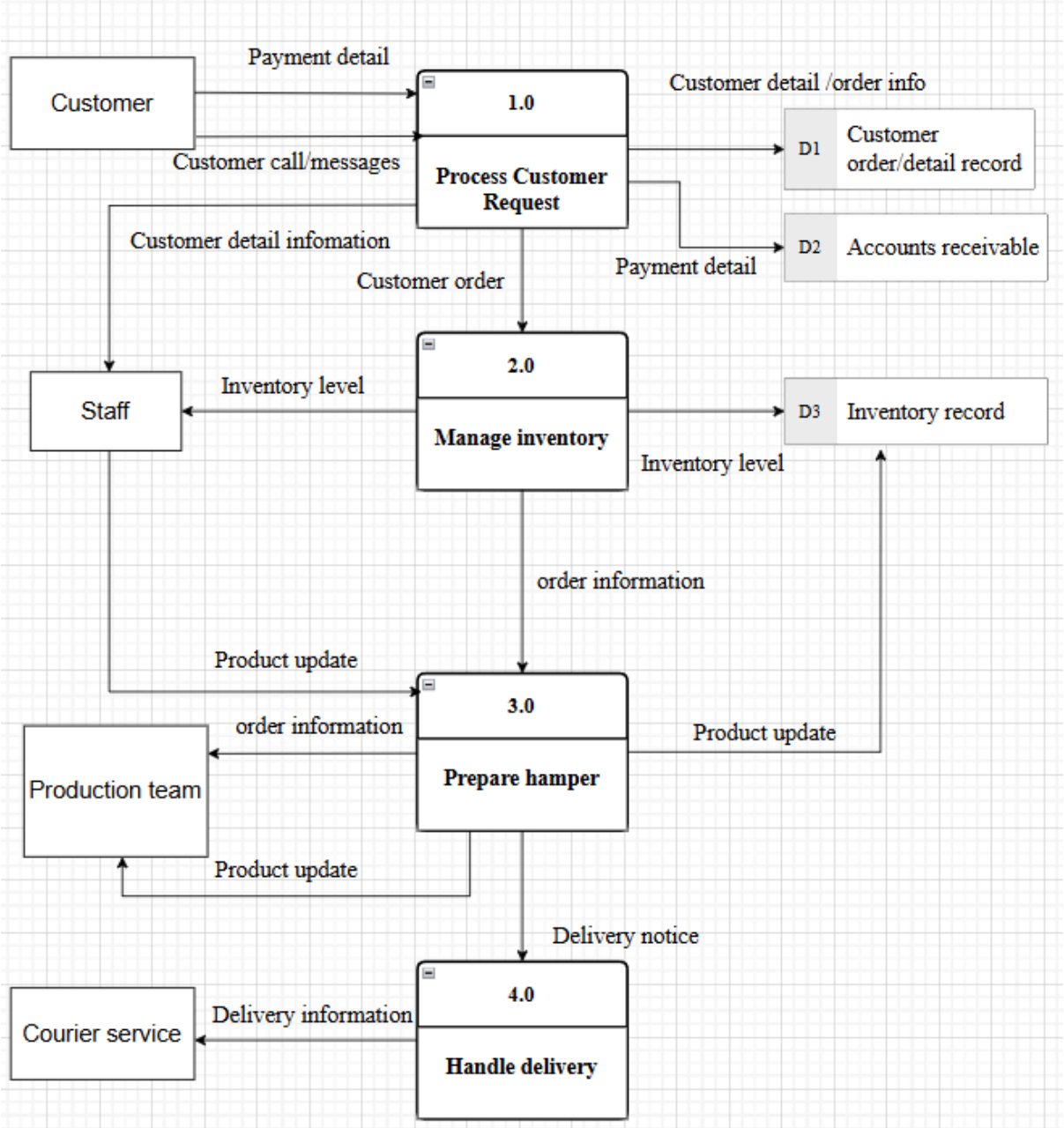
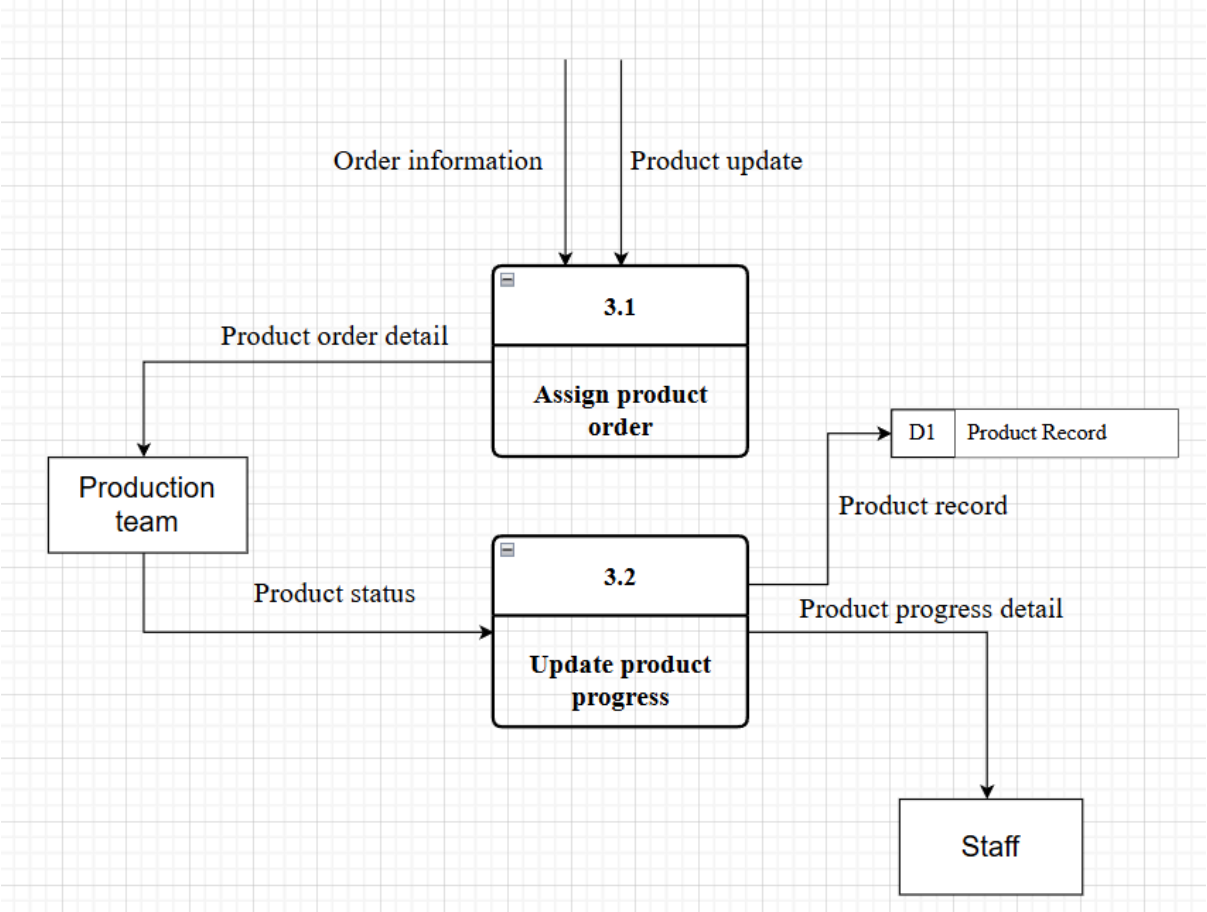


Diagram 0


Customer
Payment detail
Customer call/messages
1.0
Process Customer Request
Customer detail /order info
D1
Customer order/detail record
D2
Accounts receivable
Payment detail
Customer detail infomation
Customer order
Staff
Inventory level
2.0
Manage inventory
D3
Inventory record
Inventory level
order information
Product update
3.0
Prepare hamper
order information
Product update
Production team
Product update
Delivery notice
Courier service
Delivery information
4.0
Handle delivery

Child Diagram



6.0 Summary of Requirement Analysis Process

Currently, the customers have to make orders by contacting the trading through calls or messages. The staff will record customer information and pass the order information to the production team. The production team will prepare the hampers based on the order type. If there are any changes, the customer service team will update the changes to the production team. After the hamper is done being prepared, the customer needs to choose to pick up the hamper at the physical shop or through courier service.

To solve the limitations, the user and system requirements are identified. The system must fulfill user requirements such as shall display the available hamper types time by time, allow customers to place orders through an official website using an application, provide payment methods such as by card or online transfer and AI chatbot assistance for FAQs and order placement. Moreover, the system should also fulfill system requirements such as managing orders, payments, production, delivery, and reporting through automated processes, such as verifying inventory before order confirmation, generating receipts, updating statuses, and issuing low-stock alerts.

Other than that, the system should also fulfill non-functional requirements such as the failure rate of the system's database shall be less than 1% per 100 transactions, the restart time after system failure shall not exceed 10 minutes, the system shall include a short cut of interactive help guide with FAQs and shall be operable on Windows, macOS and other mobile OS to allow accessibility on both desktop and mobile platforms to ensure the portability of the system.

All in all, the requirements analysis process has played an important role in evaluating the current business of XIANG EN Hamper Trading. From the process, the functional requirements and non-functional requirements for the proposed system are analyzed which has helped in identifying the deficiency of the current system. Moreover, a data flow diagram is constructed to help in better analysis of the current business process.