

Supply Chain Management with Eco System

Apoorva Jindal ¹, Arnab Bhowmik ², Divyashree S³, Maya B S ⁴

^{1,2,3} Department of Computer Science and Engineering, Bangalore Institute of Technology

⁴ Assistant Professor, Dept. of Computer Science and Engineering, Bangalore Institute of Technology, Bengaluru, Karnataka state, India.

Abstract - The supply chain management system is a comprehensive framework designed to optimize the end-to-end processes involved in the production, distribution, and delivery of ion-based products. The system aims to streamline the flow of raw materials, manufacturing processes, distribution channels, and customer engagement to ensure operational efficiency, reduce costs, enhance customer satisfaction, and minimize environmental impact. The primary objective of the supply chain management system is to create a transparent, agile, and resilient supply chain ecosystem that meets the increasing demands of the market while minimizing waste and inefficiencies. It aims to showcase how this system can transform traditional supply chains into efficient, data-driven, and customer-centric networks.

Key Words: Management, Customer, Eco system, Environment, Products, Costs.

1. INTRODUCTION

Supply chain management in the context of ion supply refers to the management of the production, distribution, and supply of ions, often related to industries and technologies that rely on ion-based processes. Ions are electrically charged particles, and they play a crucial role in various fields, including chemistry, physics, electronics, and healthcare. Ion supply chain management can vary significantly depending on the specific industry and application. Whether it's in semiconductor manufacturing, water treatment, healthcare, or scientific research, effective management of ions and related processes is essential to ensure the smooth flow of products and services.

1.1 Objectives

This system aims to achieve:

Operational Efficiency: By optimizing processes and reducing bottlenecks, the system enhances the speed and accuracy of the entire supply chain, from production to delivery.

Inventory Optimization: Through data-driven insights, the system ensures that inventory levels are balanced, reducing excess stock and minimizing stockouts.

Demand Forecasting: By analyzing historical data and market trends, the system helps forecast demand more

accurately, leading to improved planning and resource allocation.

Real-time Tracking: The system provides real-time visibility into the movement of goods, enabling stakeholders to monitor shipments, identify delays, and make timely interventions.

Supplier Collaboration: Improved communication and collaboration with suppliers lead to better coordination, quality assurance, and reduced lead times.

1.2 Application

The strategies and insights presented can be tailored to suit the specific requirements and challenges [2] of each industry. The advantages of supply chain management summarized in short points:

Operational Efficiency: Streamlines processes, reduces bottlenecks, and improves resource utilization.

Cost Savings: Optimizes inventory, reduces lead times, and minimizes wastage, leading to cost efficiencies.

Inventory Optimization: Balances inventory levels to minimize excess stock and avoid stock outs.

Customer Satisfaction: Ensures on-time deliveries, accurate order fulfillment, and improved customer service.

Risk Management: Enables proactive responses to disruptions and enhances supply chain resilience.

2. Proposed Methodology

To develop a Supply Chain Management System that provides the feature to real time accessibility, operational efficiency, cost savings, inventory optimization, customer satisfaction at any instance we need.

2.1 Input

The system takes user id (Admin or customer) as input. In our approach using swings, it is mandatory for the user to enter their id. If they don't, the program won't start. Furthermore, the system takes input of the product id they want to search, or with quantity they want to purchase. The admin should give details related to raw material or product as input

2.2 Output

The system gives the following outputs:

- ❖ The system presents the supply interface to customers, displaying the product name, quantity and price respective to the input id.
- ❖ The system gives inventory details to the admin as output.

3. SYSTEM ARCHITECTURE



Fig -1: Block Diagram of Supply Chain Management

3.1 Presentation Layer

The Presentation Layer in a Supply Chain Management System is the user interface component that interacts directly with users, providing a means for them to interact with the application [1]. It is the front-facing part of the system, responsible for displaying product-related information, receiving user inputs, and presenting the results and feedback. The presentation layer is what buyers and businesses see and interact with when using the GUI shown in figure 1.

User Interface (UI): This layer handles the presentation logic and provides the user-friendly interface for clients. It includes screens for user registration, login, product creation, raw materials details and result product details.

Customization: The UI can incorporate branding elements, custom images, and logos to match the organization's or institution's identity.

Authentication and Authorization: This component manages user authentication and ensures that each user has appropriate access rights based on their role (customer, admin)

3.2 Business Logic Layer

The Business Logic Layer in a Supply chain Management System is responsible for handling the core business operations and logic of the application [3]. It acts as an intermediary between the presentation layer (user interface) and the data access layer (database). It contains the rules and algorithms that define how the system functions and processes user interactions.

Supply Management: This component handles the creation and management, products. It allows admin to add raw materials, enter supplier details [5].

Supply Table: The system may include a database that stores supplier id and name, material name, prize and quantity. Same goes for product details.

Product and Inventory details: When customers enter product details the system checks with the database with id and provide details accordingly.

3.3 Data Access Layer

The Data Access Layer in a Supply Chain Management System is a crucial component responsible for handling interactions with the underlying database. It acts as an intermediary between the application's business logic and the database, abstracting the database operations and providing a seamless way to store, retrieve, and manipulate data [4]. It allows the application to fetch product details, raw material details, and all the customer ids.

Database: This layer stores all the relevant data, including user details and participant's scores.

Performance Reports and Analytics: Data analysis and reporting components generate performance reports and analytics based on product and rm id and other relevant data.

4. TOOLS AND TECHNOLOGIES

4.1 Programming Language

A programming language is a formal set of rules and instructions used to communicate with computers and give them specific tasks to perform. It acts as a bridge between human-readable code and machine-executable code. With programming languages, developers can write algorithms, design software, and instruct computers to perform a wide range of tasks, from simple calculations to complex computations and data processing.

Java is a versatile and widely-used programming language renowned for its simplicity, portability, and platform independence. Developed by James Gosling and his team at Sun Microsystems (later acquired by Oracle Corporation), Java was first released to the public in 1995. Since then, it has grown to become one of the most popular programming

languages in the world, used extensively in a wide range of applications and industries.

Java Standard Library: Java comes with an extensive standard library that provides a wide range of classes and APIs for various functionalities, such as database connectivity, network operations, file handling, and more. JSP developers can utilize these built-in classes to perform common tasks efficiently.

Strongly Typed Language: Java is a statically typed language, which means variables must have a defined data type during compilation. This strong typing ensures greater code reliability and early detection of type-related errors during development.

Object-Oriented Programming (OOP): JSP follows the principles of Object- Oriented Programming, and Java is a pure OOP language. This enables developers to create modular, reusable, and maintainable code, which is essential for complex web applications.

Enterprise-Grade Applications: Java is widely used for building enterprise-grade applications, and JSP fits well within this ecosystem. JSP pages can access and interact with Enterprise JavaBeans (EJBs) and other components, making it suitable for large- scale, business-critical applications.

Platform Independence: Java's "Write Once, Run Anywhere" (WORA) capability allows JSP applications to be deployed on various platforms, as long as there is a Java Servlet container (e.g., Apache Tomcat) running on the server.

4.2 AWT (Abstract Window Toolkit)

AWT (Abstract Window Toolkit) is a set of classes in Java used for building graphical user interfaces (GUIs). It is one of the earliest GUI toolkits in Java and is part of the Java Foundation Classes (JFC). AWT provides a platform-independent way to create windows, dialogs, buttons, menus, and other GUI components for Java applications.

4.3 Swing

Java Swing is a powerful and widely used GUI (Graphical User Interface) library in Java. It is part of the Java Foundation Classes (JFC) and provides a rich set of components and features to create sophisticated and platform-independent GUI applications. Swing was designed to be lightweight, allowing for faster and more flexible GUI development compared to its predecessor, AWT (Abstract Window Toolkit).

4.4 IDE (Integrated Development Environment)

Eclipse IDE provides tools and features that streamline development and make GUI design easier.

5. RESULTS

5.1 Opening window for supply chain management system using AWT & Swing



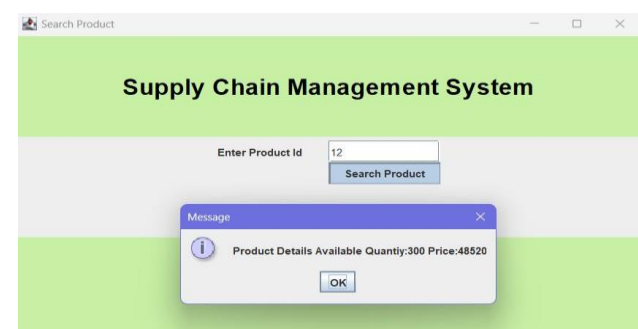
5.2 Customer Login Page

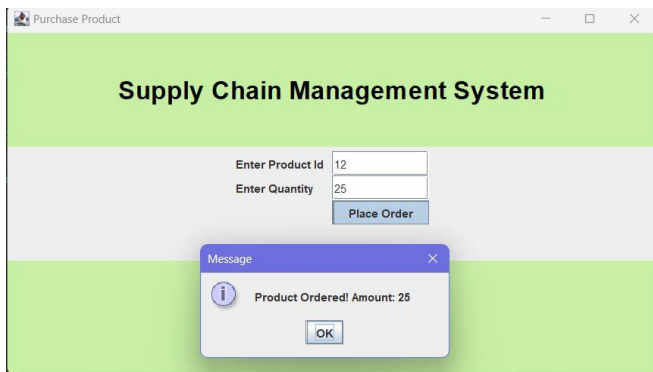


5.3 Window Displayed to Customers

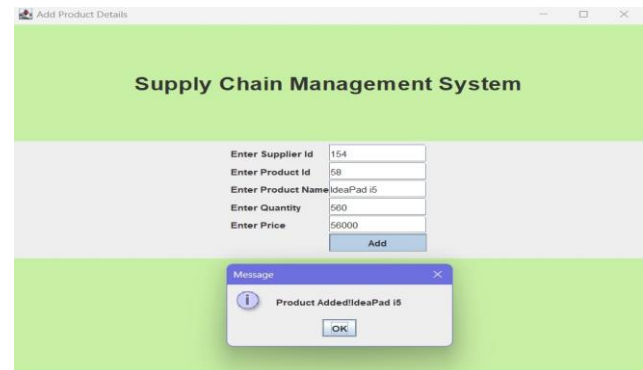


5.4 Window displaying product details and purchase





5.8 Windows Adding raw materials



5.5 Admin Login Page



6. PERFORMANCE MATRIX

Economic efficiency has been the primary performance criteria for a supply chain that includes cost, service, and operational efficiencies until the emergence of Supply Chain

Management show in below Table I.

Table –I: Economic Performance Parameter

Sl.No.	Componet	Indicator
1	Cost	Facility & Handling
		Inventory, Productivity
2	Service	Response Time, Time to Market
		Product Availability and Variety
		Customer Experience
3	Financial	Order Visibility
		Account payable turnover
		Return on Investment, Assists, Equity

5.6 Admin Interface



7. CONCLUSIONS

Supply chain management is a critical and complex field that plays a fundamental role in the success of businesses and organizations across various industries . In conclusion, our Supply Chain Management project has been an enriching experience, combining technical expertise with an in-depth understanding of supply chain operations. We should carry the knowledge and skills gained from this project into our future careers in supply chain management, where the ability to leverage technology, work effectively in teams, and manage time efficiently will continue to be paramount for success in this dynamic field.

REFERENCES

[1] Detwal, P.K., Agrawal, R., Samadhiya, A., Kumar, A. and Garza-Reyes, J.A., "Research developments in

sustainable supply chain management considering optimization and industry 4.0 techniques: a systematic review", *Benchmarking: An International Journal*, Vol. 3, pp.25-29, 2023

- [2] Lu, Lauren & Swaminathan, Jayashankar. "Supply Chain Management", *International Encyclopedia of the Social & Behavioral Sciences*. 10.1016/B978-0-08-097086-8.73032-7, 2020.
- [3] Abuzaid, Ahmad & Alateeq, Manal & Baqleh, Lubna & Madadha, Saif-Aldeen & Al-Haraisa, Yazan." Uncertain Supply Chain Management- The moderating effect of strategic momentum on the relationship between big data analytics capabilities and lean supply chain practices", *International Journal on uncertainty supply chain management*, vol.11,pp.1-14.,2023.
- [4] Abdelsalam Adam Hamid , etl" The Effects of Transaction Attributes on Logistics Performance: Empirical Study on Sudanese Food and Beverage Companies," *International Journal of Supply and Operations Management*, Volume 9, Issue 3, pp. 264-280, 2022.
- [5] Mailn song, "Green and sustainable supply chain management in the platform economy", *A Leading Journal of Supply Chain Management*, Volume 25, Issue.5, 2022.