LAGUNA UNIVERSITY

PIÑANA GOURMET: SUPPLY CHAIN MANAGEMENT SYSTEM

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TABLE OF CONTENTS

TITLE PAGE
TABLE OF CONTENTS
LIST OF TABLES
LIST OF FIGURES

CHAPTER I – INTRODUCTION

Project Context
Purpose and Description
Objectives of the Study
Scope and Limitations of the Research
Definition of Terms

CHAPTER II – REVIEW OF RELATED LITERATURE

Technical Background
Review of Related Literature / Studies
Synthesis
Theoretical Framework
Conceptual Framework

CHAPTER III – METHODOLOGY

Research Design
Population of the Study
Statistical Treatment of Data
Data Collection Procedure
Requirement Analysis
Research Instrument
Requirements Documentation
Design of Software, Systems, Product and/or Processes
Development and Testing
Description of Prototype
Implementation Plan

LIST OF TABLES

Table	Description	Page
1	Respondents of the study	
2	Five-point Likert Scale method for survey	
3	Software Resources	
4	Sprint Planning and Backlog Creation	
5	Sprint 1	
6	Sprint 2	
7	Sprint 3	
8	System Features Admin Side Test Case	
9	System Features Admin Side Test Log	
10	eCommerce Features Customer Side Test Case	
11	eCommerce Features Customer Side Test Log	

LIST OF FIGURES

Figure	Description	Page
1	Input-Process-Output (IPO) Model	
2	IPO Model	
3	Scrum Framework	
4	System Sign In Portal	
5	Dashboard	
6	Dashboard Key Performance Indicators (KPIs)	
7	Charts and Graphs	
8	Tables	
9	Inventory Management	
10	Filter, Sort, and Display	
11	Adding New Product	
12	Adding Normal Track Product	
13	Adding Batch Track Product	
14	Normal Track Product	
15	Batch Track Product	
16	Order Management	
17	Status and Date Filter	
18	Order Key Performance Indicators (KPIs)	
19	Creating Order	
20	Orders List	
21	Delivery Management	
22	Pending Orders	
23	Active Deliveries	
24	Completed Deliveries	
25	Delivery Reported Issue/s	
26	Delivery Resolved Issue/s	
27	Point of Sale	
28	POS Order	

29	POS Payment
30	POS Transaction History
31	Log Out
32	eCommerce Sign In Portal
33	eCommerce Sign Up Portal
34	Account Management
35	Landing Page
36	System’s Flowchart for Admin
37	eCommerce’s Flowchart for Customer
38	Gantt Chart

CHAPTER I

INTRODUCTION

These days, technology is evolving so fast that most businesses are learning to adapt and use technology in their daily operations. All in the hopes of bringing more customers and staying competitive in the market, businesses strive to follow modernization trends. Among the different aspects of business operations, supply chain management (SCM) is believed to have an essential role in achieving business success, as it is one of the areas that benefits the most from technology. According to Kumar, M., & Kumar, V. (2024), Supply Chain Management (SCM) simplified the operations happening in the business. Commonly suppliers are the ones implementing it, where it covers everything from production all the way to the customers. It is said that the SCM goals are to reduce inventory, like reducing waste, preventing delays, lowering costs, and making sure products are available when needed. Basically, this aspect covers the movement of goods from production up to delivery from suppliers to customers. It includes the whole process, from raw materials to manufacturing, warehousing, inventory management, delivery, and up to customer service. Implementing technology in this aspect can streamline their whole process, which will make it efficient, accurate, and more satisfactory for customers. This will be important for maintaining a smooth flow of goods, the best use of resources, and having a competitive advantage in the market.

Researchers have noticed that many businesses, whether small-scale, medium-scale, or large-scale, are still having manual processes in their supply chain. Inventories were in the Excel sheet, orders were just calls and messages, and their delivery relied only on manual communication with delivery personnel or a receipt with a customer's signature as proof of delivery. This manual process results in inaccurate records of their sales and inventory, human errors in their order processing, and unsatisfied customers due to delivery problems such as delay, loss, incorrectness, and damage. As the world is evolving and technology is being implemented, it is necessary to resolve these issues and remain competitive in the market.

The researchers aim to develop a supply chain management system focused on sales and inventory tracking, order processing, and delivery tracking along with

eCommerce integration for customers. By improving this aspect of the supply chain, businesses can enhance decision-making, ensure accurate records, minimize human errors, and provide real-time delivery visibility. Industries such as manufacturing, hardware, agriculture, and other related industries or sectors that are manually handling their sales, inventory, order processing, and delivery management will benefit the most from improvements in this aspect. By addressing issues resulting from manually managing the supply chain, this research aims to develop a system that will streamline the operations, ensuring the business can overcome the issues while keeping up with the modernization at the same time.

The proposed system will offer efficient operations and allows smoother transactions for both retailers (business-to-business) and customers (business-to-consumer). The admin will be able to manage order and delivery status for retailers and online customers visibility, use point of sales in physical stores for seamless in-person customer transactions, and will be both provided with real-time inventory updates, while retailers and online customers will have real-time delivery tracking and walk-in customers will have improved customer experience. Additionally, the eCommerce platform will serve as a central hub for online customers transactions, ensuring smooth order processing, real-time sales and inventory tracking, and delivery management.

Project Context

Calauan is often referred to as the "Pineapple Capital" of the Province of Laguna, as they are known for their sweetest pineapples. Piñana Gourmet, a top manufacturer of pineapple delicacies, was introduced to the public in the year 2018, offering a wide range of pineapple delicacies. Not only is it well-known in Calauan, but it is also frequently featured on local television shows and channels, and it has also been featured on international television. Piñana Gourmet was born because of the lack of pineapple-based product producers in Calauan, Laguna. It caters to everything from pastries to bottled pineapple-based products, which they believe would encourage pineapple farmers to plant more, and together they could help in promoting their hometown. However, as the business grows more, being featured, expanding direct-to-customer sales, and supplying to different stores, Piñana Gourmet is unable to keep up with the pace of modernization since they continue to engage in the manual processing in the supply chain management, which becomes their

main problem as the sales and inventory relied on manual records, leading to sales and inventory inaccuracy, human errors for manual order processing, and lack of real-time delivery tracking throughout the supply chain.

This study proposes a system for supply chain management meant to solve these problems. The system integrates automated sales and inventory, streamlined order tracking to minimize human errors, real-time delivery tracking for full visibility, and an eCommerce platform for Business-to-Consumer (B2C) transactions, ensuring synchronized sales, inventory, and order management across all channels. Due to the increase of demand as their retailers and customers are getting bigger due to global exposure, it is important for Piñana Gourmet to adopt this system to modernize its supply chain. Such opportunities may be achieved as the modernized system can enable real-time monitoring of sales, inventory, orders, and deliveries; minimize errors; enhance productivity; and ensure accurate records. This will improve Piñana Gourmet's supply chain management with eCommerce, ultimately enabling better control, visibility, and decision-making throughout the entire supply chain. This will enable the business to effectively modernize its operations and handle it in an efficient and accurate manner.

Purpose and Description

This study aims to develop and implement an effective Supply Chain Management System (SCMS) for Piñana Gourmet in Calauan, Laguna, to address inefficiencies in sales, inventory management, order processing, and delivery tracking. Currently, the business faces challenges such as inaccurate sales and inventory tracking, human errors in manual order processing, and a lack of delivery monitoring, leading to operational disruptions. By automating key processes, the system will enhance tracking accuracy, optimize workflow, and contribute to a more streamlined supply chain operation.

This study will be conducted at Piñana Gourmet in Calauan, Laguna, where the system will be developed, tested, and implemented. By addressing the current supply chain challenges, the SCMS will enhance operational efficiency, ensure data accuracy, and improve overall productivity. With better tracking and automation, the business can optimize resources, improve customer satisfaction, and streamline order fulfillment for both individual customers and retailers. Ultimately, this system aims to create a more efficient, accurate, and seamless supply chain for Piñana Gourmet.

All stakeholders who are expected to derive benefits from this study:

Piñana Gourmet will significantly benefit from the system's integrated features designed to streamline various processes in the supply chain for both online and physical store, such as enabling more efficient inventory and sales tracking, well-organized order processing, delivery visibility that may improve retailers and online customers satisfaction, and the management will gain access to key performance indicators (KPIs), allowing for better decision-making. This system may also reduce workload due to automation, minimizing human errors and improving efficiency.

Business Owner as the key decision maker, the owner will benefit from automated sales reports, real-time inventory monitoring and delivery updates, and improved order processing for both customers and retailers. The system can provide accurate data, and the owner can use it as a basis to make informed business decisions.

Customers both online and in-store, will receive benefits by enhancing their overall ordering experience. Online customers can easily place orders through the eCommerce platform meanwhile in-store customers will experience fast and seamless transactions through Point of Sales.

Retailers will benefit from the system as it offers transaction efficiency, ensuring a more reliable and efficient delivery system, reducing delays, and ensuring that products are consistently available, enhancing overall satisfaction.

Researchers may find this study a valuable reference for expanding their knowledge and understanding of the development and impact of modernized supply chain management for all the businesses that are currently stuck using traditional methods.

Future Researchers who are particularly exploring advancement in supply chain management, can see this study as a foundation. This study will give them insights that can contribute to their study related to this one or may contribute to further improvement in related fields.

Objectives of the Study

To design, develop, and implement a supply chain management system for Piñana Gourmet to ensure efficient, accurate, and modernized supply chain operations by developing a system that enhances sales and inventory tracking, order tracking, and

delivery tracking with B2C eCommerce integration. The following are what the study aims to accomplish:

1. To improve the process of Piñana Gourmet in their supply chain management in terms of sales and inventory tracking, order tracking, and delivery tracking.
2. To design and develop a supply chain management system that integrates automated sales and inventory, streamlined order tracking, real-time delivery tracking, with an eCommerce integration platform catering online customers along with POS for in-store customers to provide a solution to the existing challenges.
3. To implement and evaluate the effectiveness of the developed system in terms of sales and inventory tracking accuracy, reduction of human errors in order tracking, and real-time delivery tracking visibility to ensure a more efficient supply chain for Piñana Gourmet.
4. To assess the Supply Chain Management for Piñana Gourmet in Calauan, Laguna based on ISO 25010:2023, the requirement specification standards in terms of:
    - 4.1 functional suitability;
    - 4.2 performance efficiency;
    - 4.3 compatibility;
    - 4.4 interaction capability;
    - 4.5 reliability;
    - 4.6 security;
    - 4.7 maintainability;
    - 4.8 flexibility; and
    - 4.9 safety.

Scope and Limitations of the Research

This study focuses on the implementation of the supply chain management system for Piñana Gourmet, located in Calauan, Laguna, addressing the issues they experienced in their supply chain management specifically in terms of sales and inventory, order, and delivery tracking. The SCMS integrates various features, specifically on the suppliers, customers, and retailers sides, to improve operational efficiency, ensure data accuracy,

and enhance decision-making processes for the business. However, the Supply Chain Management System is only applicable to Piñana Gourmet and is not applicable to any related businesses with supply chain management.

The system offers real-time inventory tracking, wherein the supplier is able to access modern inventory that shows real-time stock levels. This feature makes sure that you can keep an eye on finished products and packed orders in order to prevent overstocking or shortages. Despite this, the system is limited to the internal supply chain management of Piñana Gourmet only and will not cover any external supplier of raw materials.

An eCommerce platform is integrated for smoother transactions. The supplier can see orders that are placed by online customers, wherein the supplier can accept or decline. The system allows the supplier to update the order status once it is accepted (e.g., Preparing, Out for Delivery, Delivered, etc.). On the other hand, the system cannot provide automatic order status updates; the supplier will have to do this manually by clicking the current status of the product. The system also provides a delivery status feature that lets the supplier see the status of all orders that are supposed to be delivered on a given day.

For those in-store customers, a point of sale system is used. Both the staff and customers are expected to experience speedier transactions and reduced pricing errors. The staff can just click whatever the customer bought and generate a receipt in an instant. Once a purchase is finished, additional sales and reduced inventory will be reflected. But it will be used just for the sales and inventory tracking for the physical store; advanced financial management or analytics is out of scope.

The system generates detailed sales and inventory reports with various options for daily, weekly, monthly, yearly, or annual insights of sales performance, stock levels, and trends for both online and in-store. Nevertheless, financial management outside sales tracking as well as advanced analytics are not applied. The system offers only sales and inventory tracking alongside KPIs to provide report generation and support decision-making as well as descriptive analytics to give a clear picture of the past and current performance of the business. This also applies to the eCommerce platform, wherein while store performance can be offered, it focuses only on descriptive analytics.

The eCommerce platform is used by online customers. The platform allow them to browse available products, view descriptions, and place orders directly through the platform,

in which they can pay either cash on delivery or online payment during checkout. They can track delivery updates (e.g., Preparing, Out for Delivery, Delivered, etc.) to be updated on the arrival of the products ordered. Nonetheless, direct communication with the supplier during the preparation period up to delivery is not offered, but cancelling orders until they are approved by the supplier is allowed.

Despite these limitations, the system remains an essential tool for managing the supply chain of Piñana Gourmet. By integrating the said features, the business is expected to improve the retailer's and customer's satisfaction and process in the supply chain, specifically in the sales, inventory, order, and delivery areas.

Definition of Terms

The following technical terms are defined based on their usage in this study to ensure clarity and reference for the readers:

Automation is the use of technology to perform manual tasks, such as updating inventory records or processing orders, with minimal human intervention.

Business-to-Consumer (B2C) eCommerce is when a business sells its products directly to individual customers through an online platform. It's like an online store wherein customers can browse, buy, and get items delivered to them.

Customers are the people buying the business products. They can be those people that buy online or in the eCommerce platform or those who buy in the physical store.

Descriptive Analytics analyze the past and present data to identify trends and patterns. It helps to understand the business performance without future prediction. It mostly aims to summarize and explain what has happened or is happening right now in the business.

Inventory Tracking is a process of monitoring the product availability and stock levels in real-time.

Key Performance Indicators (KPIs) are measurable numbers that help show how effective and efficient the business processes are, like how many total orders are made, total revenue, total products sold, etc.

Point of Sale (POS) System is a system used in physical stores to handle transactions in terms of sales and payments. It will also automatically update the inventory as products are sold.

Real-time Delivery Tracking allows businesses, retailers, and online customers to monitor the status and location of the orders as they move through the delivery process.

Retailer is a business or individual that buys products from suppliers and sells them in smaller quantities directly to consumers.

Supplier is an individual or business that provides products to another person or business, usually for resale, production, or consumption.

Supply Chain Management (SCM) is the process of tracking the flow of products, data, and related activities like inventory, sales, orders, and deliveries.

ISO 25010:2023 is used to assess the system to ensure that it meets the required quality standards, performs well, and meets the user needs. It consists of how suitable the functionality is, how efficient the performance is, how compatible it is, how capable the interaction is, how reliable it is, how secure it is, how maintainable it is, how flexible it is, and how safe it is.

Functional Suitability is a requirement specification standard that is used to assess the system in meeting the user needs. It checks whether all the features and functions are what the users expected, if the functions are suitable for the user's tasks, and if those functions are performing correctly.

Performance Efficiency is a requirement specification standard that is used to assess the system in doing the tasks quickly and smoothly. It checks on how quickly the system responds to users wants, how well the system uses resources like server capacity, memory, and storage, and how well the system handles increasing orders and customers at once.

Compatibility is a requirement specification standard that is used to assess the system in working smoothly with other systems. It checks whether the system performs efficiently without issues and is capable of handling multiple tasks while being able to integrate with other systems.

Interaction Capability is a requirement specification standard that is used to assess the system in its interface as being user-friendly and easy to navigate. It checks whether the users can easily know what to do, learn how to use it quickly, and use the features and functions without confusion.

Reliability is a requirement specification standard that is used to assess the system in using it properly without crashing or errors. It checks whether all the features and

functions continue to work even when something unexpected happens and if the system keeps running smoothly over time without glitches or downtime.

Security is a requirement specification standard that is used to assess the system in protecting the data from being changed, stolen, or misused by anyone who shouldn't have access. It checks whether the information is only accessible to the right people, like only authorized users can view or modify the data.

Maintainability is a requirement specification standard that is used to assess the system in updating or improving it easily by the people who maintain or develop it. It checks whether the system is simple to make changes and whether the updates can be tested properly.

Flexibility is a requirement specification standard that is used to assess the system in growing and adapting to changes. It checks whether the system can be easily modified for new requirements, can handle increased load, is easy to deploy, and is easy to swap or upgrade.

Safety is a requirement specification standard that is used to assess the system in its setup in a way that reduces risks. It checks whether the system has limits on how it is used to ensure safety, identifies potential risks, has features that prevent accidents or problems, gives warnings when risky actions will be made, and if it's safe to work with other systems.

CHAPTER II

REVIEW OF RELATED LITERATURE

Technical Background

A Supply Chain Management System (SCMS) is an integrated solution that automates and streamlines core business functions such as inventory tracking, sales monitoring, order processing, and delivery management. For Piñana Gourmet, implementing this system significantly improves operational efficiency, reduces human error, and supports better decision-making through real-time data and optimized workflows. To build the SCMS, the researchers use a combination of technologies chosen for their performance, scalability, and reliability across both the backend and frontend.

The backend is developed using PHP and JavaScript (Node.js). According to W3Techs (2024), PHP remains one of the most widely used server-side programming languages due to its broad community support, extensive library ecosystem, and compatibility with many frameworks. In our project, PHP helps manage vital server-side functions like order processing and inventory tracking. Complementing this, Node.js (2024) highlights the platform's non-blocking, event-driven architecture, which enables fast, scalable handling of concurrent processes. This is essential for maintaining system performance during real-time activities like stock updates or simultaneous user transactions.

On the frontend, the system is built with HTML, CSS, and Bootstrap, allowing for a clean and responsive user interface. As stated in the Bootstrap Docs (2024), Bootstrap helps create layouts that adapt easily to different screen sizes. This ensures that Piñana Gourmet staff can access the SCMS from desktops, tablets, or smartphones without usability issues, making daily operations more convenient and efficient.

Data is stored in a MySQL database. According to MySQL (2024), this database system is known for its reliability, scalability, and capability to manage large volumes of data. These features align with the SCMS’s requirements to securely handle inventory records, sales data, and user information.

For the integrated eCommerce platform, the researchers use Next.js 15 and React 19 as the framework. These tools are known for building high-performance, SEO-friendly web applications. TailwindCSS and ShadCN UI are used for UI design, offering clean,

reusable components and fast styling. Zustand is implemented for efficient state management, handling dynamic interactions like cart updates or product availability in real time. To facilitate online transactions, Stripe is integrated for secure payment processing.

Deployment is managed through Vercel, which provides seamless integration with Next.js and simplifies continuous deployment. For user authentication, Clerk is used to ensure secure and straightforward sign-up and login processes. These services help make the eCommerce component scalable, secure, and easy to manage.

Development is carried out using Visual Studio Code (VSCode). As noted by Microsoft (2024), VSCode is a lightweight yet powerful development environment that includes debugging tools, Git integration, and a wide range of extensions. This enhances development speed and code quality throughout the project.

The hardware used includes laptops with sufficient processing power for both development and system testing. Meanwhile, the peopleware consists of the researchers (as developers) and the employees of Piñana Gourmet (as end users). This complete integration of software, hardware, and peopleware ensures that the SCMS is reliable, user-focused, and tailored to the actual operational needs of the business.

Related Literature and Studies

Challenges and Limitations in Supply Chain Management

According to Li (2025), although inventory management systems have improved throughout the years, they still provide significant problems especially for handling big and complex inventory. Lack of real-time inventory updates is one of the main limitations which can be troublesome in fast-moving industries where stock levels change quickly. Delayed inventory updates can cause errors just like overstocking or shortages, which leads to affecting operational efficiency and decision-making. Also, since they cannot efficiently combine data from multiple sources—such as in logistics, sales, and inventory tracking—many current systems find it difficult as well in which it keeps businesses from having a full understanding of their inventory, which makes it challenging to control stock levels, predict demand, and simplify ordering processes. Inefficiencies therefore develop and could cause possible financial losses, waste of resources, and reduced customer satisfaction.

Research on the Malaysian wood and furniture industry (University of Wollongong, 2023) revealed that small-scale entrepreneurs struggle with limited market access,

resource constraints, and inefficient supply networks. These studies emphasize the need for businesses to diversify their suppliers and implement strategies to reduce dependency on a single source. This proves that issues that are unique to a certain industry also have a big impact on how businesses execute their strategies.

A case study in the commercial airline industry (University of Wollongong, 2022) highlighted how dominant suppliers control key aspects of the supply chain, limiting buyers' flexibility and profitability. Effective supply chain management (SCM) is critical for business efficiency, yet many industries face persistent challenges. One significant issue is supplier dominance, which affects pricing, product availability, and innovation.

As noted by Chiang et al. (2021), supply chain researchers are interested in retailing due to the growth of eCommerce and online shopping but somehow develop a problem regarding customers as they demand fast service and effective management of multiple channels for customer satisfaction in their shopping experience. As e-commerce and buying in various channels have become more popular, the demands of supply chain processes have grown more complicated. As retailers strive to meet customer demands, suppliers need to improve their supply chain processes to keep up, as the products are coming from them. Without tracking of products and delivery visibility, retailers may experience fewer delays and discrepancies.

Benson-Emenike et al. (2021) points out in supply chain management the need of making well-informed inventory decisions, particularly for products with high profit margins but unpredictable demand patterns. Making well-informed inventory decisions is another critical component of efficient supply chain management. Keeping the right amount of stock on hand can be hard when demand for these items changes quickly and without warning. Particularly with perishable items, too much stock can cause financial losses resulting from overstocking, higher storage costs, and even spoiling. On the other hand, if too little stock is kept on hand, shortages destroy relationships with customers and lose potential buyers.

The study conducted by Balamurugan et al. (2021), who highlighted how inefficient supply chain management can cause tons of perishables worldwide, the issue of perishable goods is further explored. Food waste will always be a problem in the food industry especially for businesses that manage perishable goods. If inventory levels are miscalculated, products may reach their best-before date before they are sold or delivered. Online customer's orders and orders from retailers may be processed too slowly without an

efficient system, and products may spend too much time in transit with poor delivery tracking causing them to lessen the shelf life of the perishable goods.

Digitalization and Automation in Supply Chain Management

Tong (2025) developed a semi-automated warehouse inventory stocktaking system that uses barcode technology and real-time monitoring. Traditional inventory management systems often suffer from inefficiencies, leading to financial losses and supply disruptions. Technological advancements, particularly in automation and artificial intelligence (AI), have played a significant role in optimizing supply chains. This innovation reduces human error, enhances inventory accuracy, and optimizes stock levels—benefits that are particularly important for food-related businesses.

Wang et al. (2024) highlighted that RCEP member countries' supply chain management has become more transparent and efficient due to digitalization, which has decreased costs and risks associated with cross-border trade. Beyond inventory management, digitalization has transformed supply chain transparency and efficiency on a global scale. Businesses participating in cross-border e-commerce can monitor and analyze data at different stages of the supply chain by using digital technology. Greater flexibility and responsiveness resulting from this help businesses to reduce inventory and transportation costs while also helping to lower risk resulting from instability in the market. Additionally, the digital supply chain management enhances product quality and delivery speed, along with enhancing production efficiency. This increases market competitiveness and helps businesses to better satisfy customer demands. Using digital tools helps businesses to simplify processes, improve decision-making, and strengthen supply chain resilience, leading to a more sustainable and flexible supply chain across the globe.

As mentioned in the study of Bendal (2024), supply chain process is crucial for enhancing business operations and maintaining overall efficiency. The role of supply chain management extends beyond cost savings to overall business performance and sustainability. For the business, a good supply chain management system results in reduced waste, improved cost control, and decreased lead times—all of which ultimately help to ensure smoother operations and higher business success. In all of these areas which are essential for long-term success, businesses may increase customer satisfaction and loyalty, improve their ability to adjust to market changes, keep competitiveness, and

support sustainability by optimizing the flow of goods and services. As for the customer, an effective supply chain makes shorter waiting times, more convenience, and access to a broad range of products and services. This guarantees the effectiveness of satisfying the customer demands, so supports a more dependable and sustainable market. The availability of products at the right time and location, without unnecessary delays, improves overall consumer experiences and trust in businesses, which may show the importance of an optimized and effective supply chain system.

According to Sansaluna (2024), E-commerce is an innovative way of conducting business transactions digitally over the internet, allowing customers to browse, compare, and buy products via an online platform. It offers a digital marketplace where sellers may highlight their products, manage and control inventory, and enable seamless client communication. E-commerce platforms are essential for increasing customer engagement, simplifying sales processes, and expanding market reach. These platforms let businesses operate effectively in modern times by integrating several features such as online payment processing, order management, and marketing tools. The arrival of eCommerce has changed supply chain processes even more. Adopting e-commerce can help businesses maximize their sales operations, be less dependent on physical stores, and enhance customer accessibility, which means improving greater accessibility and profitability.

Kumar et al. (2023) found that due to the automation process in the fishery industry, connection between the farmers and customers has the chance to improve as a result of the delivery transparency, ensuring more reliable and healthier food delivery. The suppliers, retailers, and customers connection will be improved once the manual processes are enhanced or use an automated system for delivery management ensuring both online customers and retailers have better visibility into order statuses and delivery schedules of the products they order. They were both provided with up-to-date information on the status of their orders which minimizes uncertainties and allows them to be prepared for product arrival without guesswork. This will ensure that retailers and online customers' expectations are met, ultimately improving their satisfaction. This proves that some fields, like fisheries, have also been changed significantly by automation.

As observed by Chandrasiri et al. (2022), robots and automated systems are playing an increasingly important role in the food industry, as businesses use automation solutions to improve efficiency, lower expenses, and increase production capacity. Similarly,

automation is transforming the food industry by enhancing efficiency and reducing reliance on manual tasks. Many food industry operations traditionally depended on manual labour, which could be time-consuming, inconsistent and prone to human errors. But because of developments in automation technologies, food businesses can now produce more precisely and quickly, which means achieving more supplies.

Bigliardi et al. (2022) emphasizes how important effective supply chain management is for industries advancing toward Smart Manufacturing. It uses modern technology, data analytics, and automation to simplify manufacturing processes, improve all aspects of efficiency, and enhance decision-making. This means, automation is also a critical component of Smart Manufacturing. The goal is to make sure that materials, inventory, and production schedules are all optimized to reduce waste and increase output.

According to Ang (2022), businesses who embrace digital change immediately might affect others in their supply chain, resulting in increasing widespread implementation as e-commerce platforms expand easily available and widely used. Changing supply chains to digital also has an influence that affects businesses all over the ecosystem of businesses. This change lets businesses enhance procedures, staying competitive in a fast-changing industry, and improve efficiency. The concept about e-commerce is not just about survival but also about grabbing opportunities for long-term success since challenging situations may offer innovative concepts that may work for the business in the long run.

Apolonio and Norona (2021) noted that the rapidly evolving global market environment is causing modern supply chains to grow even more dynamic and complicated. Businesses have to use sustainable supply chains if they intend to efficiently satisfy customer demands. Businesses have to implement modern technologies including the Internet of Things (IoT) if they want to stay competitive. IoT increases operational efficiency and supply chain visibility by enabling real-time tracking, data-driven decision-making, and automation. Using IoT can help businesses maximize inventory control, improve delivery management, and reduce waste, and therefore saving costs and enhancing the quality of products and services. As supply chains become more complicated, sustainability has become a top issue. Adoption of such technologies guarantees that businesses can maintain their competitive advantage while adapting to changes in the market.

As stated by Kumar et al. (2021), AI-powered analytics improve demand forecasting

by predicting market fluctuations and customer needs. Meanwhile, ML algorithms enhance quality control and optimize production efficiency by analyzing patterns in supply chain operations. AI and machine learning (ML) are transforming data-driven decision-making in supply chains. By integrating AI and ML into SCM, businesses can reduce operational costs, minimize waste, and enhance supply chain resilience.

Descriptive Analytics in Supply Chain Management

According to Asgari (2025), descriptive analytics is a useful method applied in multiple industries to examine past data and evaluate present operational situations. It enables businesses to identify repeating problems, know early trends, and find the root causes of disruptions. Descriptive analytics is quite important in supply chain management since it helps businesses to monitor supplier performance, track delivery delays, quality problems, and overall efficiency. Also, businesses can find weaknesses and make smart decisions to improve reliability and stability of their supply chain. Using descriptive analytics helps businesses in fields like agri-food production—where supply chains are frequently affected by changes in demand, weather conditions, and logistical challenges—anticipate risks and adjust to changing situations.

Velandia León (2024) emphasizes that descriptive analytics in supply chain management helps in knowing past trends and patterns in manufacturing, commercialization, and supply within various areas and distribution centres. Businesses can learn a great deal about supply dynamics by responding to important questions including how items flow through the supply chain and how quantity, distance and prices are related in the supply chain. This kind of analytics helps in forecasting, identifying market trends and improvements in the logistics. Knowing the connections between them helps businesses to make better decisions, increase operational efficiency, and develop more effective supply chains that adapt with current trends and logistical difficulties.

Local-Related Studies of the Current Technology

Tabang (2025) studied how Metro Manila-based SMEs integrated supply chain technologies like cloud-based inventory, automated ordering systems, and logistics optimization post-pandemic. Data was gathered from 150 SMEs using a quantitative research approach in order to examine the connection between technology innovation and

business performance. The results demonstrated how businesses that implemented a variety of supply chain technology improved order processing, inventory accuracy, and logistics efficiency, allowing them to respond more effectively to unexpected disruptions. Particularly in the aftermath of a pandemic, supply chain technology integration has been an important factor for business efficiency. Using automation and data analytics in supply chain management, it helps businesses decrease operational inefficiencies, manage expenses, and improve decision-making.

As investigated by Galang et al. (2024), artificial intelligence technologies affect operational efficiency, customer satisfaction, and financial performance in retail businesses. Adoption of artificial intelligence improves inventory management, predictive maintenance, and automated processing, resulting in reduced human errors and improved decision-making based on a quantitative-descriptive research approach. Expanding on the role of artificial intelligence in supply chain management, faster transaction processing, better sales forecasting, and improved customer acquisition approaches due to AI-driven automation have helped retail chains remain competitive in a market that is rapidly evolving with these changes.

Elajas (2024) explored how SMEs in the Philippines integrate IoT into their supply chain processes. In addition to AI, the Internet of Things (IoT) has also transformed supply chain operations. The study highlights IoT's role in real-time tracking, predictive maintenance, and automated inventory management. For a successful implementation of IoT in SCM, the study assessed the advantages, difficulties, and policy recommendations using comparative and thematic analysis. By allowing real-time inventory tracking, predictive maintenance, and automated logistics coordination—which helps to improve SCM—the results showed IoT adoption greatly enhances SMEs.

As examined by Pua (2023), logistics in the Philippines have evolved with digital technologies to support e-commerce and international trade. Using a case study approach, the study investigated the impact of tracking systems, automated warehousing, and order management systems on minimizing delays and improving order fulfillment. The primary findings showed that small and medium businesses (SMEs) in the Philippines struggle to scale operations due to high shipping costs, infrastructure limitations, and inefficiencies in logistics as well as other factors. The study emphasized how improving logistics infrastructure and including digital supply chain solutions would maximize delivery systems

and help e-commerce growth. This proves that logistics is another critical component of supply chain efficiency.

Atilano-Tang and Damsani (2023) investigated the challenges and inefficiencies in inventory management in a public-sector business. By using a case study approach, they found significant issues including inadequate documentation, lack of standardizing, and poor inventory management that resulted in operational inefficiencies, delays, and waste of resources. Challenges in inventory management remain a common issue across industries. In order to improve inventory accuracy and decision-making, the study emphasized the importance of automation, centralized inventory control, and standardized processes.

Management Sciences for Health (2023) discussed the implementation of a unified supply chain information system by the Department of Health (DOH) in the Philippines. The study examined the ways in which eLMIS enhanced healthcare organizations' real-time inventory tracking, supply chain transparency, and distribution efficiency using a case study approach. Based on their findings, logistics operations were scattered among 10 different systems, which frequently resulted in overstocks, stockouts, and expired medical supplies. Through eLMIS, real-time data sharing, automated procurement tracking, and demand forecasting greatly improved supply chain resilience. eLMIS was installed in 216 sites as of December 2023, comprising 7 central warehouses, 28 regional warehouses, 59 LGU warehouses, and 112 service delivery points, ensuring enhanced visibility and coordination of medical supply distribution. This system facilitates real-time monitoring of medical supplies, preventing shortages and ensuring efficient distribution. This proves that the impact of digital transformation on supply chain management is also evident in the public sector.

Catral et al. (2022) examined the supply chain management practices of ESCO Philippines Inc. to assess their impact on operational efficiency covering ordering, inventory, warehousing, and delivery management. They gathered data using a descriptive research approach from 64 respondents in the supply chain by means of questionnaires. The results showed that smooth operations rely on good supply chain management, especially in sectors depending on efficient delivery, inventory management, and order fulfillment systems. The study emphasized how observing reorder levels and appropriate inventory control helps businesses decrease excess stock and shortages, allowing them to fulfill customer demands and lower expenses. The research found that delivery, inventory, and

ordering are interconnected therefore inefficiency in one area might affect the whole supply chain. Focusing even more on the role of supply chain management best practices, adopting best practices in supply chain management, as the researchers highlighted, can increase customer satisfaction, reduce operational expenses, and improve overall production efficiency.

The study conducted by Secretario and Naval's (2021), explored MSM grocery stores' inventory management's sourcing, storage, and selling practices. They evaluated current inventory management processes using a descriptive-correlational approach and found that most grocery stores lacked designated inventory personnel, depended on manual tracking methods, and struggled with stock monitoring. The study highlighted that the most effective inventory management strategies were Enterprise Resource Planning (ERP) and the ABC Classification System, which allows businesses to maximize their resources. It also revealed that many local MSMEs lack automated systems, which causes ineffective stock management and replenishment.

Foreign-Related Studies of the Current Technology

Kollia et al. (2021) conducted a detailed study on how artificial intelligence and automation are transforming the food supply chain by improving efficiency, accuracy, and product safety. The study identified significant areas where automation has changed supply chain operations, especially in inventory control, sourcing, material handling, and delivery logistics, using a meta-analysis that integrated a comprehensive literature review with professional perspectives. The results suggest that automation reduces human mistakes, increases operational effectiveness, and simplifies decision-making, therefore enhancing supply chain adaptability. Moreover, the study emphasizes how artificial intelligence-powered inventory tracking, automated procurement, and logistics management helps businesses to maximize supply chain operations, reduce inefficiencies, and improve overall business competitiveness. This proves that the integration of artificial intelligence and automation has fundamentally changed supply chain operations, particularly in enhancing efficiency, accuracy, and product safety.

Jaimez-González and Luna-Ramírez (2021) introduced a Multi-Agent System (MAS) architecture that facilitates real-time coordination between different supply chain entities. MAS technology enables automated decision-making and logistics optimization, allowing

businesses to respond dynamically to fluctuations in demand and supply. The MAS architecture is made up of six collaborating agents: the Coordinator, the Sales Manager, the Supply Manager, the Inventory Manager, the Production Manager, and the Delivery Manager, all of whom perform specific supply chain functions. The research showed that MAS technology can lower inventory mismanagement, increase order fulfillment efficiency, and simplify procurement and distribution processes. Using predictive analytics and machine learning helps the system improve supply chain adaptability and responsiveness in very dynamic markets.

Nitsche (2021) conducted a study that investigates how supply chain management and logistics could potentially be affected by automation. By means of a meta-analysis combining a comprehensive literature review with views of experts, the study showed significant areas in which automation has changed operations in inventory control, sourcing, material handling, and delivery logistics. According to the findings, automation reduces human errors, improves operational efficiency, and simplifies decision-making ultimately improving supply chain adaptability. Further emphasizing the impact of automation, adopting artificial intelligence-powered inventory tracking, automated procurement, and logistics management can help the business to maximize supply chain operations, lower operating inefficiencies, and improve overall industry competitiveness.

Synthesis

To support this study, the researchers gathered relevant literature and studies from both local and foreign sources, focusing on the automation of supply chain management (SCM) for Piñana Gourmet. Literature and studies are published between 2021 up to 2025 to ensure the findings remain current and relevant. The researchers gathered ideas from previous research under the topics of Challenges and Limitations, Digitalization and Automation, Descriptive Analytics, and current technology that has been applied on supply chain management.

In this present day, it is essential for businesses to adapt to technological advancements in order to remain competitive. However, numerous companies, such as Piñana Gourmet, continue to depend on manual processes for managing their supply chains. Challenges like inaccurate inventory tracking, inefficient order processing, and a lack of real-time data in delivery lead to inefficiencies that hinder business growth and

reduce customer satisfaction. To overcome these challenges, multiple studies emphasize the advantages of automation and other related technology in supply chain management. The implementation of these technologies has been shown to enhance inventory accuracy, streamline order fulfillment, optimize delivery tracking, and improve decision-making by providing real-time data insights. Through the integration of these developments, businesses are able to reduce human errors, enhance operational efficiency, and offer smooth customer experience.

Supply chain management (SCM) continues to encounter challenges in inventory management, logistics, and coordination, primarily due to insufficient real-time updates, ineffective tracking, and poor demand forecasting (Li, 2025). In relation to my study, the SCMS is supposed to resolve these issues by implementing real-time inventory tracking, allowing for accurate stock levels and timely updates. This is important to food businesses like Piñana Gourmet, where overstocking and shortages can significantly impact customer satisfaction and operational efficiency.

Additionally, industry-specific challenges, including supplier dependency in Malaysia's wood industry (2023) and supplier dominance in commercial airlines (2022), contribute to the complexity of their SCM. As relevant to my study, these cases show how a lack of supplier flexibility can affect operational efficiency. Supplier dependency means relying on one supplier only, and supplier dominance means the supplier has no equal rights with the customer and has more control over the orders. For Piñana Gourmet, similar challenges may arise, especially in the stock levels management. As only one supplier is present, shortages may happen, and if there is a supplier dominance, the customer can't do anything about when and how many available products there are to be ready to deliver. So implementing SCMS with eCommerce can help in solving these issues, as it offers real-time inventory monitoring and simplified order processing, reducing operational risks and enhancing customer satisfaction.

The growth of eCommerce has increased the need for quicker and more accurate supply chain operations (Chiang et al., 2021). As it applies to my study, it emphasizes the importance of SCMS for Piñana Gourmet that offers real-time inventory tracking, streamlines order processing, and efficient delivery monitoring. By implementing it, the Piñana Gourmet can lessen delays, reduce manual errors, and respond more quickly to customer orders. With the integration of eCommerce, customers are provided with fast,

reliable service and visibility across the delivery process, maintaining customer satisfaction and competitiveness in the marketplace.

Lacking inventory decisions, particularly regarding perishable or high-margin items (Benson-Emenike et al., 2021), lead to food waste and financial losses (Balamurugan et al., 2021). The challenges we face emphasize the importance of adopting integrated, technology-driven supply chain management solutions to improve efficiency and resilience. As aligned with my study, the SCMS for Piñana Gourmet directly addresses these concerns by having features such as real-time inventory tracking, automated stock level monitoring, and expiration date management for their products. This can make the business have well-informed inventory decisions, prevent overstocking or shortages, and reduce losses due to spoilage or delayed order fulfillment.

Digitalization and automation are transforming supply chain management (SCM) by enhancing efficiency, transparency, and adaptability. Tong (2025) presented a barcode-based semi-automated inventory system aimed at reducing errors and enhancing stock levels. As related to my study, SCMS is implemented to optimize inventory management due to inefficiencies in traditional inventory methods. By using this, Piñana Gourmet ensures accurate stock levels, reduces losses, and improves the reliability of product availability.

Wang et al. (2024) discovered that in RCEP countries, digitalization improves trade efficiency by reducing costs and increasing responsiveness. As connected to my study, integrating eCommerce and automating supply chain operations such as inventory management, order processing, and delivery tracking, the system can enhance operational efficiency, reduce manual errors, and improve responsiveness to customer demands globally. Digitalization enables real-time data monitoring, which allows the business to make informed decisions, adjust to market changes quickly, and streamline logistics.

The implementation of SCMS for Piñana Gourmet aligns with the crucial aspects highlighted by Bendal (2024). By automating and streamlining business processes like sales, inventory management, order processing, and delivery tracking, it will contribute to reducing waste, controlling costs, and minimizing lead times for the business. This ensures that Piñana Gourmet can operate more efficiently and remain competitive in the market. In the case of eCommerce integration, it will enhance customer experience by providing faster order fulfillment, more convenient purchasing options, and access to a broader range of

gourmet products. This improves the availability of products at the right time and location, fulfilling customer demand and building trust, which is essential for business sustainability.

The expansion of eCommerce (Sansaluna, 2024) has enhanced inventory management and broadened market access. In relation to my study, automating inventory tracking and order processing, the SCMS of Piñana Gourmet will reduce manual errors, improve stock management, and provide real-time updates for both the business and customers. The eCommerce platform will also provide a wider customer reach, moving beyond traditional store limitations and tapping into a broader, online market. This will not only improve operational efficiency but also enhance customer experience by offering easy access to products, timely updates, and secure payment options, which are important in today's competitive market.

Automation is bringing significant changes to multiple industries, such as fisheries (Kumar et al., 2023) and food production (Chandrasiri et al., 2022), by enhancing logistics and delivery tracking. As relevant to my study, automation in the SCMS, particularly through the integration of eCommerce and delivery management, can similarly enhance the efficiency, transparency, and reliability of Piñana Gourmet's operations. By adopting automated systems for inventory management, order processing, and delivery tracking, Piñana Gourmet can ensure real-time updates for customers and retailers, improving customer satisfaction and minimizing uncertainties around product availability and delivery schedules.

Smart Manufacturing, as discussed by Bigliardi et al. (2022), incorporates IoT and data analytics to enhance production processes. As aligned with my study, it can also be applied to the automation and optimization of Piñana Gourmet's SCMS, as it incorporates modern technologies such as descriptive analytics and automation. The system can streamline inventory management, sales tracking, and order processing, much like how Smart Manufacturing optimizes production processes. This can help reduce waste, improve operational efficiency, and provide real-time data for better decision-making.

In relation to Ang's (2022) study, Piñana Gourmet has this SCMS integrated with eCommerce. By digitizing operations, Piñana Gourmet can not only enhance its internal processes but also stay competitive in the market. Digitization will allow Piñana Gourmet to streamline its inventory management, sales automation, and order processing, ensuring efficiency and responsiveness to consumer demand. Adopting eCommerce provides

Piñana Gourmet with the opportunity to tap into long-term growth and innovation, enabling the business to adapt quickly to market changes and consumer behavior changes while maintaining a sustainable competitive advantage.

Meanwhile, Apolonio & Norona (2021) emphasize the importance of IoT in promoting sustainability through improved supply chain visibility and waste reduction. As connected to my study, the integration of modern technologies like real-time tracking of inventory and automated updates on order status ensured greater efficiency and transparency in operations. This contributes to sustainability by optimizing inventory management, reducing waste, and minimizing shortages or overstocking, all while improving the quality and timely delivery of products from Piñana Gourmet.

Artificial Intelligence and Machine Learning (Kumar et al., 2021) are enhancing demand forecasting and quality control, helping businesses maintain competitiveness and resilience in a marketplace that is evolving. In relation to my study, integrating AI and Machine Learning into Piñana Gourmet's SCMS can significantly improve demand visualization and inventory management, ensuring that the company can see customer needs and adjust stock levels accordingly. By using the system, Piñana Gourmet can optimize product availability, reduce excess inventory, and enhance the overall customer experience.

Descriptive analytics improves supply chain management by analyzing historical data to enhance current operations and predict future trends. Asgari (2025) highlights its importance in managing supplier performance, monitoring delays, and enhancing reliability, especially in sectors such as agri-food production, where changes in demand and logistical challenges frequently occur. As relevant to my study, descriptive analytics plays a crucial role in improving the operational efficiency and decision-making within Piñana Gourmet's SCMS. By analyzing historical sales, inventory, and order data, descriptive analytics will enable Piñana Gourmet to identify patterns, monitor business performance, and track delivery times, which can help pinpoint areas for improvement.

Velandia León (2024) emphasizes the importance of understanding supply dynamics, such as product flow and pricing, to enhance forecasting and logistics efficiency. Through the use of descriptive analytics, businesses can make well-informed decisions that improve their resilience and adaptability. As aligned in my study, leveraging descriptive analytics will provide insights into how products move through the supply chain, how pricing

fluctuates, and how these factors impact inventory management and order fulfillment. This will enable Piñana Gourmet to better anticipate demand, optimize stock levels, and ensure timely delivery, ultimately improving operational efficiency and responsiveness to market trends.

In the aftermath of the pandemic, advancements in supply chain technologies have significantly enhanced business efficiency through the automation of inventory management, order processing, and logistics. Tabang (2025) emphasizes the advantages that Metro Manila SMEs have gained from cloud-based and AI-driven systems, which have improved their operational responsiveness. As related in my study, Piñana Gourmet's SCMS also seeks to enhance operational efficiency through automation. Just as Metro Manila SMEs benefited from cloud-based and AI-driven systems for inventory management, order processing, and logistics optimization, Piñana Gourmet's system aims to leverage similar technologies to streamline its operations. By integrating automated systems for sales, inventory tracking, and order processing, Piñana Gourmet can improve its responsiveness to market demands, reduce human errors, and ensure a seamless customer experience.

Galang et al. (2024) and Elajas (2024) highlight the significance of AI and IoT in predictive maintenance, real-time tracking, and inventory automation, which contribute to minimizing errors and enhancing decision-making. Although both of this study primarily addresses artificial intelligence-driven business growth in the retail sector, its insights are relevant to the proposed Supply Chain Management System (SCMS) for Piñana Gourmet, especially in the areas of inventory automation, analytics, and operational efficiency. Unlike retail businesses which focus on customer engagement and sales optimization, the proposed SCMS extends AI applications to sales and inventory tracking, order processing, and delivery tracking to streamline supply chain management for food manufacture and distribution.

Pua (2023) and Atilano-Tang & Damsani (2023) discuss the challenges related to logistics and inventory, emphasizing the importance of automation as a solution. As it applies to my study, its results nonetheless apply to businesses like Piñana Gourmet, who similarly operate manual tracking inefficiencies as well as issues regarding inaccurate inventory records. By using real-time inventory tracking, automated order processing, and digitized record-keeping to improve operational efficiency and reduce human errors, the

proposed Supply Chain Management System (SCMS) for Piñana Gourmet addresses these kinds of issues. The business can also apply these findings to strengthen logistics and supply chain automation for timely and reliable deliveries.

The Department of Health's eLMIS (2023) highlights the benefits of centralized supply chain management, where businesses like Piñana Gourmet can adopt similar strategies to streamline inventory tracking and supplier coordination, enhancing overall operational reliability and service efficiency, whereas Catral et al. (2022) and Secretario & Naval (2021) emphasize best practices in ERP, and it is connected in my study in addressing manual tracking inefficiencies and the need for real-time inventory monitoring. The proposed SCMS seeks to enhance operational efficiency, reduce human errors, and improve decision-making in supply chain processes by integrating automated sales and inventory tracking, order processing, and delivery tracking.

Kollia et al. (2021), Jaimez-González & Luna-Ramírez (2021), and Nitsche (2021) examine the roles of AI, automation, and multi-agent systems (MAS) in enhancing adaptability and efficiency. In relation to my study, Piñana Gourmet, which faces challenges due to manual sales recording, inventory management, and delivery tracking, these studies provides highly relevant insights. The adoption of AI-enabled supply chain systems would enable Piñana Gourmet to process orders more quickly, maintain up-to-date and accurate inventory records, and offer real-time delivery visibility to both retailers and customers. This would allow the business to handle increasing demand more effectively and meet customer expectations with precision. It would also help the company maintain its reputation as a trusted producer of pineapple delicacies, both locally and internationally, by ensuring product quality and timely delivery across all sales channels. For businesses like Piñana Gourmet, MAS provides an integrated approach to managing suppliers, inventory, and logistics. Its ability to adapt to market changes makes it a viable solution for businesses aiming to improve operational efficiency and competitiveness in a highly dynamic environment.

The studies provided support for Piñana Gourmet's implementation of an automated Supply Chain Management System (SCMS) to improve sales tracking, enhance inventory accuracy, and streamline logistics and order management, which will maintain competitiveness.

By emphasizing the value of automation, digitization, and decision-making in

addressing common supply chain issues, the relevant literature and research are related to Piñana Gourmet's Supply Chain Management System (SCMS). Several studies emphasize the inefficiencies present in inventory, sales, logistics, and order fulfillment, which are significant concerns for Piñana Gourmet. The inefficiencies frequently result in delays, an excess or lack of stock, and financial losses—concerns that the SCMS seeks to address through the integration of real-time tracking, automated inventory control, and analytics. The increasing demand for quicker and more precise supply chain processes, especially due to the rapid growth of eCommerce, matches with Piñana Gourmet's demand for a more flexible and technology-driven system. Automating order processing, inventory tracking, and logistics management can significantly enhance efficiency, minimize human errors, and improve the overall movement of operations within the SCMS. Technological advancements also encourage the implementation of an automated SCMS. These innovations improve visibility within the supply chain, streamline operations, and enhance decision-making by offering real-time insights into sales, inventory, order, and logistics. By recognizing these technologies, Piñana Gourmet can enhance its adaptability, streamline supply chain efficiency, and sustain a competitive advantage in the market. Therefore, it suggests that automation and digital integration play a crucial role in modern supply chain management, emphasizing the importance of Piñana Gourmet's SCMS in achieving operational success and sustainability.

Theoretical Framework

A theoretical framework serves as the foundation of a research study, providing structure and direction through established theories and models. It guides the development of research arguments, helping to explain phenomena and justify the significance of the study. For this research, the Input-Process-Output (IPO) Model is used as the theoretical framework. The IPO model is a systematic approach commonly applied in system development and process improvement studies. It illustrates how data and resources (inputs) are transformed through organized procedures and workflows (processes) to produce desired outcomes (outputs). The input represents the raw information, resources, and requirements necessary for system operation. The process refers to the methods and mechanisms that handle, transform, and manage these inputs, often through automation, tracking, and analysis. The output reflects the end results, typically in the form of

improvements in efficiency, accuracy, and decision-making capabilities. The IPO model provides a logical flow, ensuring that all components work cohesively to meet business goals. Its application in this study ensures that the Supply Chain Management System (SCMS) for Piñana Gourmet is designed with clear direction, transforming organizational data and operations into effective and measurable outcomes that address the current challenges of sales monitoring, inventory management, order processing, and delivery tracking.

Figure 1

Input-Process-Output (IPO) Model

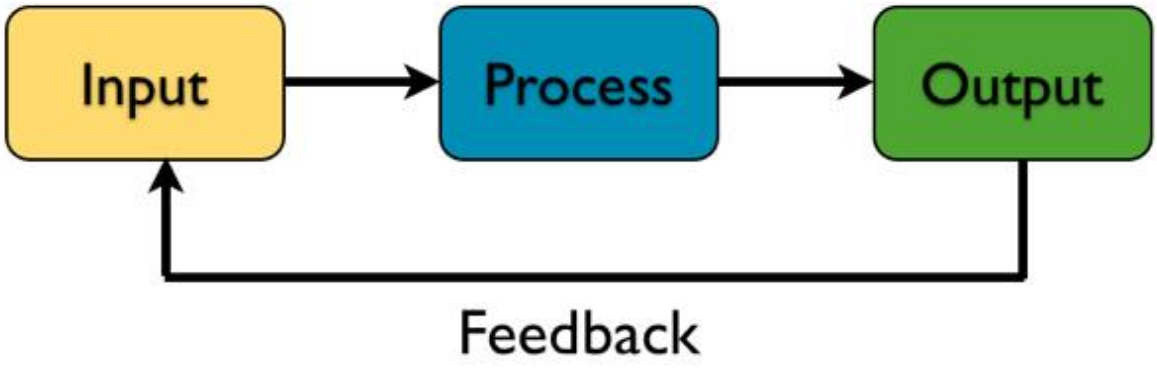

Figure 1 illustrates the theoretical framework developed by the researchers, demonstrating the flow and relationship between input, process, and output based on the IPO model.

Conceptual Framework

Key concepts, variables, and relationships among the research aspects are defined using a conceptual framework in research and projects. The conceptual framework employed in this study is the Input-Process-Output (IPO) model wherein it aids researchers and developers in visualizing and explaining system, process, and problem structure of Piñana Gourmet's Supply Chain Management. This study aims to automate sales, inventory tracking, order processing, and delivery tracking while integrating B2B and B2C eCommerce functionalities to enhance operational efficiency.

Figure 2

IPO Model

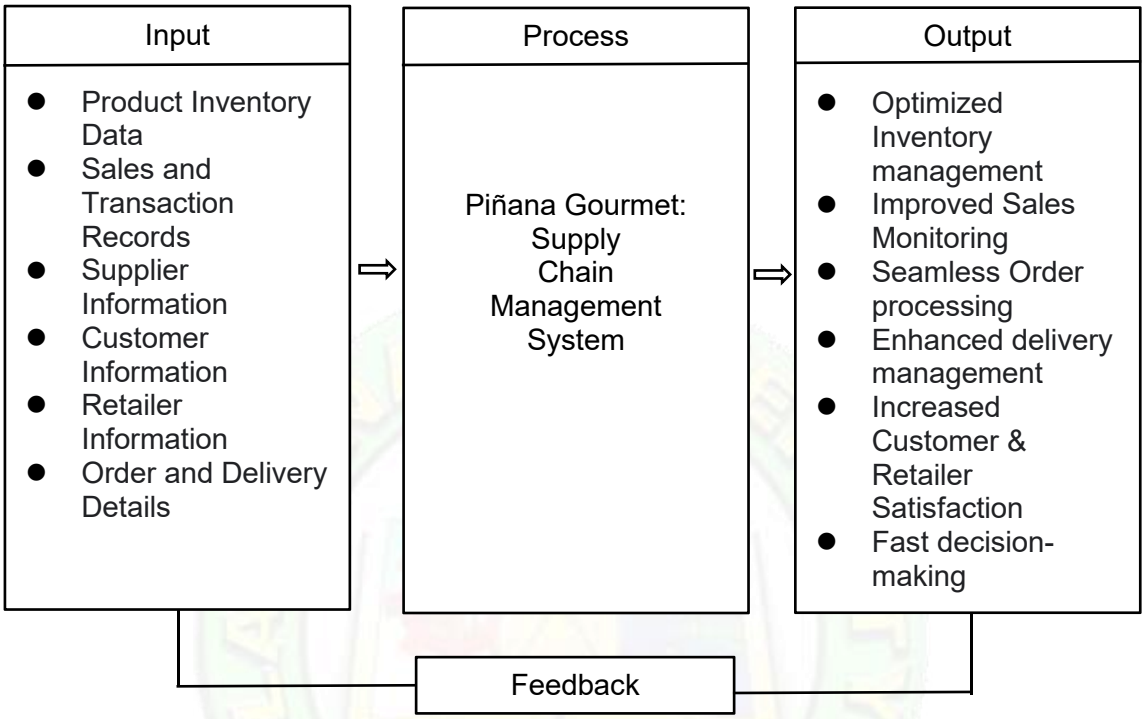

Figure 2 indicates the IPO model that researchers used in the study. The system requires various inputs that serve as essential data points for managing the supply chain effectively. The process stage involves automating supply chain operations through a web-based system using the collected inputs. The expected outcome of the system is a centralized and automated supply chain management platform that enhances operational efficiency by streamlining workflows and minimizing manual tasks.

CHAPTER III

RESEARCH METHODOLOGY

Research Design

According to Adeniran and Tayo-Ladega (2024), a research design is a structured and strategic plan that outlines how a study is conducted to answer specific research questions. It serves as a roadmap that ensures all elements of the research process—such as data collection, setting, participant selection, timeframe, and data analysis—are systematically aligned with the study's objectives. In this study, the researchers adopted a mixed-method approach, incorporating both descriptive and developmental research designs. This dual approach is appropriate given the study's goal to both analyze the current challenges in Piñana Gourmet's supply chain management and to develop a web-based Supply Chain Management System (SCMS) tailored to those needs.

Widadi and Sibarani (2025) emphasize the value of using both quantitative and qualitative methods in descriptive research to gain a comprehensive understanding of business operations. Following this approach, the descriptive research design is used to examine and understand Piñana Gourmet's current supply chain management processes. This helps find problems in areas like sales, inventory, ordering, and delivery. Surveys and interviews with business owners, retailers, and customers are used in the study to gather insights that will support the system development. Structured surveys will be conducted with 100 customers and 4 retailers to collect measurable insights into their experiences and expectations. Additionally, in-depth interviews will be held with the business owner and key staff members to explore internal workflows and challenges from a qualitative standpoint. The study will be conducted at Piñana Gourmet, a pineapple delicacy manufacturer in Calauan, Laguna. Data collection will take place over a specific period of time to make sure that it accurately shows how the business operates.

Arbatan et al. (2025) discuss how developmental design frameworks are ideal for constructing digital systems based on real-world needs. In the context of this study, the developmental phase began after the descriptive data was analyzed. The developmental research design is used in the design and implementation of a web-based Supply Chain Management System (SCMS). The development process adopted the Input-Process-

Output (IPO) model as its theoretical foundation and followed the Scrum Framework, a recognized methodology under the Agile umbrella. By dividing the system creation into sprints, this guides the creation and implementation, ensuring that the system is systematically planned, developed, and improved based on the needs of the stakeholders and the findings from the descriptive phase of the study.

Datta et al. (2025) highlight the importance of user-centered evaluation and the application of international quality standards in system development. In alignment with this, the SCMS was evaluated using the ISO 25010:2023 quality standards, focusing on criteria such as functional suitability, performance efficiency, compatibility, interaction capability, reliability, security, maintainability, flexibility, and safety. Evaluation tools included Likert-scale surveys, direct user testing, and stakeholder feedback sessions. Usability testing was carried out across multiple devices and access points to ensure that the system functioned well on both desktop and mobile platforms. These strategies ensured that the final product was not only technically sound but also intuitive and user-friendly for Piñana Gourmet's staff, retailers, and customers.

Gallo et al. (2025) note that combining real-world data collection with iterative system development results in practical, user-driven solutions. In this study, the integration of descriptive and developmental designs allowed the researchers to respond directly to operational inefficiencies with a tailor-made solution. The descriptive design provided a grounded understanding of the actual challenges faced by the business, while the developmental design enabled the creation of a responsive system that addressed those challenges in real time. This dual-method strategy ensured that the SCMS was both functionally effective and aligned with stakeholder expectations. Ultimately, the combination of these approaches resulted in a system capable of modernizing Piñana Gourmet's supply chain operations, improving accuracy, and streamlining business performance.

Population of the Study

The client of this study is the Piñana Gourmet. According to the researchers' findings, the populations of this study consist of stakeholders involved in Piñana Gourmet's supply chain operations including the business itself as a supplier, retailers, and customers. Additionally, IT experts will be involved. This group of participants will provide valuable insights into the effectiveness of Piñana Gourmet's supply chain management, helping in

the evaluation and improvement of the proposed web-based system. For the study, a sample size of 107 respondents will consist of one hundred (100) customers, four (4) retailers, two (2) IT experts, and one (1) supplier.

Table 1

Respondents of the study

RESPONDENTS (R)	TARGET POPULATION	PERCENTAGE (%)
Customers	100	93.46%
Retailers	4	3.74%
IT Experts	2	1.87%
Supplier	1	0.93%
TOTAL	**107**	**100%**

Table 1 presents the target population and percentage distribution of the four (4) groups of respondents. The research study consists a total of one hundred-seven (107) respondents.

Statistical Treatment of Data

The researchers use a percentage frequency distribution to determine the proportion of respondents from different stakeholder groups, including customers, retailers, IT experts, and the supplier. In order to determine how useful, effective, and essential the web-based Supply Chain Management System (SCMS) being developed for Piñana Gourmet, the researchers use a proper statistical method to ensure accurate representation and give meaningful insights.

To ensure proper data representation, the researchers used this method to effectively compare the distribution of stakeholder groups in the study. The formula used to compute the percentage is as follows:

$$\% = \left[\frac{r}{p} \right] \times 107$$

Where:

% - Percentage Distribution

r - No. of respondents answered

p - Total no. of population

Likert Scale Method

The researchers will use the Five-Point Likert Scale Method, developed by Rensis Likert, to assess the effectiveness and usability of the web-based Supply Chain Management System (SCMS) for Piñana Gourmet. This method will enable respondents to state their level of agreement or disagreement with a range of statements regarding the system's functionality, usability, efficiency, and overall impact on supply chain operations. This method offers a systematic way to collect measurable feedback from customers, retailers, and suppliers, ensuring an objective evaluation once the system development is finished.

Below is the grading scale to be used in the survey, intended to provide readers with an understanding of the study's methodology while maintaining transparency in the evaluation process.

Table 2

Five-point Likert Scale method for survey

SCALE	RANGE	INTERPRETATION
5	4.50 – 5.00	Strongly Agree (SA)
4	3.50 – 4.49	Agree (A)
3	2.50 – 3.49	Moderately Agree (MD)
2	1.50 – 2.49	Disagree (D)
1	1.00 – 1.49	Strongly Disagree (SD)

Table 2 displays the Likert scale that will be used by the researchers to assess the effectiveness and usability of the web-based Supply Chain Management System (SCMS) for Piñana Gourmet. The scale uses a five-point rating system wherein Strongly Agree (SA) is represented by a score range of 4.50 to 5.00, Agree (A) is between 3.50 and 4.49, Moderately Agree (MA) ranges from 2.50 to 3.49, Disagree (D) is rated between 1.50 and 2.49, and Strongly Disagree (SD) corresponds to scores from 1.00 to 1.49. This scale offers a systematic approach to evaluate respondents' feedback and assess the system's

effectiveness in enhancing supply chain operations.

The Likert Scale Method Formula that was used in this study is:

$$R = \frac{(SA * 5) + (A * 4) + (MA * 3) + (D * 2) + (SD * 1)}{TNR}$$

Where:

R	-	Rating
TNR	-	Total Number of Respondents
SA	-	Strongly Agree
A	-	Agree
MA	-	Moderately Agree
D	-	Disagree
SD	-	Strongly Agree

The researchers will use the formula provided to calculate the average weighted mean for each question in the system evaluation. This will enable them to provide a verbal interpretation of the results, ensuring a clear and organized analysis of respondents' feedback regarding the system's effectiveness and usability.

Data Collection Procedure

The researchers composed an approval letter addressed to the owner of Piñana Gourmet, seeking permission to propose a system to streamline their processes in their supply chain management. Once approved, a face-to-face interview was conducted to gather information about the owner's experiences and challenges in their current manual processes. Since the system includes an e-commerce component, questions regarding the problems encountered when engaging with customers and retailers were also asked. This interview helped the researchers gain a deeper understanding of the current workflows, operational issues, and other concerns related to customers and retailers, which may help in knowing the functions that should be included in the system and as well as the owner's expectations for the system.

To support the study with existing knowledge, reviewing published materials, online references, and case studies on supply chain management was done. Standardized procedures were used to guarantee the accuracy and consistency of data gathering; accordingly, the interview followed a structured format, and the questionnaire will be consulted before its distribution. All collected information is then carefully reviewed, arranged, and documented using Microsoft Office tools.

To further support analysis, the researchers developed a flowchart that visually represents key transactions and relationships within the supply chain. We carefully considered ethical concerns, prioritizing data confidentiality by implementing anonymization when necessary, and ensuring that all participation was voluntary. Regular consultations with the capstone adviser are conducted to ensure that the project follows proper academic and technical guidelines and to avoid unnecessary repetition of revisions. By following this systematic process, the researchers aim to make well-founded recommendations that can help Piñana Gourmet improve efficiency, accuracy, and decision-making in its supply chain management.

Requirement Analysis

The researchers are developing a Supply Chain Management System (SCMS) to improve operational efficiency, specifically for sales and inventory management, delivery visibility, and order fulfillment of Piñana Gourmet. It is being developed to address inefficiencies in their supply chain workflow, involving a digital solution for better tracking, reporting, and decision-making. It also supports B2B and B2C transactions, assuring supplier, retailer, and customer coordination.

Piñana Gourmet handles its current supply chain using manual processes and some digital tools like spreadsheets, phone calls, and in-person transactions for inventory tracking, order processing, and store coordination, causing delays, miscommunication, and stock issues. They don't have ecommerce which limits direct customer engagement and online transactions. These challenges show how a centralized, automated system that can solve inefficiencies and offer real-time insights is needed.

In order to guarantee that the system aligns with the specific needs of Piñana Gourmet, the researchers conducted a personal interview with the business owner to collect detailed information about operational requirements, needed system features, and

preferred technical specifications. Based on the findings, the system is being designed as a web-based application that runs in browsers with consistent internet connectivity. The backend uses both JavaScript (Node.js) and PHP. PHP serves as server-side scripting, working with databases, and generating dynamic content. Node.js enhances the backend by handling asynchronous processes and supporting scalable server-side operations. For the eCommerce, the researchers used Next.js 15 and React 19 to ensure fast performance, while TailwindCSS and ShadCN UI were applied for a responsive design. Zustand was used for state management, Stripe for payment integration, Clerk for user authentication, and Vercel for deployment. The front-end uses HTML, CSS, and Bootstrap to provide a responsive and accessible interface across desktops, tablets, and smartphones. Data is stored and managed in a MySQL database, chosen for its reliability and ability to process large datasets. Development is being done in Visual Studio Code (VSCode), an extensible and efficient coding environment. This combination of tools and technologies ensures the supply chain management system will function efficiently and meet the specific needs of Piñana Gourmet upon completion.

Research Instrument

The purpose of these research instruments is to gather essential information, such as identifying problems encountered by users when interacting with the web-based system. Additionally, they provide a clear and efficient approach to collecting data needed for system development. To accomplish this, the researchers make use of four key instruments: interviews, survey questionnaires, library research, and online research.

Survey Questionnaire is a structured survey that will be distributed to 107 respondents, consisting of the business itself as a supplier, retailers, and customers of Piñana Gourmet. This tool is intended to collect data on current issues, user expectations, and suggestions for improvement. The information gathered will help shape the system design and ensures it addresses real needs and concerns.

Interview was conducted with the owner of Piñana Gourmet to collect detailed insights on business operations, difficulties faced, and system requirements. This process ensures that the system will be built according to the client's specific needs and expectations.

Library Research was done in the Laguna University Library to find relevant

studies, articles, and literature connected to supply chain management. These materials help strengthen the academic foundation of the study and connect scholarly findings to the project's practical goals.

Web/Internet Research was used to explore the latest developments, case studies, and best practices related to web-based food supply chain management systems and integrated analytics. This process allowed the researchers to expand their knowledge and incorporate industry standards into the project.

Requirements Documentation

The Piñana Gourmet Supply Chain Management System (SCMS) is being designed to address the challenges encountered by Piñana Gourmet in Calauan, Laguna, specifically targeting issues in sales and inventory management, as well as order and delivery tracking. The SCMS is intended to integrate functionalities for suppliers, customers, and retailers to enhance operational efficiency, ensure data accuracy, and support better decision-making processes.

Functionally, the system is being developed to include real-time inventory tracking to monitor stock levels of finished products, and packed orders. The order management feature will allow suppliers to view, accept, decline, and manually update the status of orders placed by retailers and online customers. Delivery tracking will be facilitated with a dedicated interface where suppliers can view all scheduled deliveries and manually update statuses. The eCommerce platform will enable customers to browse products, view descriptions, place orders, and choose between cash on delivery or online payment method. Additionally, the point-of-sale system will support offline transactions by providing quick processing and automatic inventory adjustments, while the reporting functionality generates comprehensive sales and inventory reports on daily, weekly, monthly, and annual intervals focusing on descriptive analytics and key performance indicators.

Operationally, the SCMS is being developed as a web-based platform accessible through both desktop and mobile browsers and will include defined user roles for suppliers or administrators, and designated platforms for retailers and customers. Security protocols are being implemented through role-based access controls, secure login procedures, and data encryption. The system will require manual updating by suppliers for order and delivery statuses. It will ensure real-time data processing to reflect accurate inventory and

sales updates. Input requirements of the system include product details such as names, descriptions, prices, stock levels, order specifications, and payment method selections. Correspondingly, output requirements will involve the generation of updated inventory statuses, current order and delivery statuses, sales receipts from POS transactions, and reports on sales, inventory performance, and KPIs.

Design of Software, Systems, Products and/or Processes

Software Resources

Table 3

Software Resources

Software	Description
Web Browser	An application utilized to securely access the system and eCommerce through HTTPS protocols
Visual Studio Code	An integrated development environment used to create the system and eCommerce with JavaScript (Node.js), PHP, HTML, CSS, Bootstrap, Next.js 15, React 19, TailwindCSS, ShadCN UI, and Zustand.
XAMPP	A local server environment used for testing PHP-based applications and managing MySQL databases during development.
MySQL Database	A relational database management system that stores data in structured tables with defined columns and rows.
Vercel	A cloud hosting platform used for hosting and optimizing the eCommerce with seamless deployment workflows.
Clerk	For user management designed to handle login, registration, and security features for eCommerce platform.

Table 3 details the various programming languages, development environments, and software platforms being employed in the creation of the web-based system and

eCommerce. The system and eCommerce's functionality are intended to be accessed through a secure web browser, ensuring continuous online availability. Development is currently being conducted using Visual Studio Code, integrating JavaScript (Node.js), Next.js 15, React 19, PHP, HTML, CSS, TailwindCSS, and Bootstrap. Furthermore, ShadCN UI is used to simplify UI design with pre-styled components, and Zustand is used for efficient state management across authentication, cart, and wishlist functionalities. Additionally, Vercel is used for eCommerce deployment, Clerk is used for user authentication, XAMPP is being utilized to support local testing procedures, and MySQL is being implemented as the database system to efficiently store and manage user and transactional data in real time.

Software Methodology

In the development of the Piñana Gourmet Supply Chain Management System (SCMS), the researchers adopted the Scrum framework, a highly adaptive and iterative methodology under the umbrella of Agile software development models. Scrum was chosen due to its proven effectiveness in managing complex, evolving system requirements within limited timeframes. As described by Mulyana et al. (2024), Scrum encourages iterative development, continuous delivery, and active user engagement, making it an ideal approach for projects that involve frequent feedback and shifting stakeholder expectations. This methodology aligns with the overall objectives of the study, which involve not only identifying inefficiencies in Piñana Gourmet's supply chain operations but also designing and implementing a fully functional, responsive, and user-centered digital system.

Scrum is structured around short development cycles known as sprints, which are typically time-boxed to two to four weeks. Each sprint in this study covered a defined set of goals including documentation, development tasks, stakeholder consultations, and system evaluations. The development team followed a typical Scrum cycle, beginning with Sprint Planning, where the scope of work for each sprint was discussed and prioritized based on the product backlog. During the sprints, daily Scrum meetings (also known as stand-ups) were held to provide updates, address challenges, and maintain momentum. After the sprint duration, a Sprint Review was conducted to demonstrate the completed features to stakeholders and gather feedback. This was followed by a Sprint Retrospective, where the

team reflected on successes, obstacles, and areas for improvement. This cycle repeated through three planned sprints until the system met the required specifications.

In terms of structure, the project defined the necessary roles within the Scrum team. The Product Owner was responsible for maintaining and prioritizing the product backlog based on user needs and research findings. The Scrum Master ensured that the Scrum process was followed correctly, facilitating communication, resolving impediments, and ensuring the development stayed on track. The Development Team, composed of the researchers themselves, was tasked with building, testing, and refining the system throughout each sprint. This team collaborated closely to deliver incremental improvements and to ensure that each iteration brought the system closer to its final functional form.

The development process was segmented into three primary sprints, each serving a distinct function in the overall project timeline. Sprint 1 focused on the planning and preparatory work, including the title defense, gathering of initial data, and laying the foundation for the documentation of Chapters 1 to 3. Sprint 2 progressed into the development phase, covering the prototyping of the SCMS and the refinement of system features based on insights gathered during the descriptive research. Sprint 3 was centered on finalizing the system, conducting mock defenses, and preparing for final submission and deployment. Throughout each sprint, regular communication with the capstone adviser was maintained to ensure academic alignment and to address potential deviations from project expectations.

To support this iterative process, visual project management tools such as a Gantt chart, sprint backlog, and task tables were utilized to track progress and manage time effectively. The backlog provided a dynamic list of tasks and system features, which were regularly reprioritized based on stakeholder feedback and technical evaluations. These tools helped the development team stay organized, meet deliverables on time, and ensure traceability throughout the software development lifecycle.

The system's continuous development and refinement were supported by rigorous testing protocols implemented at the end of each sprint. These included functional testing, usability evaluations, and cross-device testing to ensure the SCMS worked effectively on different platforms such as desktops, tablets, and smartphones. The iterative nature of Scrum allowed for real-time adjustments based on feedback gathered during system demonstrations, making it easier to incorporate user-centered features like real-time

inventory tracking, automated order processing, and delivery status updates.

By using the Scrum framework, the researchers ensured that the software development process remained flexible, stakeholder-driven, and aligned with the goals of improving Piñana Gourmet's supply chain management. This methodology not only supported the technical development of the system but also ensured that it evolved directly in response to the actual problems and needs identified during the descriptive phase of the research. Ultimately, Scrum provided the structure, adaptability, and collaboration necessary to produce a working SCMS that addresses operational inefficiencies and enhances business performance.

Figure 3

Scrum Framework

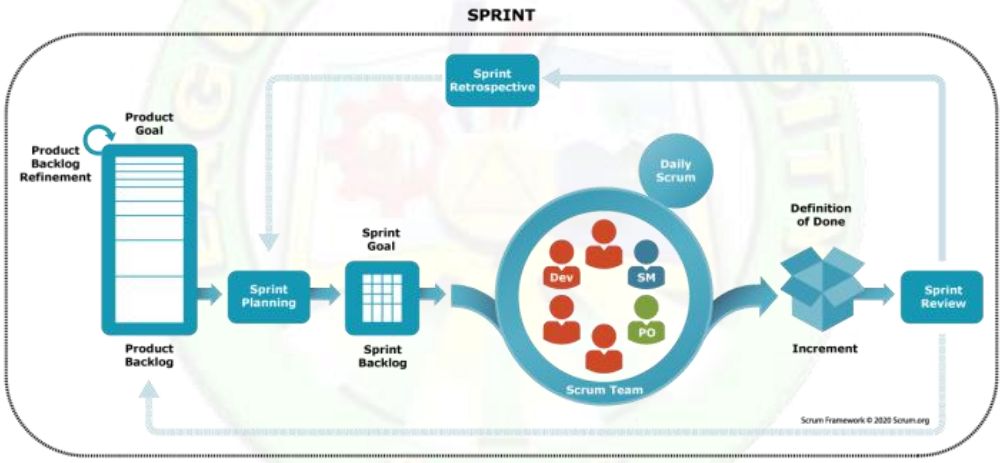

Figure 3 illustrates the Scrum framework used to manage the ongoing development of the web system through a structured and iterative process. Each Sprint serves as a time-boxed container for all work, beginning with Sprint Planning and concluding with a Sprint Review and Retrospective. The Scrum Team, composed of the Product Owner, Scrum Master, and Developers, collaborates daily to monitor progress and address challenges. Continuous Product Backlog Refinement ensures that priorities remain clear and aligned with project goals. Sprints follow one another without interruption, maintaining steady progress and promoting adaptability, rapid feedback, and continuous improvement until the system achieves its intended objectives.

Development and Testing

The researchers have formed a team composed of a Scrum Master, developers, a writer, and individuals responsible for direct collaboration with stakeholders, including the business owner, customers, and retailers. The Scrum master facilitates daily meetings to track progress and tackle challenges, ensuring they are addressed to maintain smooth development cycles. The development process started with a thorough analysis of Piñana Gourmet's operational challenges and system requirements. This involved collaborating with the business owner, retailers, and customers to identify essential functionalities, including sales and inventory tracking, order management, delivery visibility, and e-commerce integration. By applying Agile principles, the team made sure that every development cycle provides a well-defined set of features, while also being open to stakeholder feedback for further enhancements.

SCMS is being developed as a web-based application, providing accessibility on multiple devices while featuring a user-friendly interface. Key features, including real-time inventory updates, automated order processing, and delivery visibility, are currently being implemented to enhance the efficiency of supply chain operations. The system used JavaScript (Node.js) and PHP for backend development, while HTML, CSS, and Bootstrap ensured a responsive front-end experience. MySQL operates as a database management system, providing reliable data storage and retrieval. For the eCommerce platform, Next.js 15 and React 19 are used to enhance performance with server-side rendering and dynamic UI components. TailwindCSS and ShadCN UI are used to simplify UI design, Zustand efficiently manages state across authentication, cart, and wishlist functionalities, Clerk is used for user authentication, and Vercel is used for deployment. Additionally, Stripe is integrated to enable secure and seamless online payment transactions.

The testing phase is playing a vital role in the ongoing development process for validating the system's reliability, security, performance, and usability. The researchers carried out tests to confirm that all features operated as expected and are accessible on various devices. Before finalizing the system, the researchers continue to engage in regular consultations with their capstone adviser to ensure that the development process complies with both academic and technical standards. The team follows a structured and collaborative approach, ensuring that the SCMS aligned with Piñana Gourmet’s operational

needs, enhanced supply chain efficiency, and offers a scalable solution for future growth.

Sprint Planning and Backlog Creation

Table 4

Sprint Planning and Backlog Creation

Sprint Planning and Backlog Creation		
TO-DO LIST	**IN PROGRESS**	**DONE**
• Chapter 4-5 Documentation • Reports Generation	• System Admin Side & eCommerce (70%) • Backend & Database • Sales Tracking • Inventory Tracking • POS • Order & Delivery Tracking • Website's User Interface • User Authentication • Descriptive Analytics • User Dashboard	• Chapter 1-3 Documentation

Table 4 presents a clear overview of the project's current status by organizing tasks into To-Do, In Progress, and Done categories. As you can see, chapters 1 to 3 of the documentation have been finished, which is a big step forward in the project's research and documentation part. At the same time, key components of the system are under development on, such as the System Admin Side and eCommerce, the Backend and Database, Sales Tracking, Inventory Tracking, POS, Order and Delivery Tracking, the Website's User Interface, User Authentication, Descriptive Analytics, and User Dashboard.

On the other hand, Chapters 4 to 5 in documentation are still on the To-Do List, which means that the last steps of research and evaluation have not been completed yet. This will involve analyzing system performance, evaluating user experience, and completing the final written requirements of the study. Additionally, Report Generation is not yet available in the system but will be added soon. Through the process of sprint planning and backlog creation, it allows organized development by identifying areas that require additional refinement, all while ensuring a transparent workflow for upcoming tasks. By using this approach, the team guarantees that the system will accomplish its intended functionalities and objectives prior to achieving full completion.

Sprint Review

The researchers outline the schedules they constructed for the current sprints 1-3, applying the Scrum Framework of Agile Development. Each sprint focused on particular tasks such as data gathering, development, testing, and other related tasks, ensuring ongoing progress.

Table 5

Sprint 1

Weeks	Description
Week 1 to 2	Data Gathering, Daily Scrum Meetings
Week 3 to 4	Title Creation, Daily Scrum Meetings, Adviser Consultation
Week 5	Title Defense, Daily Scrum Meetings, Sprint Planning

Table 5 shows the researchers' utilization of the Scrum Framework of Agile Development for scheduling Sprint 1. Sprint 1 was given 5 weeks to be completed.

Table 6

Sprint 2

Weeks	Description
Week 6 to 8	Chapter 1 to 3 Documentation, Project Work, Daily Scrum Meetings, System Development, Requirements Gathering
Week 9	Continue Documentation, Project Work, System development, Adviser Consultation
Week 10	Mock Defense, Sprint Review Meeting, Initial System testing, Adviser Consultation

Table 6 shows how the researchers have planned to complete Sprint 2 within 5 weeks.

Table 7

Sprint 3

Weeks	Description
Week 11 to 13	Continuing system development, Daily Scrum Meetings, Chapter 1 to 3 Documentation Updates
Week 14	Sprint Review Meeting, Adviser Consultation, System testing
Week 15	Final Defense for Chapter 1 to 3 Documentation and 70% System

Table 7 shows the tasks outlined by the researchers for Sprint 3, expected to be completed in a span of 5 weeks.

Increment

The researchers applied the Scrum Framework of Agile Development to ensure steady progress throughout the project. By the end of sprint 1, the researchers had successfully defended their title, planned their project plan, and began the process of backlog creation for future development, ensuring that the foundation for the study and system development was well-prepared.

During each phase of Sprint 2, the researchers shifted their attention towards documentation and the initial phases of system development. Chapters 1 to 3 of the documentation were completed and the first version of the system was developed before a mock defense.

While in Sprint 3, the researchers will enhance the system and revise their documentation in accordance with the results from the mock defense. By the end of this sprint, a 70% completed system and updated chapter 1 to 3 documentation should be prepared for the final defense.

Testing Phase

During the testing phase, the researchers conducted initial stress testing to evaluate the system's performance under different scenarios. The initial testing was crucial in identifying areas that might need improvement and ensured that essential features such as inventory tracking, order management, sales monitoring, and delivery tracking were functioning correctly in their current state. Additional tests will be conducted as development progresses to further refine system performance and validate its stability, as well as to ensure that the system runs smoothly on various devices and browsers, ensuring accessibility for all stakeholders such as customers, retailers, and the business itself. By doing these tests, the researchers hope to improve the system's functionality, fix any vulnerabilities, and make sure the Piñana Gourmet SCMS satisfies user and business standards.

Test Case

In order to assess the functionality of the Piñana Gourmet Supply Chain Management System (SCMS) at its current stage of development, the researchers developed structured test cases that focused more on key system processes. Each test case outlined specific actions and expected outcomes. These tests help in ensuring that the implemented features operated as intended and meet the system requirements. As the system progresses, further test cases will be conducted to confirm enhancements, resolve any issues, and improve the overall reliability of the system.

Table 8

System Features Admin Side Test Case

Case No.	Test Plan	Description
1.0	Sign In	To access the system, the user must enter authentication credentials, such as a username and password. It verifies the user's identification and provides access to allowed features.
2.0	Dashboard	It provides a real-time overview of key metrics. It typically includes charts, graphs, and tables, which help the users to track progress and assess the performance of the business.
3.0	Inventory Management	It provides an organized way to track and manage products. It helps the business to monitor its inventory in real time, allowing for quick updates, easy product searching, and keeping track of stock levels.
4.0	Order Management	It provides tracking and managing customer orders. It allows users to monitor order statuses, total revenue, and successful transactions.
5.0	Delivery Management	It provides tracking and managing order deliveries. The business can easily access delivery statuses and manage shipments effectively.
6.0	Point of Sales	It simplifies the sales processes in the physical store. Users can add items to the cart, adjust quantities, offer other payment options, and generate a receipt.
7.0	Log Out	It ends the user's session and prevents unauthorized access until the user signs in again with valid authentication credentials.

Table 8 shows the sign-in and log out process as well as all the current features available to the administrator. This table is used to make sure that each current system feature operates as intended.

Test Case 1.0: Sign In

Procedure:

- Enter the username in the provided field.
- Enter the password in the provided field.
- Click 'Sign In'.

Expected Output:

- If the credentials are valid, it will be directed to the dashboard.

Actual Result:

Figure 4

System Sign In Portal

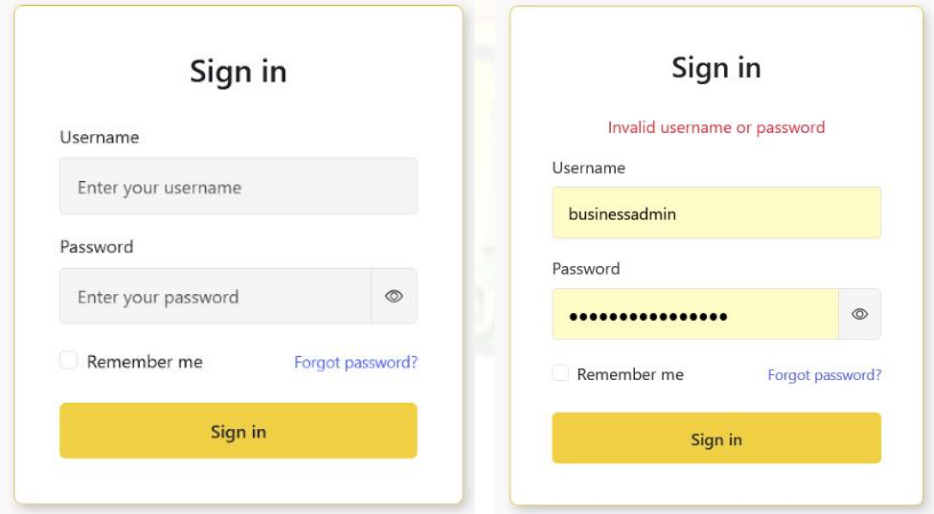

Figure 4 shows the sign-in portal wherein the users input their username and password in the designated field, but if it's wrong, then it is invalid and asks the user to retype their credentials.

Test Case 2.0: Dashboard

Procedure:

- Sort the dashboard data by clicking the dropdown menu for period filter, wherein you can choose between Today, This Week, This Month, This Quarter, and This Year.

Expected Output:

- KPIs based on the selected period.
- Sales trend based on the selected period.
- Revenue by category based on the selected period.
- Inventory status based on the selected period.
- Payment methods based on the selected period.
- Top products based on the selected period.
- Recent transactions based on the selected period.

Actual Result:

Figure 5

Dashboard

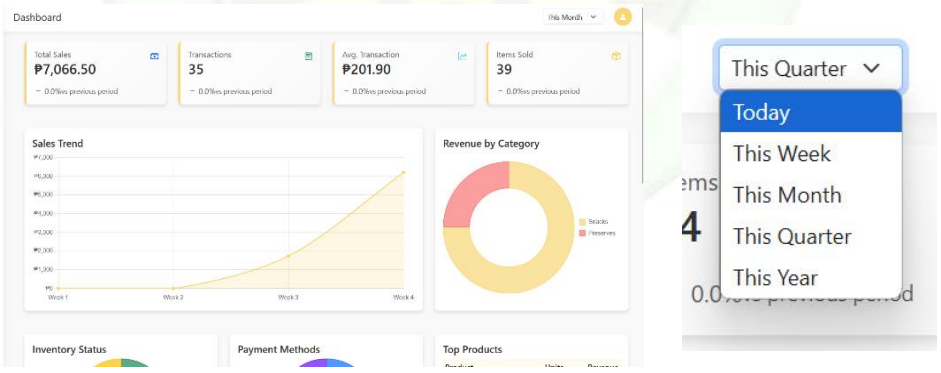

Figure 5 shows the dashboard wherein the user is directed once credentials are validated. A dropdown menu is present for filtering periods.

Figure 6

Dashboard Key Performance Indicators (KPIs)

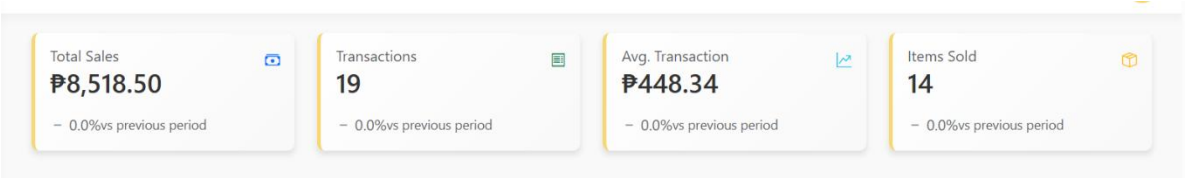

Figure 6 displays the KPIs that can be seen in the dashboard. It shows the Total Sales, Transactions, Average Transactions, and Items Sold based on the selected period.

Figure 7

Charts and Graphs

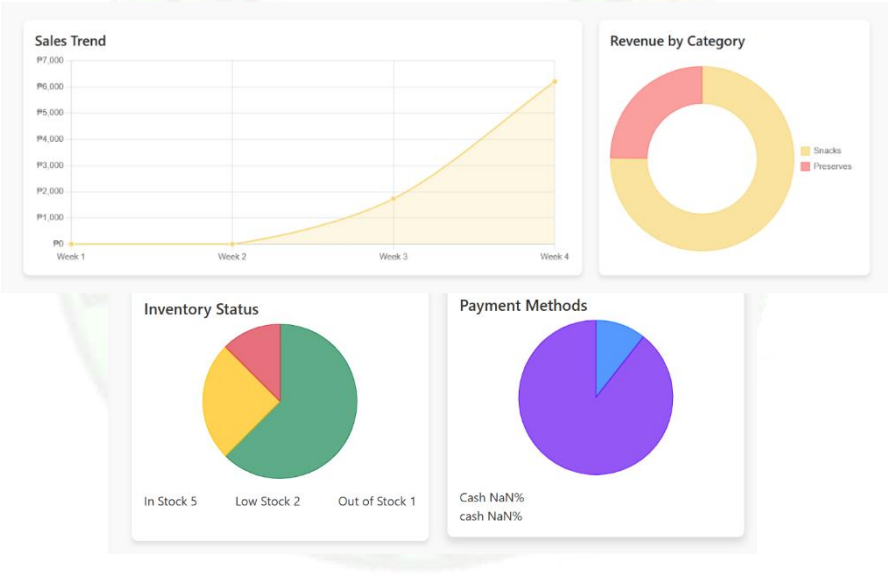

Figure 7 shows the charts for the Sales Trend, Revenue by Category, Inventory Status, and Payment Methods based on the selected period.

Figure 8

Tables

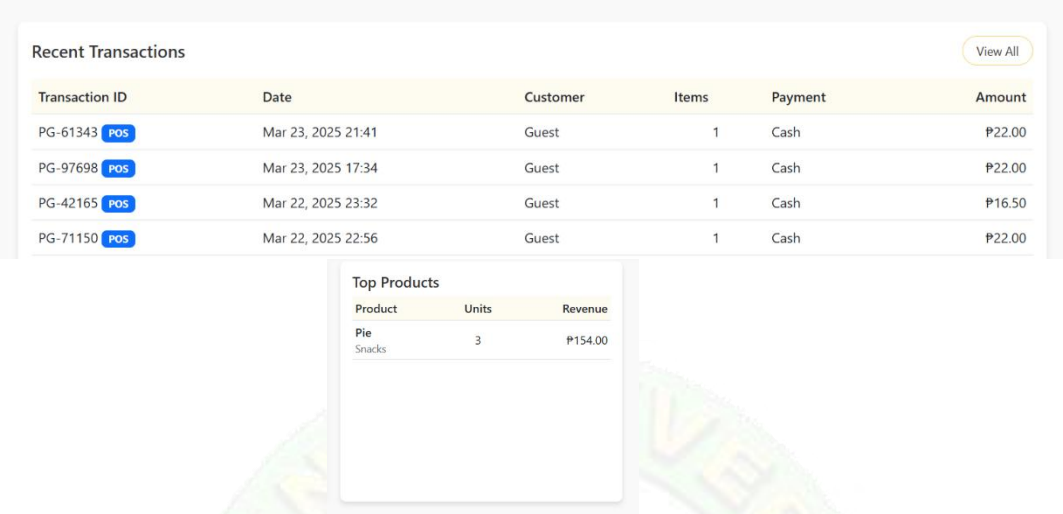

Figure 8 shows the tables for the Recent Transactions and Top Products based on the selected period.

Test Case 3.0: Inventory Management

Procedure:

- Click ‘Filter’ to filter the products based on their status, including In Stock, Low Stock, and Out of Stock.
- Click ‘Sort By’ to sort the products based on their name, price, and stock.
- The user can choose to display the inventory products in either Table View or Card View.
- The user can easily search for products using the search box.
- To add a product, the user can choose between normal tracking and batch tracking.

Expected Output:

- Filtered products based on their status.
- Sorted products based on their name, price, and stock.
- Inventory products are displayed in Table View.
- Inventory products are displayed in Card View.

- The product is added through normal tracking.
- The product is added through batch tracking.

Actual Result:

Figure 9

Inventory Management

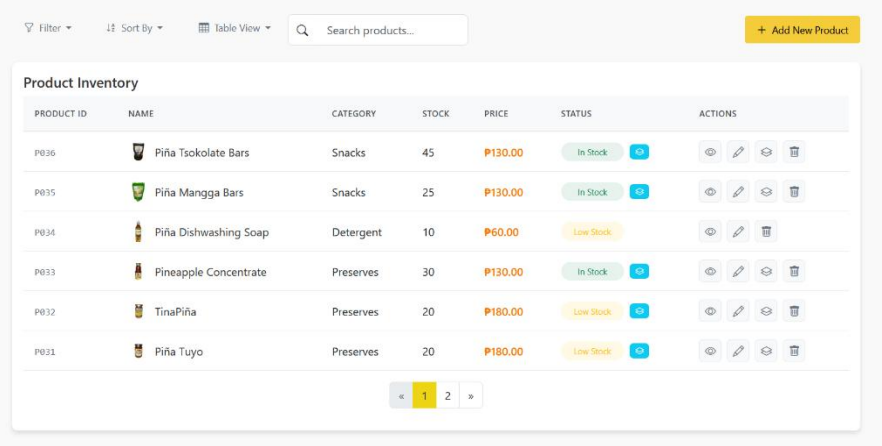

Figure 9 shows the product inventory. Filtering, sorting, changing the display, and searching product are at the left top part and the add new product button is on the right top side.

Figure 10

Filter, Sort, and Display

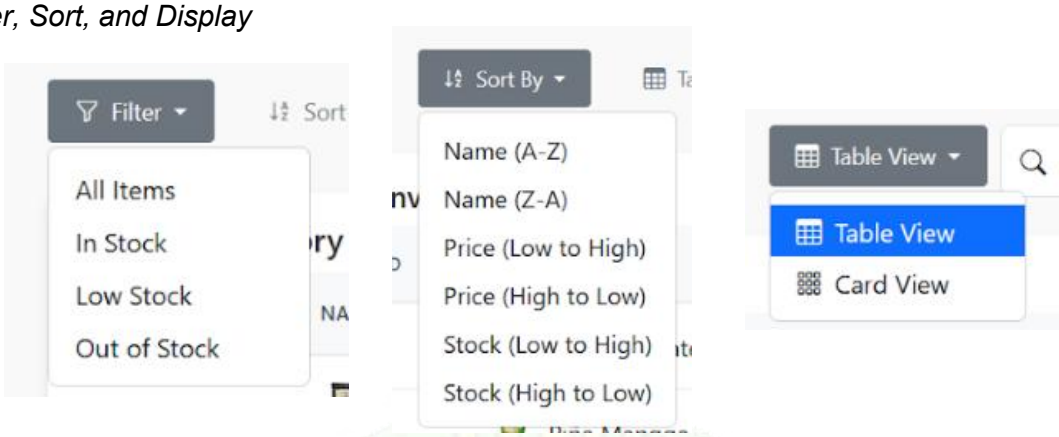

Figure 10 shows the filtering choices, sorting options, and inventory product display preferences.

Figure 11

Adding New Product

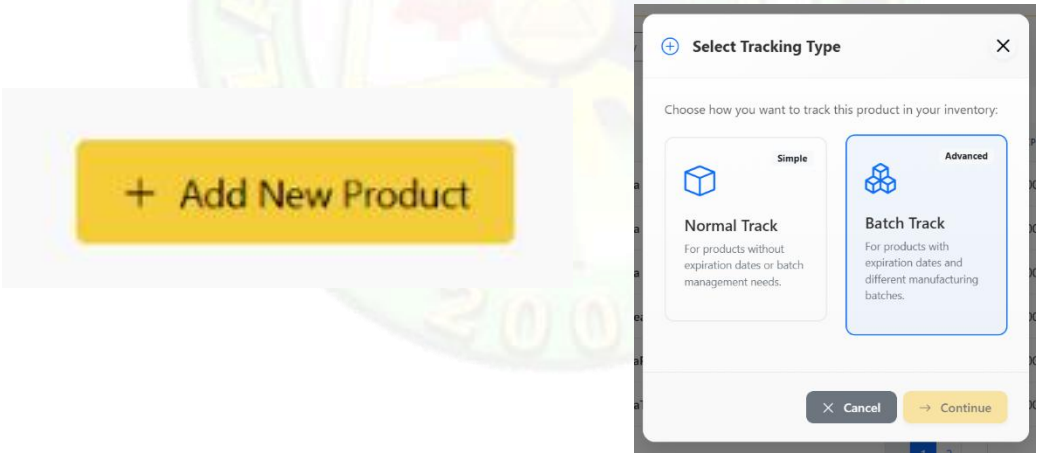

Figure 11 shows that when adding a new product, the user has the option to select between two tracking types, either Normal Track or Batch Track.

Figure 12

Adding Normal Track Product

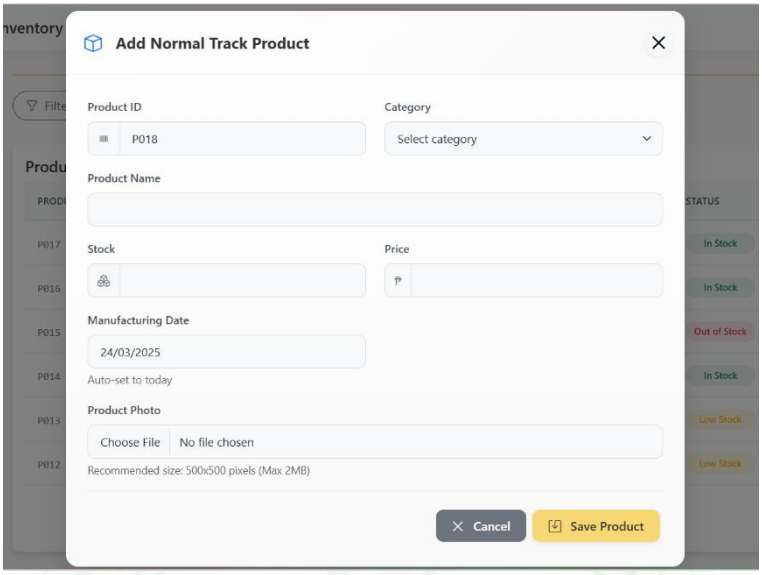

Figure 12 shows the necessary details for normal tracking. Normal Track is for products without expiration dates or for those that don't need batch management.

Figure 13

Adding Batch Track Product

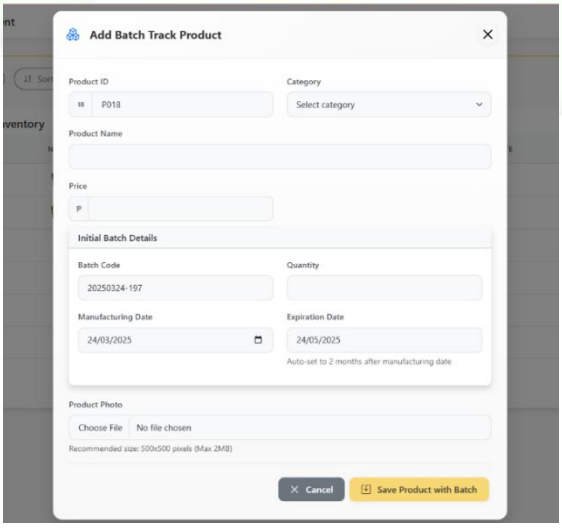

Figure 13 shows the necessary details for batch tracking. Batch Track is for products with expiration dates and different manufacturing batches.

Figure 14

Normal Track Product

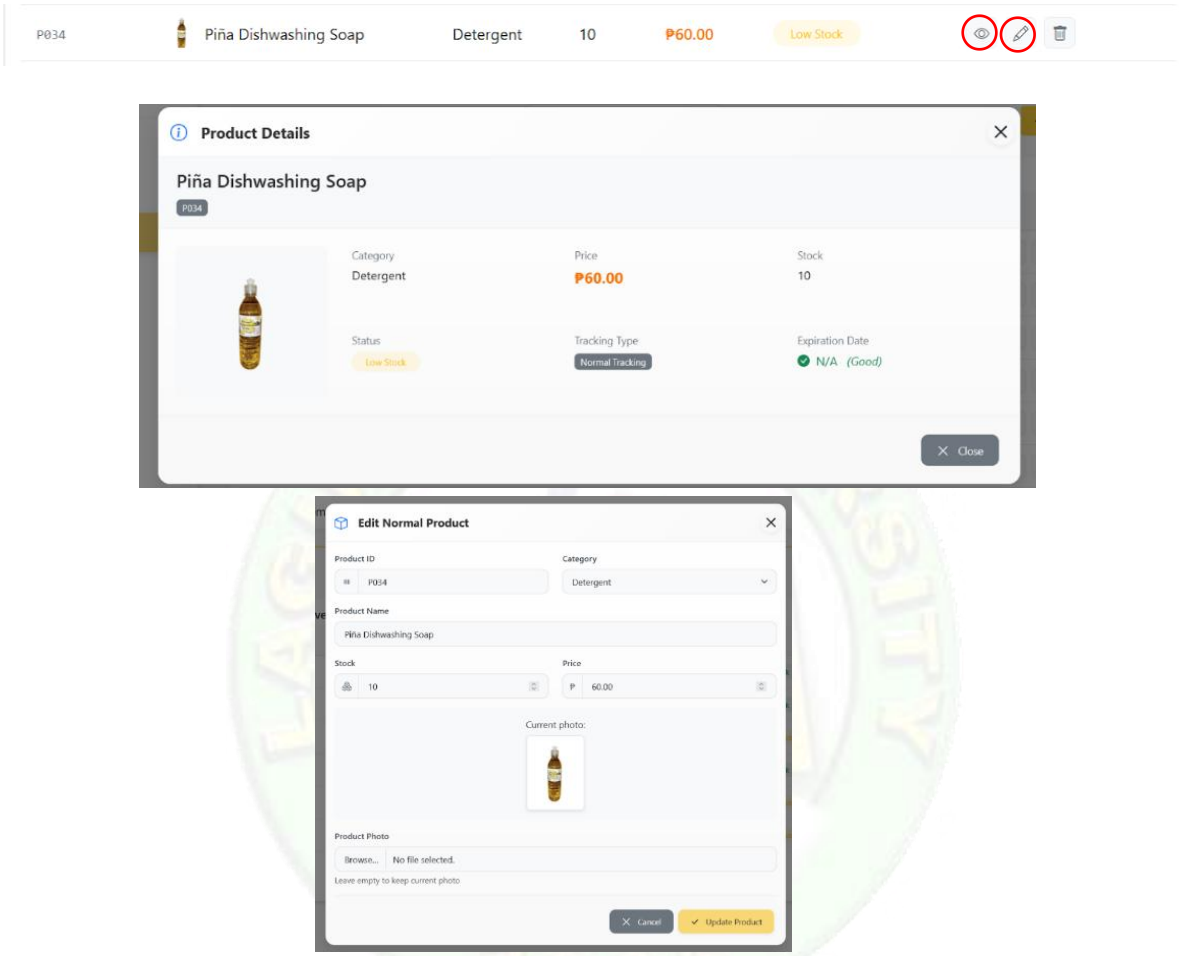

Figure 14 shows the view and edit button of the product under normal tracking. Users can view, edit, and delete the product.

Figure 15

Batch Track Product

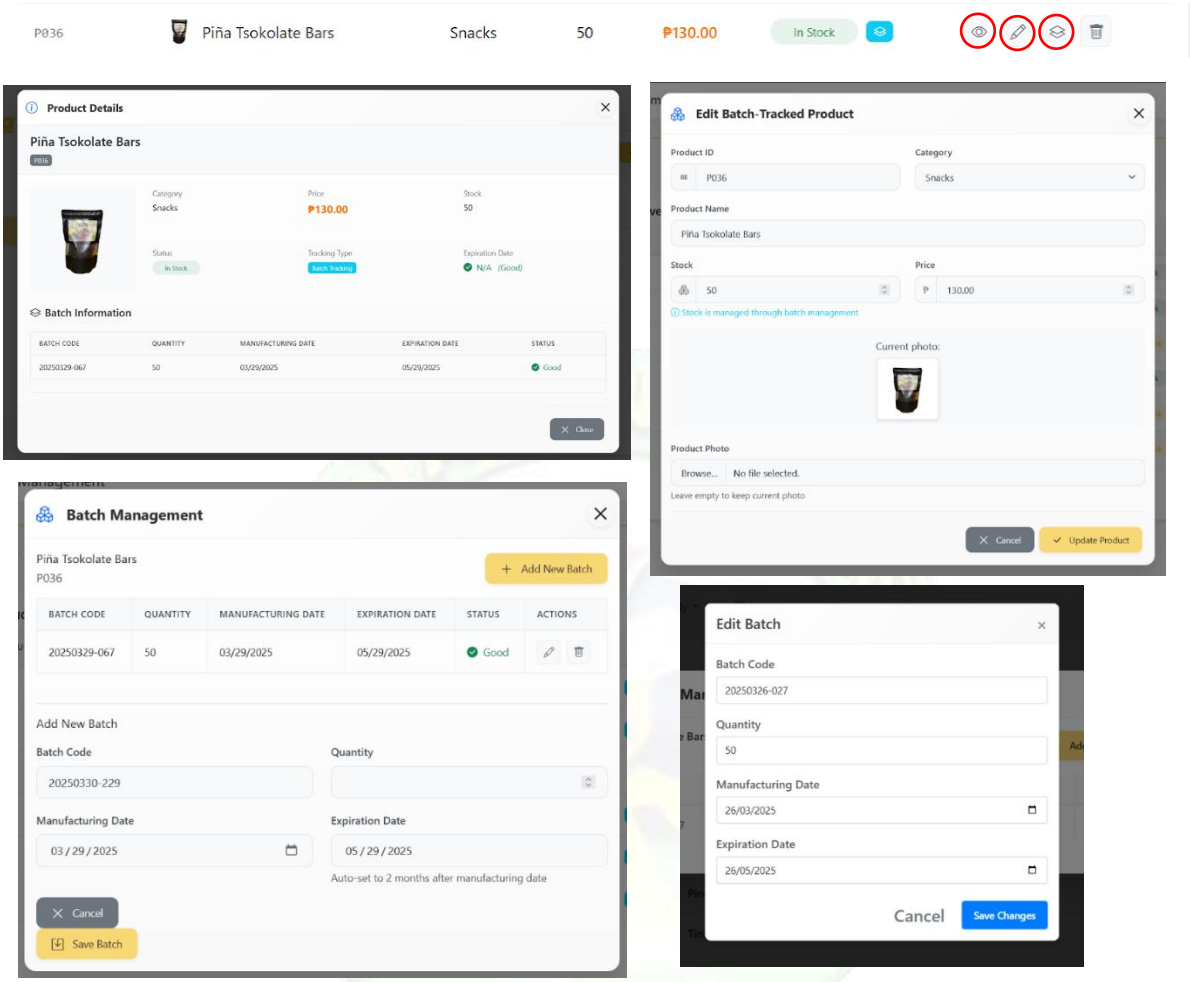

Figure 15 shows the features under batch tracking wherein users can edit, view, and delete the products, as well as view and add another product in the same batch.

Test Case 4.0: Order Management

Procedure:

- Click ‘Status’ to filter the orders based on their status, including Pending, Processing, Shipped, Delivered, and Cancelled.
- Click ‘Date’ to sort the orders based on the date, including Today, Last 7 Days, and Last 30 Days. The user can manually select the specific start and end date by clicking the Custom Range.
- The user can easily search for orders using the search box.
- Click ‘Create Order’ for those orders that a point-of-sales feature can’t handle, like ordering in a physical store and wanting it to be delivered.
- The orders can be viewed, edited, and deleted by the users.

Expected Output:

- Filtered orders based on their status.
- Sorted orders based on the date.
- KPIs.

Actual Result:

Figure 16

Order Management

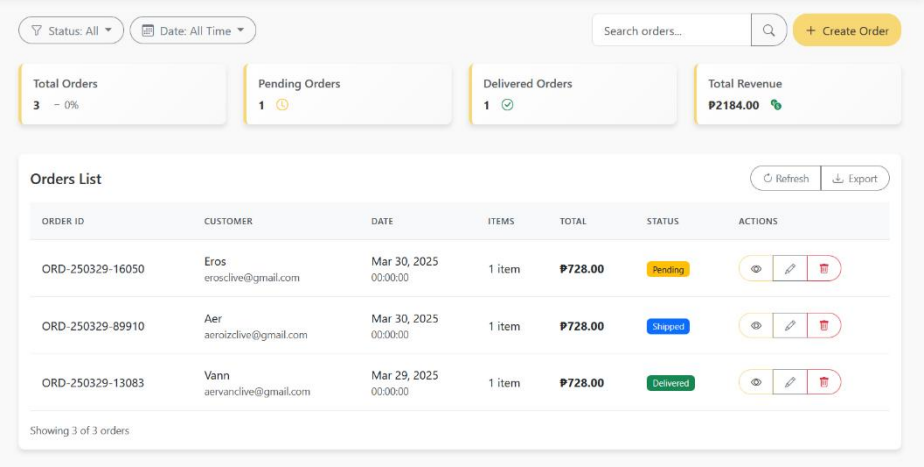

Figure 16 shows the order management. Status and Date Filter are at the left top part, order creation feature is at the right top part, and KPIs are displayed below them. Orders list is seen with the export and refresh feature.

Figure 17

Status and Date Filter

Figure 17 shows the filtering choices for status and date.

Figure 18

Order Key Performance Indicators (KPIs)

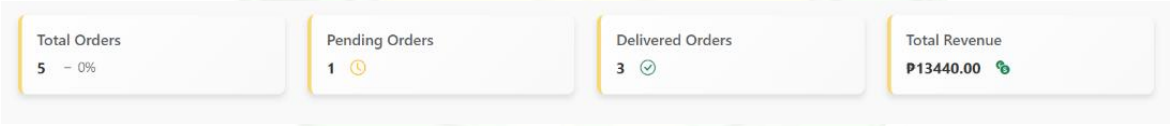

Figure 18 shows the KPIs in the order management consisting of the Total Orders, Pending Orders, Delivered Orders, and Total Revenue.

Figure 19

Creating Order

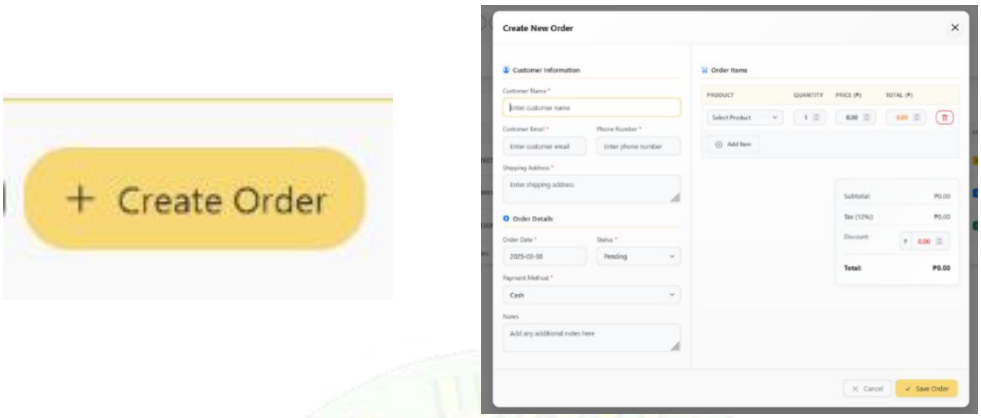

Figure 19 shows the necessary details when creating a new order. It consists of customer information, order details, and order items.

Figure 20

Orders List

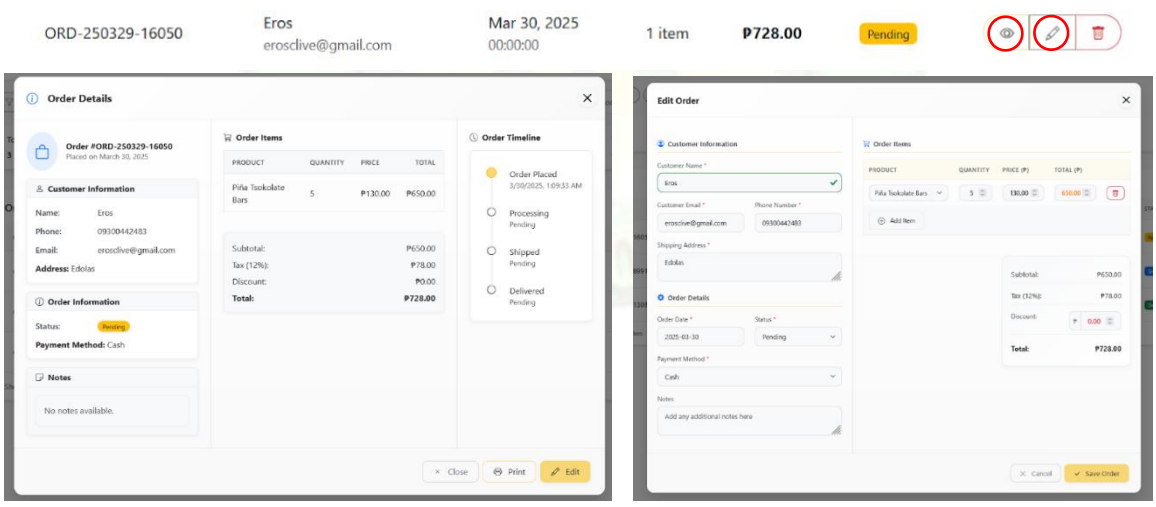

Figure 20 shows that the users can view, edit, and delete the orders.

Test Case 5.0: Delivery Management

Procedure:

- Schedule the delivery.
- Mark the order ready for delivery.
- Report and view delivery issue/s.
- Mark the order delivered.

Expected Output:

- Scheduled delivery.
- Order ready for delivery.
- Resolve delivery issue/s.
- Order delivered.

Actual Result:

Figure 21

Delivery Management

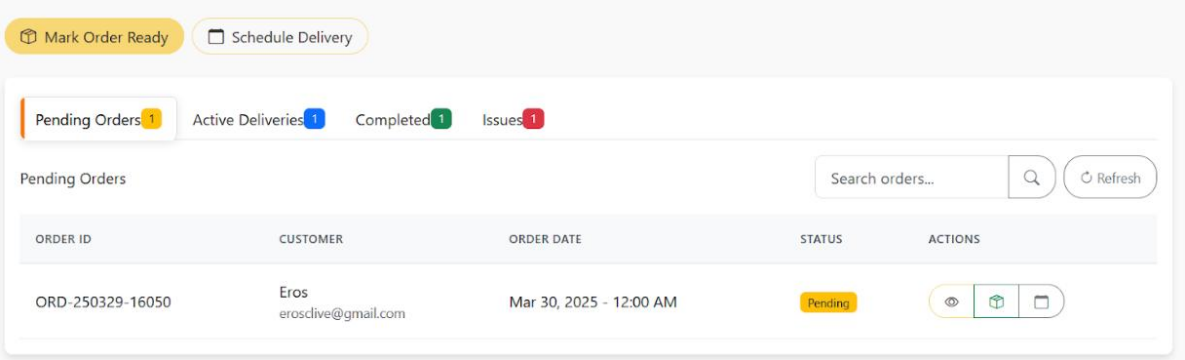

Figure 21 shows the delivery management. This offers visibility throughout the delivery process. Shortcuts for marking the order ready and scheduling the delivery are in the left top part. Users can also view the pending orders, active deliveries, completed deliveries, and issues.

Figure 22

Pending Orders

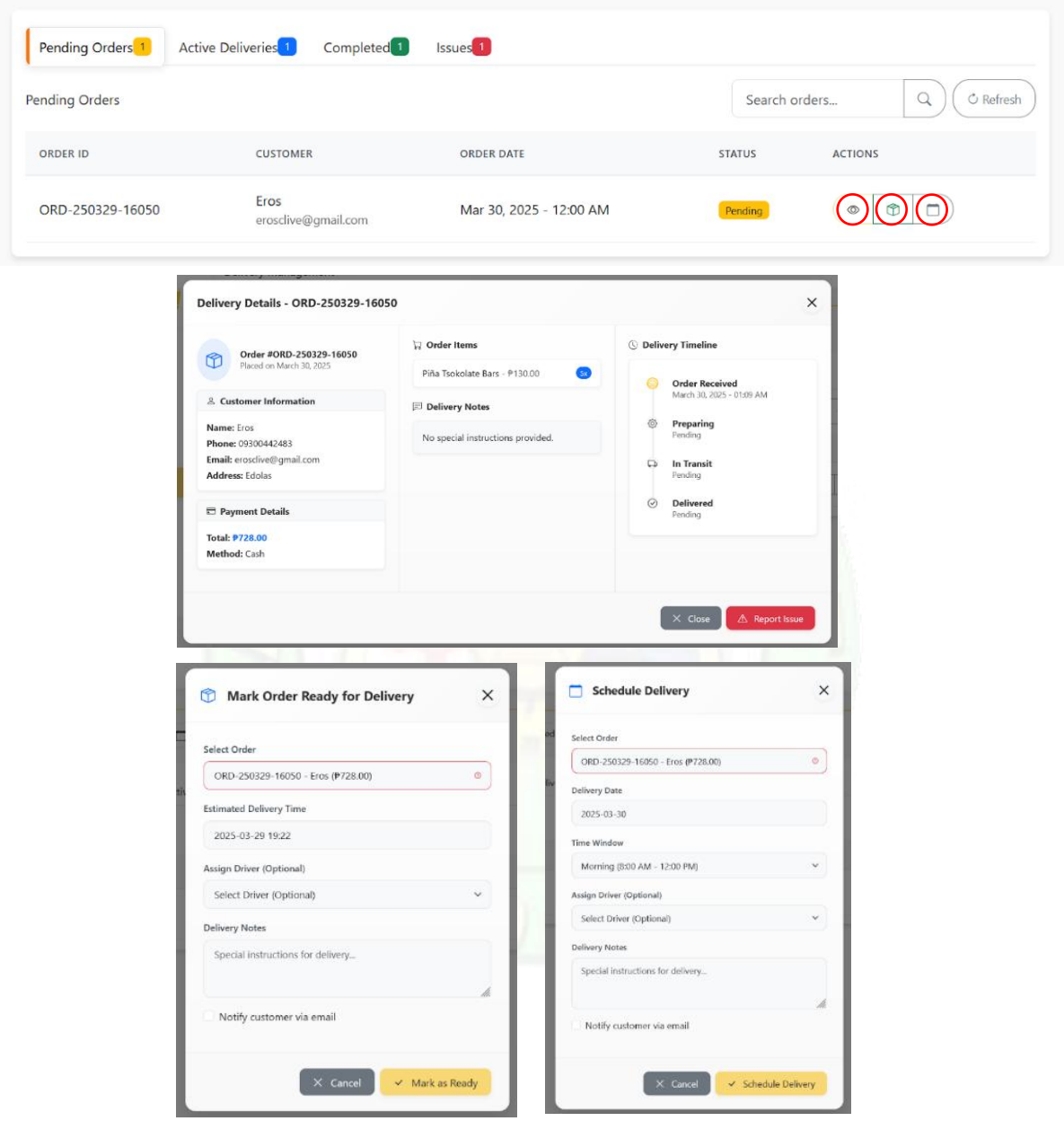

Figure 22 shows the pending orders wherein the user can view the details, mark the order as ready to be delivered, and schedules the delivery.

Figure 23

Active Deliveries

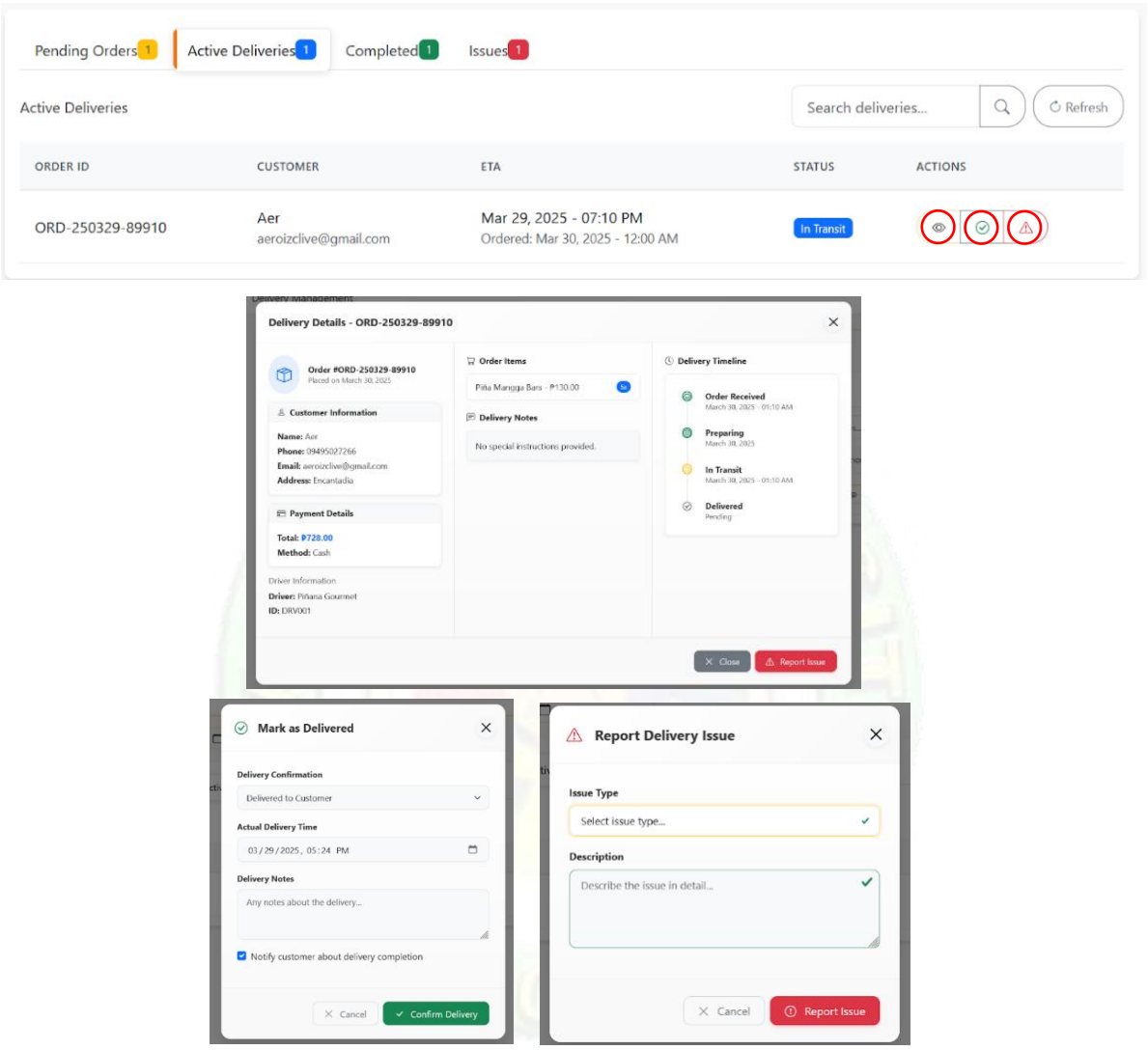

Figure 23 shows the active deliveries, allowing the user to view the delivery details, mark them as delivered, and report any delivery issues.

Figure 24

Completed Deliveries

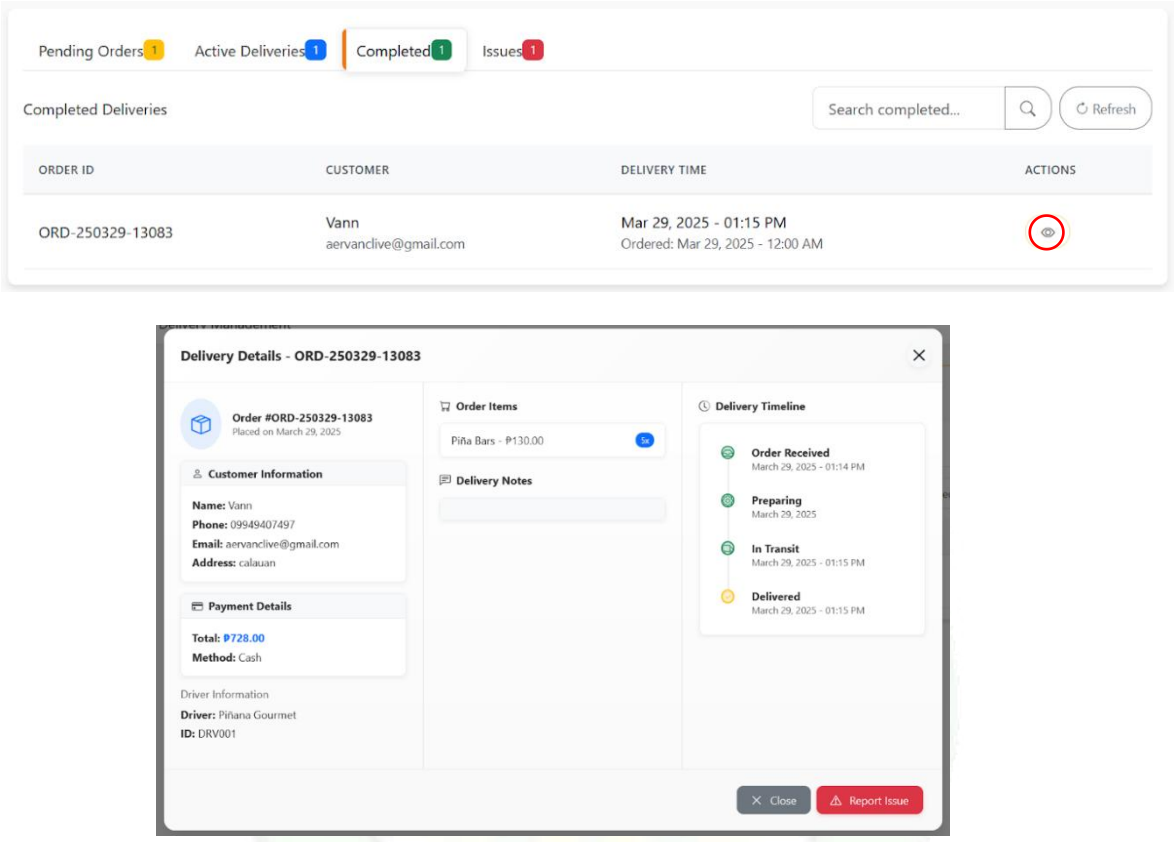

Figure 24 shows the completed deliveries, wherein users can also see the delivery details.

Figure 25

Delivery Reported Issue/s

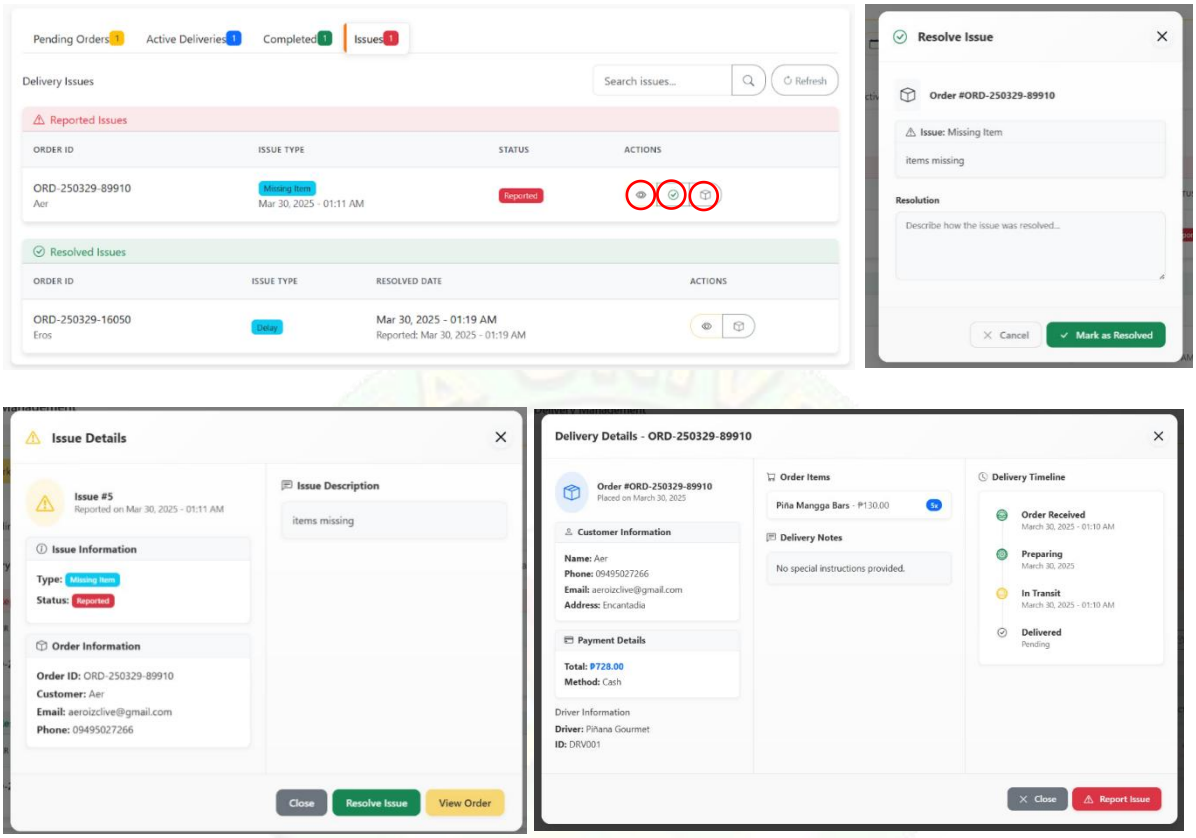

Figure 25 shows the delivery reported issue/s wherein the user can view the issue, delivery details, and resolve the issue.

Figure 26

Delivery Resolved Issue/s

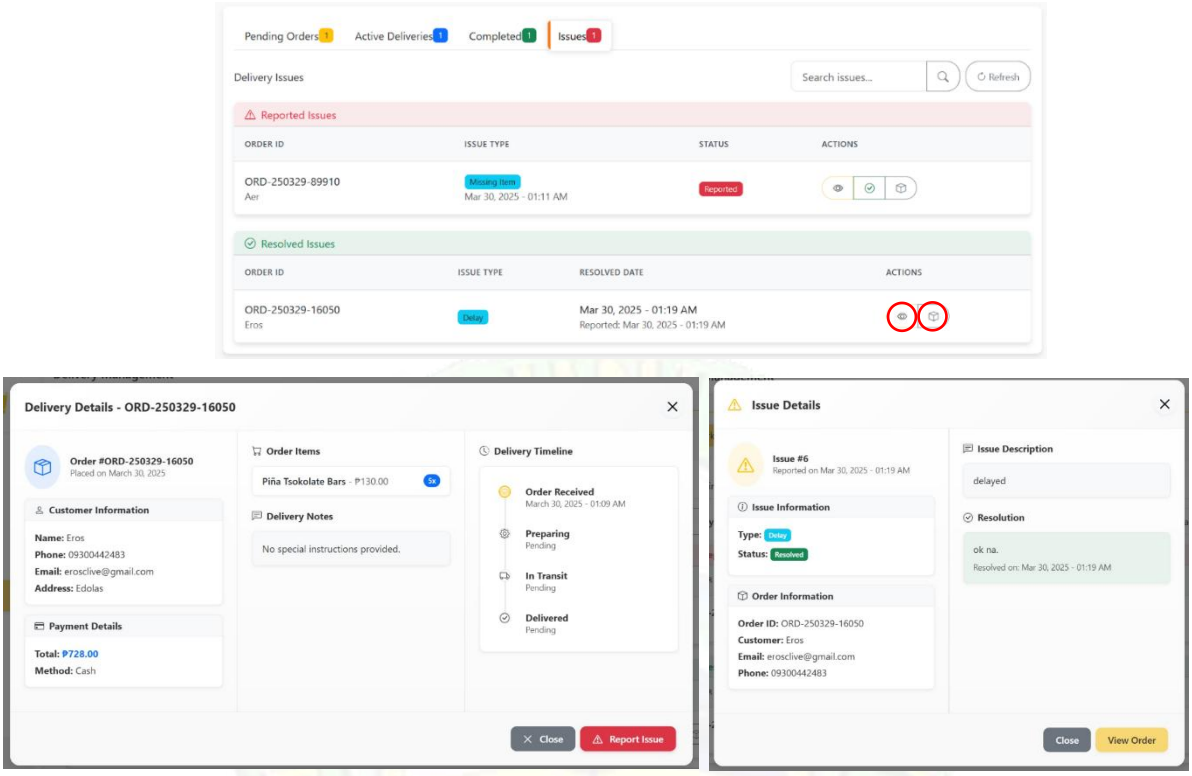

Figure 26 shows the delivery resolved issue/s wherein the user can view the issue and delivery details.

Test Case 6.0: Point of Sales

Procedure:

- Click ‘Add’ to add order.
- Enter the discount, if possible. Click ‘Apply’.
- Click ‘Proceed to Payment’ for the payment.
- Click ‘Print Receipt’ to print the receipt.

Expected Output:

- Printed receipt.
- Successful purchase.

Actual Result:

Figure 27

Point of Sale

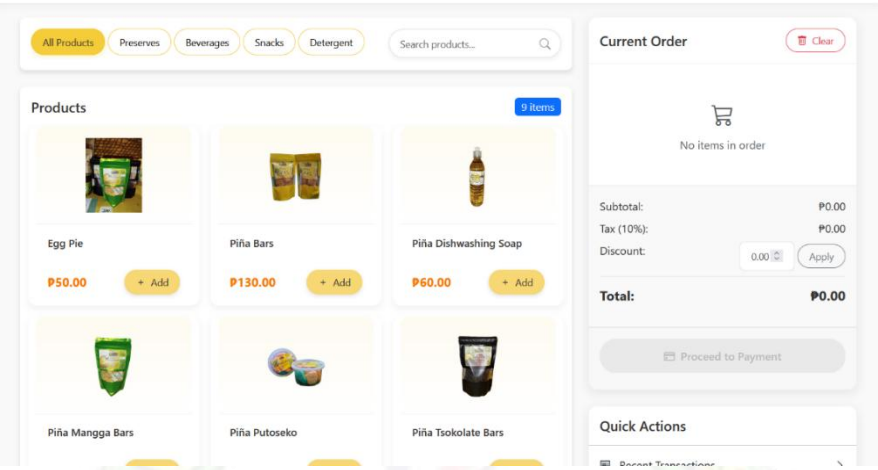

Figure 27 shows the point of sale, which is only applicable to in-store customers. The user can add the order to the cart, and the customer has the options for payment.

Figure 28

POS Order

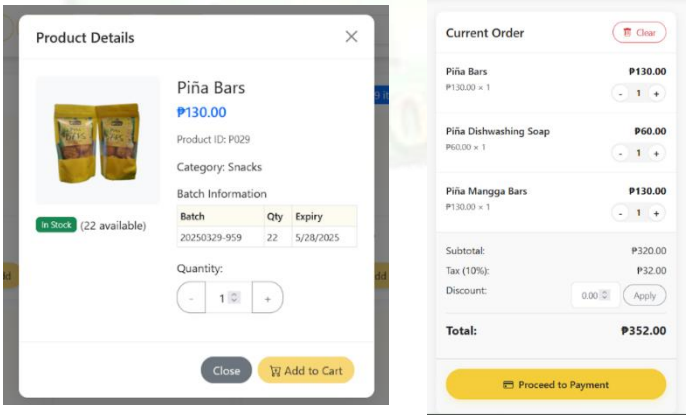

Figure 28 shows the current order wherein the product is added and is ready to be paid. The current order consists of the subtotal, automatic tax, and discount section. Additionally, to remove all the products in the cart, just click the ‘Clear’ button.

Figure 29

POS Payment

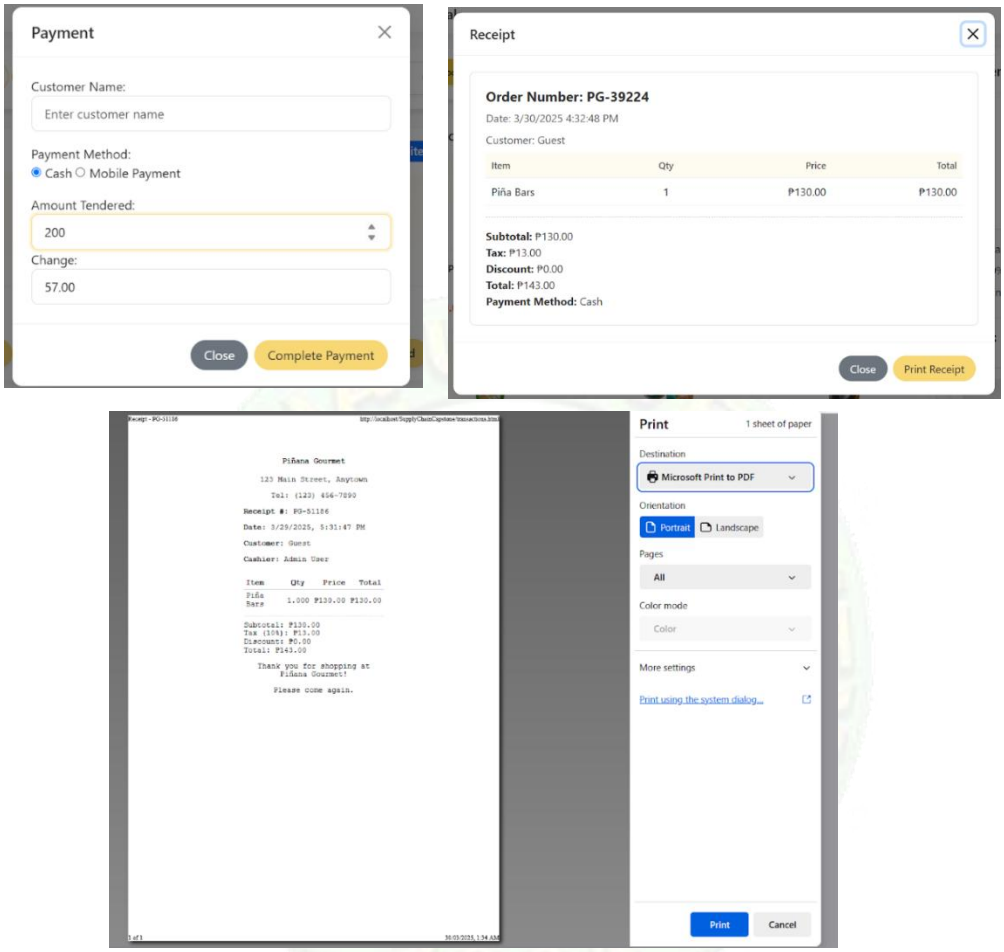

Figure 29 shows the payment process in the point of sale. The customer has two payment options, including cash and mobile payment. The receipt can be printed as well.

Figure 30

POS Transaction History

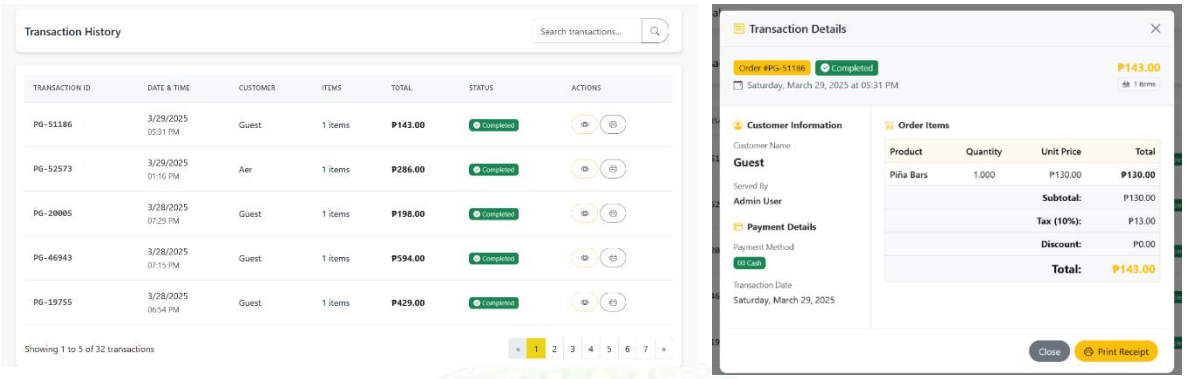

Figure 30 shows the transaction history in the point of sale. The user can view the transaction and print it as well.

Test Case 7.0: Log Out

Procedure:

- Click the profile and select ‘Logout’.

Expected Output:

- Successfully logged out.

Actual Result:

Figure 31

Log Out

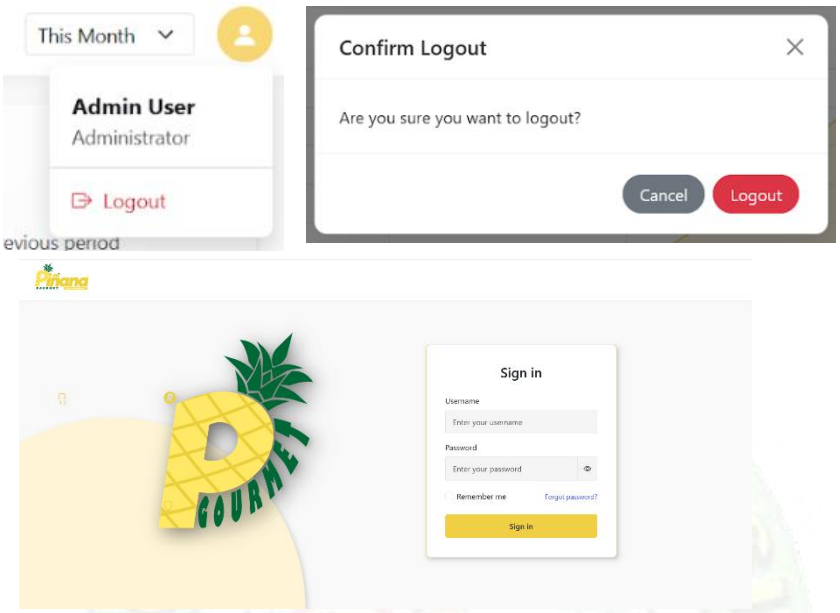

Figure 31 shows the log-out process, where the user returns to the sign-in portal after logging out of the system.

Table 9

System Features Admin Side Test Log

Test Case No.	Test Plan	Result
1.0	Sign In	Success
2.0	Dashboard	Success
3.0	Inventory Management	Success
4.0	Order Management	Success
5.0	Delivery Management	Success
6.0	Point of Sales	Success
7.0	Log Out	Success

Table 9 shows that the test cases for the current admin side are successful and no errors encountered.

Table 10

eCommerce Features Customer Side Test Case

Case No.	Test Plan	Description
8.0	Sign In & Sign Up	To access the site, the customer must enter their authentication credentials or sign in using third party methods like social media. If there is no account, the customer must sign up by providing the necessary details.

Table 10 shows the sign-in and sign-up process for the current eCommerce platform. This table is used to make sure that the eCommerce feature operates as intended.

Test Case 8.0: Sign In & Sign Up

Procedure:

- Click ‘Login’.
- Sign in using Facebook, Google, TikTok, or enter an email address and the code will be sent to the email provided.
- If there is no account, click ‘Sign up’ and enter the necessary details.

Expected Output:

- The customer will be directed to the landing page.

Actual Result:

Figure 32

eCommerce Sign In Portal

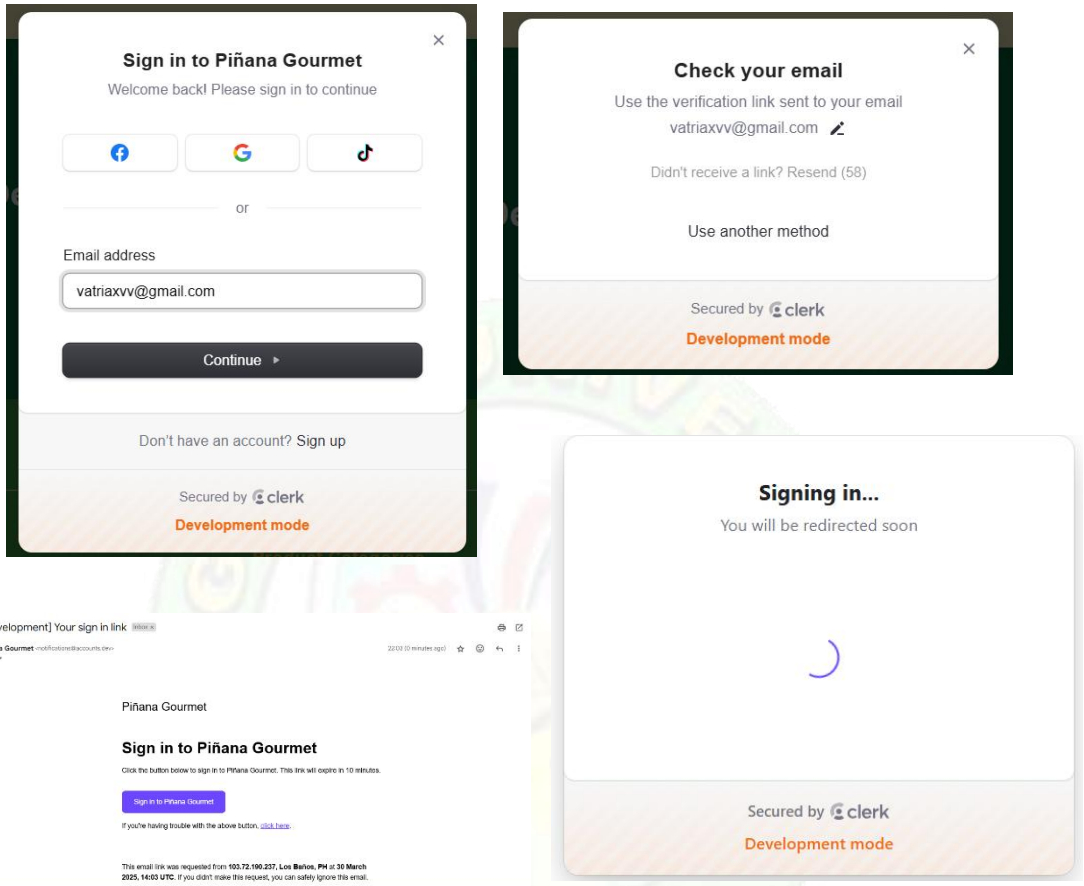

Figure 32 shows the sign-in portal where the customer can sign in using third-party methods such as Facebook, Google, and TikTok. They can also enter their email address in the designated field, receive a verification link in the provided email, and be redirected to the landing page.

Actual Result:

Figure 33

eCommerce Sign Up Portal

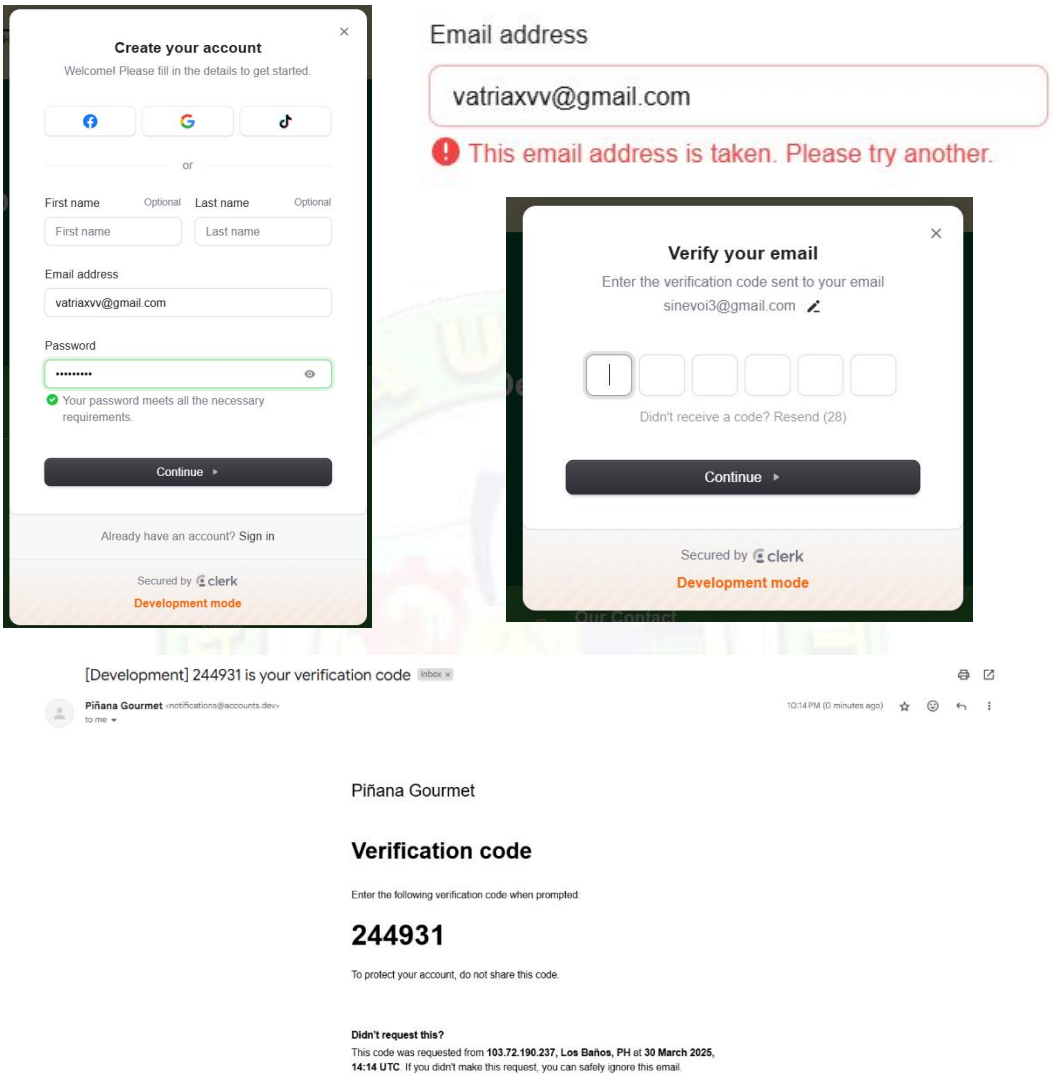

Figure 33 shows the sign-up portal where the customer fills out the necessary details. If the email address is already taken, it shows an error and does not let you sign up until you change the provided email. Once changed, the email address provided receives a verification code, which you need to enter for email verification in order to redirected to the landing page.

Actual Result:

Figure 34

Account Management

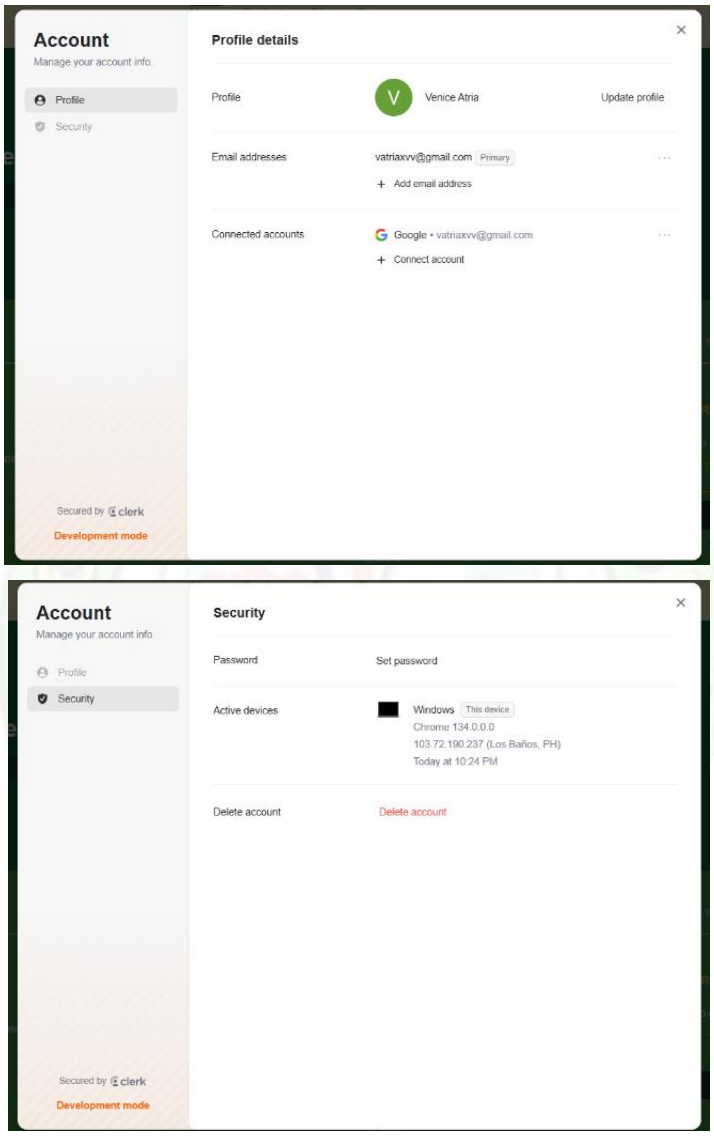

Figure 34 shows the account management where the customer can see their profile details, including profile, email address/es, and connected accounts. They can also view the security section, which includes the password, active device/s, and delete account option.

Actual Result:

Figure 35

Landing Page

Figure 35 shows the landing page where customers are redirected after signing in.

Table 11

eCommerce Features Customer Side Test Log

Test Case No.	Test Plan	Result
8.0	Sign In & Sign up	Success

Table 11 shows that the test case for the current customer side is successful and no errors encountered.

Description of Prototype

Flowchart

The researchers used a flowchart to show the process of the current supply chain management system for Piñana Gourmet, which is still in progress, focusing on sales automation, inventory tracking, order processing, and delivery tracking.

Figure 36

System's Flowchart for Admin

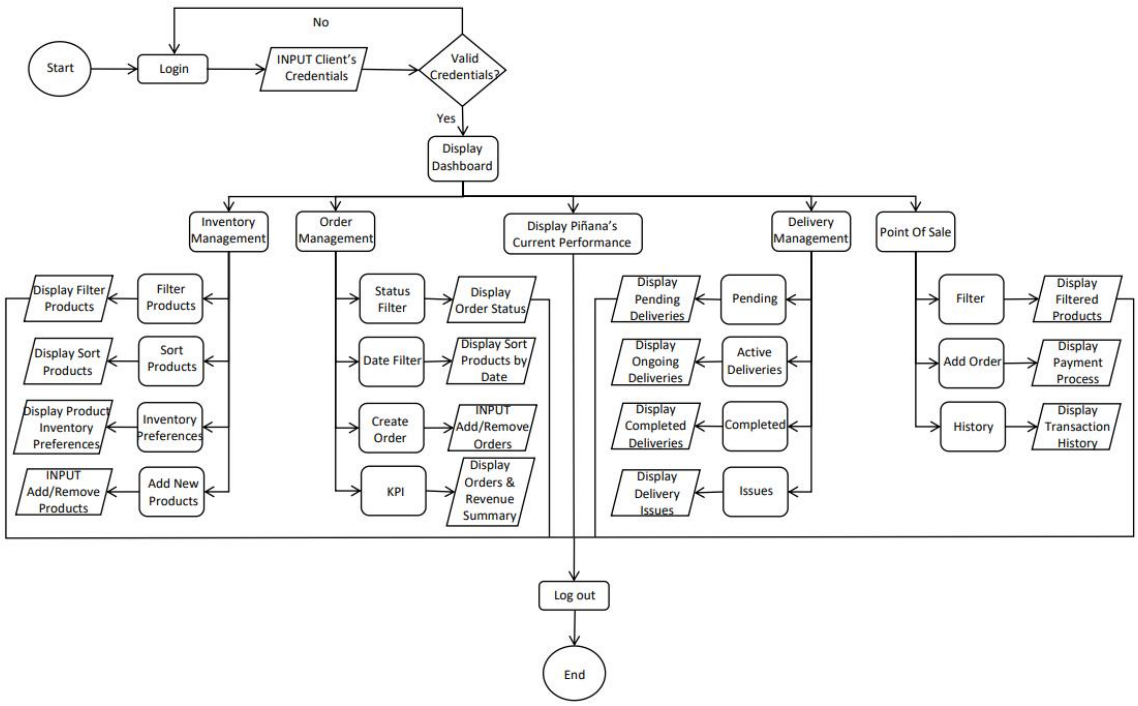

Figure 36 illustrates the flow of the system by showcasing the connections between its various functions. The researchers used this flowchart to present an overview of the admin side and demonstrate how the system carries out its tasks. However, it only includes the functions currently present in the system, making it an incomplete representation.

Figure 37

eCommerce's Flowchart for Customer

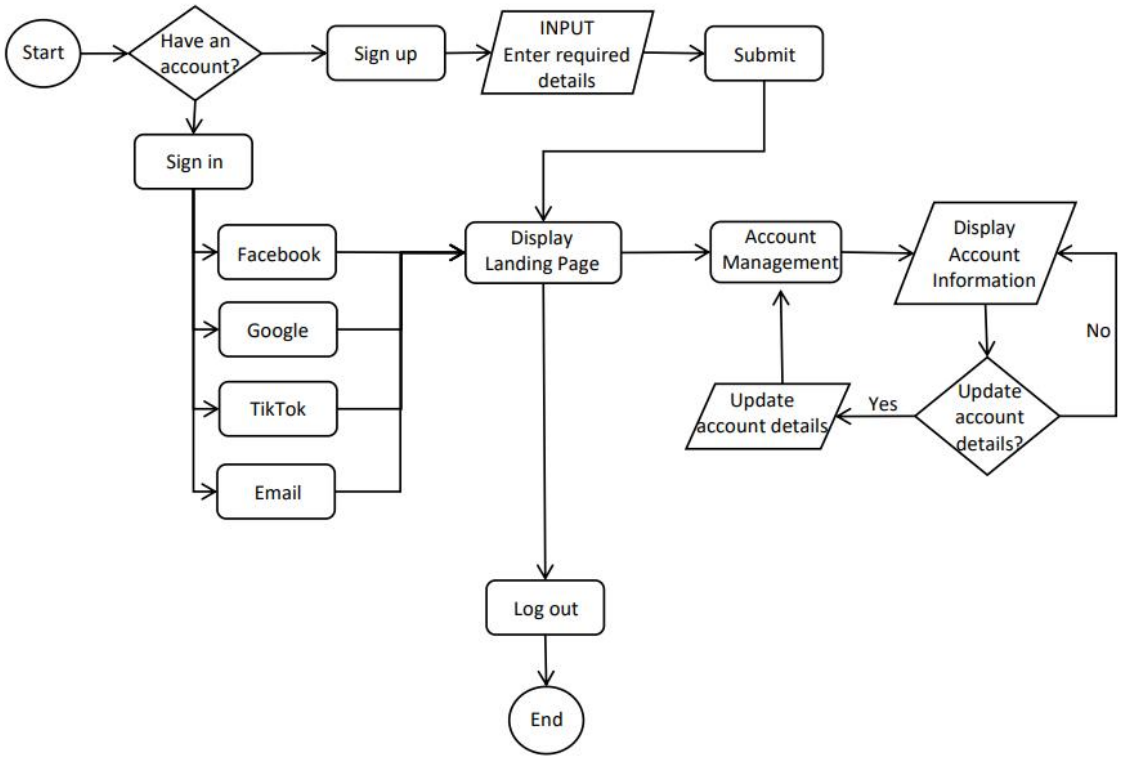

Figure 37 presents an overview of the eCommerce's existing functionalities, including sign-up, sign-in, account management, and the landing page. The researchers illustrated these features to showcase the platform's current capabilities. However, as it only reflects the functions currently available, it remains an incomplete representation.

Implementation Plan

Pre – Implementation Plan

During the pre-implementation phase, the researchers conducted a personal interview with the Piñana Gourmet owner. Knowing that they rely on manual processes within the business, researchers gathered insights regarding the challenges encountered in sales and inventory tracking, order processing, and delivery processes. To address these issues, the researchers proposed a system that aims to streamline sales automation, optimize inventory management, and enhance order tracking and delivery processes. The goal is to create a web-based system for their supply chain management that aims to minimize human errors, reduce operational delays, and provide real-time data insights to support business decision-making while improving satisfaction for both customers and retailers. Additionally, the proposed system integrates eCommerce capabilities for both B2B and B2C transactions, ensuring a seamless ordering experience. Recognizing the importance of usability, the researchers consider the need for a user-friendly interface to ensure a smooth transition from manual to automated processes while maintaining operational flexibility.

During Implementation

As for the development of the web-based supply chain management continues, the researchers have not yet fully completed the system. However, 70% of the system will be presented to the set of panelists to showcase the system's progress and gather feedback for further improvements. This will help the researchers in refining the system before it is presented to Piñana Gourmet for testing and implementation.

Post Implementation

Once the development of the web-based supply chain management system for Piñana Gourmet is completed and implemented, the researchers will take responsibility for ensuring its smooth operation. This will include regular monitoring of the system performance. The feedback gathered during the testing phase will be used to enhance the system, ensuring it effectively supports Piñana Gourmet’s supply chain management operations. The researchers intend to provide guidance and support throughout the transition from manual processes to the digital system, aiming to help with successful

adoption by the business.

Software Project Scheduling

The project scheduling is necessary because it serves as a guide for tracking the progress of the system's development. This approach ensures that tasks are finished within the set timeframe and provides an outline of the actions performed before, during, and after the development process. This schedule describes the essential steps for system planning, design, development, and initial testing, enabling the researchers to effectively monitor progress.

For the project schedule of the web based supply chain management system, the researchers use a Gantt chart as a visual tool to manage the project timeline. This chart highlights the essential phases necessary to reach 70% development of the system within a limited period of time. This involves monitoring task dependencies, deadlines, and milestones to guarantee consistent progress. By following the project schedule, the researchers are able to monitor the system's progress and implement any necessary adjustments to ensure they stay on track with the intended partial completion of the system.

Figure 38

Gantt Chart

Figure 38 displays the Gantt chart of Piñana Gourmet's supply chain management system, showing the project timeline. It illustrates the scheduled tasks that started from January up to April. The data gathering started in the middle of January, followed by the title creation in the first two weeks of February, wherein every title created was consulted with the capstone adviser. 3rd week of February when the title was successfully defended, so the researchers started to improve the manuscript and later consulted it again with the adviser before passing it to the subject adviser. In the last week of February up to the day of the mock defense, 70% development of the system and documentation for chapters 1 to 3 were ongoing. The pending tasks, including the consultation, system development, and documentation, were added for continuous development and improvement until the day of the final defense. This timeline served as a guide for the ongoing 70% system development and completion of Chapter 1–3 documentation.