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# SUPPLY CHAIN END-TO-END VISIBILITY DASHBOARD WITH VENDOR PERFORMANCE BENCHMARKING AND DELAY ROOT CAUSE ANALYSIS

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## Abstract

The Supply Chain End-to-End Visibility Dashboard with Vendor Performance Benchmarking and Delay Root Cause Analysis project aims to enhance supply chain efficiency by providing a comprehensive, data-driven view of operations. In modern supply chains, organizations face challenges such as delayed deliveries, lack of transparency, vendor inefficiencies, and poor coordination across different stages. This project addresses these challenges by developing an interactive dashboard that integrates data from procurement, inventory, transportation, and vendor systems.

The system utilizes advanced analytics and visualization tools such as Microsoft Power BI to transform raw supply chain data into meaningful insights. It enables real-time monitoring of order status, shipment tracking, inventory levels, and delivery performance across the entire supply chain lifecycle. The dashboard provides end-to-end visibility, helping organizations identify bottlenecks and improve operational coordination.

A key feature of the project is vendor performance benchmarking, where suppliers are evaluated based on metrics such as on-time delivery, order accuracy, lead time, and reliability. This allows organizations to compare vendors, identify high-performing suppliers, and take corrective actions for underperforming ones. Additionally, the system performs delay root cause analysis by examining factors such as transportation issues, inventory shortages, supplier delays, and process inefficiencies.

## I. Introduction

Supply chain management plays a crucial role in ensuring the efficient movement of goods and services from suppliers to end customers. In modern business environments, organizations deal with complex logistics networks that involve multiple vendors, transportation systems, and distribution channels. However, many companies face challenges such as lack of real-time visibility, frequent delivery delays, poor vendor performance tracking, and inefficient utilization of resources. These issues not only increase operational costs but also affect customer satisfaction and overall business performance. Hence, there is a strong need for a system that can monitor, analyze, and improve supply chain operations effectively.

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With the rapid growth of data analytics and business intelligence tools, it has become easier to convert large volumes of raw data into meaningful insights. This project utilizes Power BI to develop an interactive dashboard that provides end-to-end visibility of supply chain activities. The system analyzes key parameters such as logistics delays, shipment status, asset utilization, traffic conditions, and demand forecasting. By presenting the data through visualizations like bar charts, line graphs, and pie charts, the dashboard enables users to quickly understand patterns and trends.

Furthermore, the dashboard helps in identifying root causes of delays by analyzing factors such as traffic congestion, waiting time, and inefficient asset usage. It also supports vendor performance evaluation and highlights areas that require improvement. The insights generated from the system assist managers in making data-driven decisions, optimizing resources, and reducing delivery time. Overall, this project demonstrates the importance of data visualization in enhancing transparency, improving efficiency, and achieving better control over supply chain management processes.

## II. Literature Survey

The literature survey highlights the evolution of supply chain management from traditional manual systems to modern data-driven approaches that enhance visibility and operational efficiency. Earlier supply chain systems relied heavily on spreadsheets, paper-based records, and disconnected modules to manage procurement, logistics, and delivery processes. These methods lacked real-time visibility and efficient communication among stakeholders, leading to delays, errors, and poor coordination. Decision-making in such systems was mostly reactive due to the absence of timely and accurate data. As a result, organizations faced challenges such as increased operational costs, inefficient resource utilization, and limited ability to track vendor performance effectively.

Recent research emphasizes the growing adoption of business intelligence and data visualization tools such as Microsoft Power BI to improve supply chain performance. These tools enable the development of interactive dashboards that provide insights into shipment status, delivery delays, and resource utilization through visual elements like bar charts, line graphs, and pie charts. Studies also highlight the importance of real-time vendor performance benchmarking, which allows organizations to continuously evaluate suppliers based on key performance indicators such as delivery reliability, lead time, and order accuracy. Unlike traditional static evaluations, real-time benchmarking improves supplier relationships and enhances decision-making.

In addition, research on delay root cause analysis shows that most supply chain disruptions arise from predictable factors such as supplier delays, transportation inefficiencies, customs issues, and inaccurate demand forecasting. Automated analysis of these delay events helps organizations quickly identify problems and implement corrective measures. Cloud-based supply chain systems and event-driven architectures have also been widely studied, demonstrating the benefits of scalability, real-time data processing, and improved operational responsiveness. These platforms

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enable seamless integration of data from multiple sources and support advanced analytics.

However, despite these advancements, existing systems still face several limitations, including complex integration across heterogeneous data sources, limited scalability in traditional on-premise environments, and reliance on periodic rather than real-time monitoring. These challenges highlight the need for an integrated, scalable, and real-time supply chain visibility system that combines end-to-end tracking, vendor performance benchmarking, and delay root cause analysis. This project addresses these gaps by providing a comprehensive dashboard solution that enhances transparency, improves efficiency, and supports data-driven decision-making in supply chain operations.

## III. System Analysis

Modern supply chains are complex networks involving multiple stakeholders such as suppliers, manufacturers, distributors, and retailers. Managing these operations efficiently requires real-time visibility and accurate data analysis. Traditional systems lack integration and fail to provide a unified view of the supply chain. There is a need to track shipments, monitor vendor performance, and identify delays effectively. Data-driven systems can help in analyzing large volumes of supply chain data. Visualization tools simplify complex logistics information into understandable insights. Vendor performance benchmarking is essential for selecting reliable suppliers. Delay analysis helps in identifying bottlenecks and improving processes. Real-time monitoring supports proactive decision-making. The system should be scalable and flexible to handle dynamic data. Efficient resource utilization is also a key requirement. This project addresses these needs by developing an integrated dashboard solution.

### Existing System

In the existing system, supply chain operations are managed using manual processes and basic software tools. Data is often stored in separate systems across departments, leading to fragmentation. Organizations rely on spreadsheets and periodic reports for analysis. There is no centralized platform to monitor end-to-end supply chain activities. Vendor performance is evaluated manually and infrequently. Shipment tracking is limited and not available in real time. Communication gaps between departments lead to inefficiencies. Delay identification is reactive rather than proactive. Visualization tools are either absent or very limited. Decision-making is based on outdated or incomplete data. Integration between systems is poor. Overall, the existing system lacks efficiency and transparency.

### Disadvantages of Existing System

- Lack of end-to-end visibility
- No real-time tracking of shipments
- Fragmented and unintegrated data
- Manual vendor performance evaluation

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- Delayed identification of issues
- Poor visualization of supply chain data
- Inefficient resource utilization
- Slow decision-making process
- Increased operational costs
- High chances of errors and delays
- Limited scalability
- Lack of data-driven insights

**Proposed System**

The proposed system is an integrated supply chain visibility dashboard developed using Microsoft Power BI. It collects data from multiple sources such as procurement, inventory, and logistics systems. The system provides real-time tracking of shipments and order status. It enables vendor performance benchmarking based on KPIs like delivery time, reliability, and accuracy. Delay root cause analysis is performed to identify reasons for disruptions. The dashboard presents insights using interactive visualizations such as charts and graphs. It centralizes data into a single platform for better accessibility. Users can filter and analyze data dynamically. The system supports proactive decision-making. It improves transparency across the supply chain. The solution is scalable and adaptable to different business needs. Overall, it enhances operational efficiency.

**Advantages of Proposed System**

- End-to-end supply chain visibility
- Real-time shipment tracking
- Centralized data management
- Improved vendor performance evaluation
- Faster delay detection and resolution
- Interactive and user-friendly dashboards
- Better decision-making support
- Reduced operational costs
- Improved coordination across departments
- Enhanced overall supply chain performance

## IV. Methodology

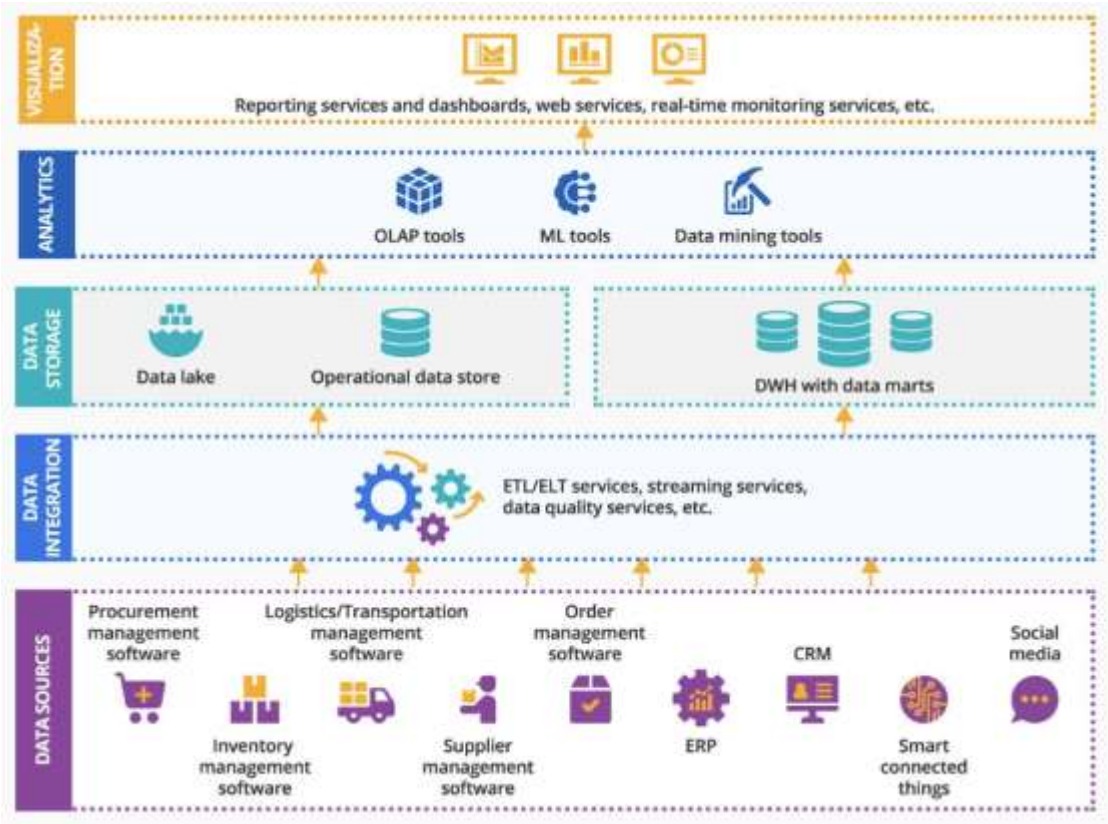
The project begins with collecting supply chain data from multiple sources such as inventory systems and logistics records. The data is cleaned and preprocessed to remove inconsistencies. Data transformation is performed to structure it for analysis. The processed data is loaded into Power BI for visualization. Key performance indicators (KPIs) are defined, including delivery time, vendor performance, and delay rates. Data modeling is performed to establish relationships between datasets. Interactive dashboards are created using charts and graphs. Filters and slicers are added for dynamic analysis. Delay root causes are identified using analytical methods. Vendor benchmarking is implemented based on performance metrics. The system is

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tested for accuracy and usability. Finally, the dashboard is deployed for use by stakeholders.

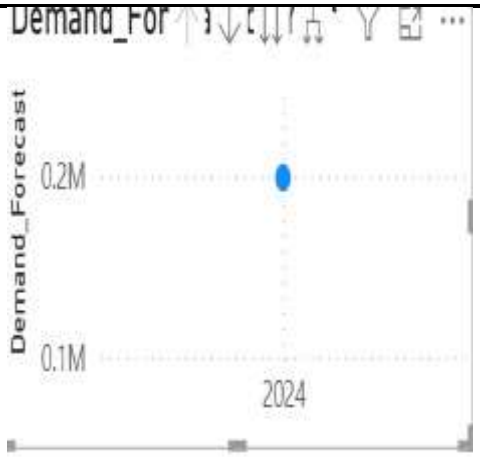
### System Architecture

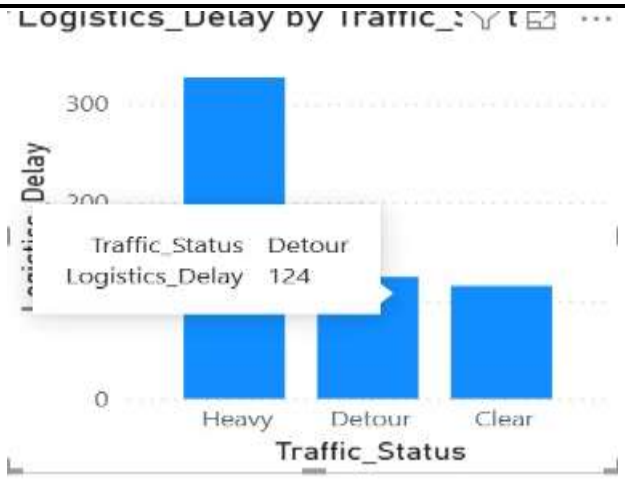
The system architecture consists of multiple layers for efficient data flow and analysis. The first layer is the Data Source Layer, which includes procurement, inventory, and logistics systems. The second layer is the Data Preprocessing Layer, where data cleaning and transformation are performed. The third layer is the Data Integration Layer, which combines data from multiple sources. The fourth layer is the Data Storage Layer, where processed data is stored in databases. The fifth layer is the Data Analysis Layer, where KPIs and metrics are calculated. The sixth layer is the Visualization Layer, implemented using Power BI dashboards. The seventh layer is the User Interaction Layer, where users access and analyze data. The system supports real-time updates for better monitoring. It ensures data consistency and accuracy. The architecture is scalable and flexible. Overall, it provides a complete solution for supply chain management.




## V. Result and Output

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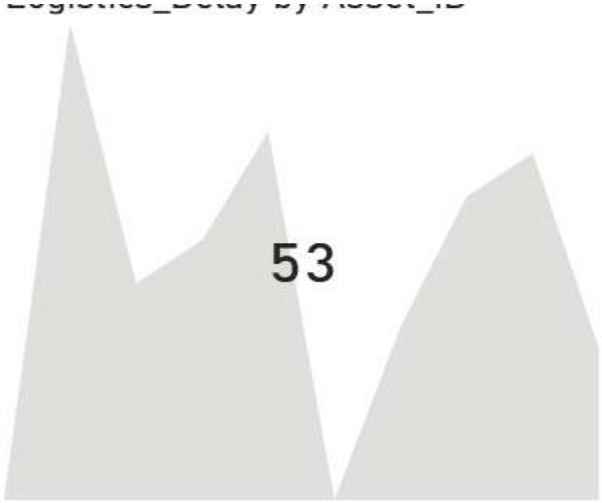




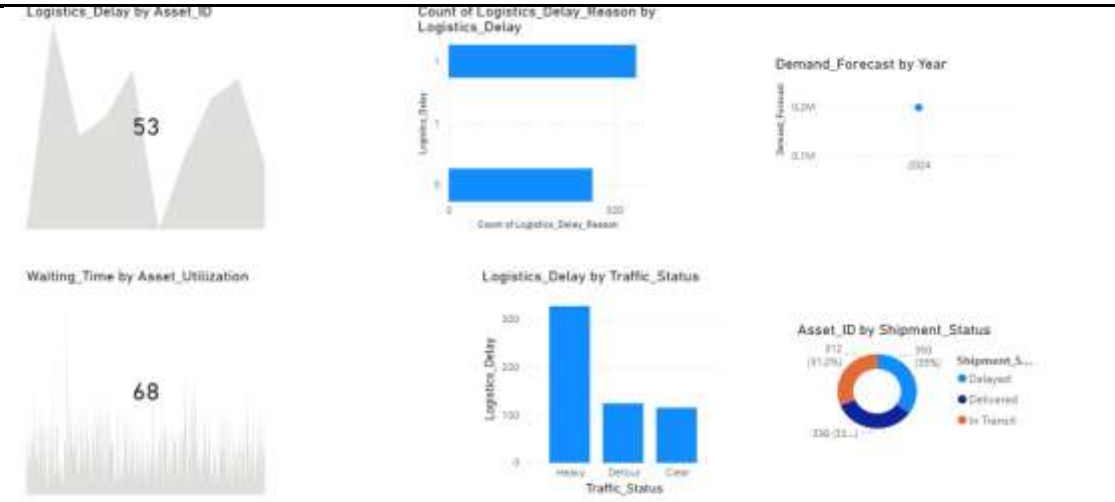





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## VI. Conclusion

The Supply Chain End-to-End Visibility Dashboard with Vendor Performance Benchmarking and Delay Root Cause Analysis provides an effective solution to overcome the limitations of traditional supply chain systems. It offers a centralized and real-time platform that enables organizations to monitor and manage all supply chain activities efficiently.

The system improves visibility across all stages of the supply chain, from procurement to final delivery. By integrating data from multiple sources, it ensures accurate and up-to-date information, which helps in faster and better decision-making. The vendor performance benchmarking feature allows organizations to evaluate suppliers based on key performance indicators such as on-time delivery, quality, and cost, leading to improved supplier management.

Additionally, the delay root cause analysis feature helps in identifying the exact reasons behind delays and enables organizations to take corrective actions. This reduces repeated issues and improves overall operational efficiency. The use of analytics and visualization tools further enhances the system by providing insights, predictions, and easy-to-understand reports.

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Overall, the proposed system transforms supply chain management from a reactive approach to a proactive and data-driven approach. It helps in reducing delays, minimizing costs, improving efficiency, and increasing customer satisfaction. Thus, it serves as a powerful tool for modern organizations to achieve better performance and maintain a competitive advantage.

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