

E-COMMERCE ORDER LIFECYCLE AND CUSTOMER EXPERIENCE ANALYTICS DASHBOARD WITH DELIVERY SLA TRACKING

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Abstract

The rapid expansion of e-commerce has increased the need for efficient order management and enhanced customer satisfaction. The E-Commerce Order Lifecycle and Customer Experience Analytics Dashboard with Delivery SLA Tracking project focuses on analyzing the complete journey of customer orders, from placement to final delivery, using a data-driven approach. The system is developed using Microsoft Power BI to provide interactive and real-time insights into e-commerce operations. The dashboard integrates data from multiple sources, including customers, orders, order items, payments, reviews, and sellers, to create a unified view of performance. It monitors key stages of the order lifecycle such as order placement, processing, shipment, and delivery. This enables businesses to identify delays, bottlenecks, and inefficiencies in the supply chain.

A key feature of the system is Delivery Service Level Agreement (SLA) tracking, which compares estimated delivery dates with actual delivery dates to evaluate on-time delivery performance. This helps organizations measure service quality, improve logistics planning, and enhance customer satisfaction. Additionally, the dashboard provides insights into customer experience through metrics such as order completion rates, delivery delays, and customer feedback. Interactive visualizations and key performance indicators (KPIs) allow users to analyze trends and make informed decisions.

I. Introduction

The rapid growth of the e-commerce industry has significantly transformed how businesses manage customer orders and deliver products. With increasing customer expectations for fast, accurate, and reliable delivery, organizations must closely monitor every stage of the order lifecycle to ensure smooth operations and high levels of customer satisfaction. The order lifecycle consists of multiple stages, including order placement, processing, shipment, and final delivery, each of which plays a critical role in determining overall service quality.

In modern e-commerce systems, tracking delivery performance has become essential for maintaining customer trust and operational efficiency. One of the key metrics used in logistics is the Service Level Agreement (SLA), which defines the expected delivery time promised to customers. Monitoring SLA compliance helps businesses

identify delays, evaluate delivery performance, and improve logistics planning. Failure to meet delivery timelines can negatively impact customer experience, leading to dissatisfaction, poor reviews, and potential loss of customers.

To address these challenges, organizations increasingly rely on data analytics and visualization tools to monitor order processes and analyze customer feedback. This project focuses on developing an E-Commerce Order Lifecycle and Customer Experience Analytics Dashboard with Delivery SLA Tracking using Microsoft Power BI. The system integrates data from multiple sources such as customers, orders, order items, payments, sellers, and reviews to provide a unified and comprehensive view of operations.

II. Literature Survey

The rapid growth of the e-commerce industry has led to a significant increase in online transactions, resulting in the generation of large volumes of operational and customer-related data. Researchers and industry studies emphasize that effective data management and analytics are essential for ensuring smooth order processing and maintaining customer satisfaction. Traditional e-commerce systems often focused only on order processing and billing, with limited analytical capabilities. However, modern research highlights the importance of analyzing the complete order lifecycle to gain insights into operational performance and customer experience.

Several studies have explored the importance of logistics performance and delivery efficiency in e-commerce. A key concept discussed in the literature is Service Level Agreement (SLA) tracking, which measures whether orders are delivered within the promised timeframe. Research indicates that monitoring SLA compliance helps organizations identify delivery delays, evaluate logistics performance, and improve supply chain efficiency. Without proper analytical systems, businesses face difficulties in detecting delays and understanding their root causes, leading to reduced customer satisfaction.

Recent advancements in data analytics have introduced the use of business intelligence tools such as Microsoft Power BI for developing interactive dashboards. These tools enable organizations to transform raw data into meaningful insights through visualizations such as charts, graphs, and KPI indicators. Studies show that dashboards improve decision-making by providing real-time monitoring of key metrics, including order processing time, delivery performance, and customer feedback.

In addition, research has highlighted the importance of customer experience analytics in e-commerce. Factors such as delivery time, product quality, and service reliability directly influence customer satisfaction and reviews. Analyzing customer feedback and ratings helps businesses understand user expectations and improve service quality. Many studies also emphasize the integration of multiple data sources, such as orders, payments, and reviews, to create a unified analytical system.

Another important area discussed in the literature is the identification of inefficiencies and bottlenecks in the order lifecycle. Delays in shipping, errors in order handling, and poor coordination between departments can negatively impact performance. Analytical systems help in tracking each stage of the order process and identifying problem areas, enabling organizations to take corrective actions.

Despite these advancements, existing systems often lack full integration, real-time analytics, and comprehensive visualization capabilities. Many solutions focus on specific aspects such as delivery tracking or customer feedback, rather than providing a complete view of the order lifecycle. Therefore, there is a need for an integrated dashboard that combines order lifecycle tracking, SLA monitoring, and customer experience analysis.

This project addresses these gaps by developing a unified system that leverages Power BI for data visualization and analytics. It provides a comprehensive view of e-commerce operations, helping businesses improve efficiency, ensure timely deliveries, and enhance overall customer satisfaction.

III. System Analysis

The e-commerce industry generates large volumes of data from customer orders, payments, and delivery operations. Managing and analyzing this data is essential for improving efficiency and customer satisfaction. The order lifecycle includes multiple stages such as order placement, processing, shipment, and delivery. Each stage must be monitored to ensure timely completion. Delivery performance is measured using Service Level Agreement (SLA) compliance. Identifying delays and bottlenecks is crucial for operational improvement. Traditional systems lack real-time insights and integrated analysis. There is a need for a centralized dashboard to track order lifecycle and customer experience. Data analytics helps in understanding trends and performance metrics. Visualization tools simplify complex datasets into actionable insights. The system should support real-time monitoring and decision-making. It must be scalable and user-friendly. This project addresses these requirements using modern analytics tools.

Existing System

In the existing system, e-commerce operations are managed using separate systems for orders, payments, and deliveries. Data is stored in different databases, leading to fragmentation. Analysis is often performed using manual reports or basic tools. There is no unified view of the order lifecycle. Delivery performance is not tracked effectively in real time. SLA compliance is either not monitored or done manually. Customer feedback is analyzed separately from operational data. Visualization capabilities are limited or absent. Decision-making is based on outdated or incomplete data. Identifying delays and bottlenecks is difficult. Reports are static and lack interactivity. Overall, the system lacks integration and efficiency.

Disadvantages of Existing System

- Lack of centralized data integration
- No real-time monitoring of order lifecycle
- Manual and time-consuming reporting
- Poor SLA tracking and delay identification
- Limited visualization and insights
- Fragmented data across systems
- Inefficient decision-making
- Difficulty in identifying bottlenecks
- No integration of customer feedback
- Increased chances of errors
- Lack of scalability
- Reduced operational efficiency

Proposed System

The proposed system is an integrated analytics dashboard developed using Microsoft Power BI. It combines data from multiple sources such as customers, orders, payments, sellers, and reviews into a single platform. The system tracks the complete order lifecycle from placement to delivery. It monitors SLA compliance by comparing estimated and actual delivery times. The dashboard provides real-time insights into operational performance. It analyzes customer experience through feedback and reviews. Interactive visualizations such as charts and graphs are used for data representation. Users can explore data using filters and drill-down features. The system identifies delays and bottlenecks in the process. It supports data-driven decision-making. The solution is scalable and user-friendly. Overall, it improves efficiency and customer satisfaction.

Advantages of Proposed System

- Centralized data integration
- Real-time monitoring and analysis
- Effective SLA tracking
- Improved delay detection
- Interactive dashboards and visualizations
- Better decision-making support
- Integration of customer experience data
- Reduced manual effort and errors
- Efficient identification of bottlenecks
- Scalable and flexible system
- Enhanced operational efficiency
- Improved customer satisfaction

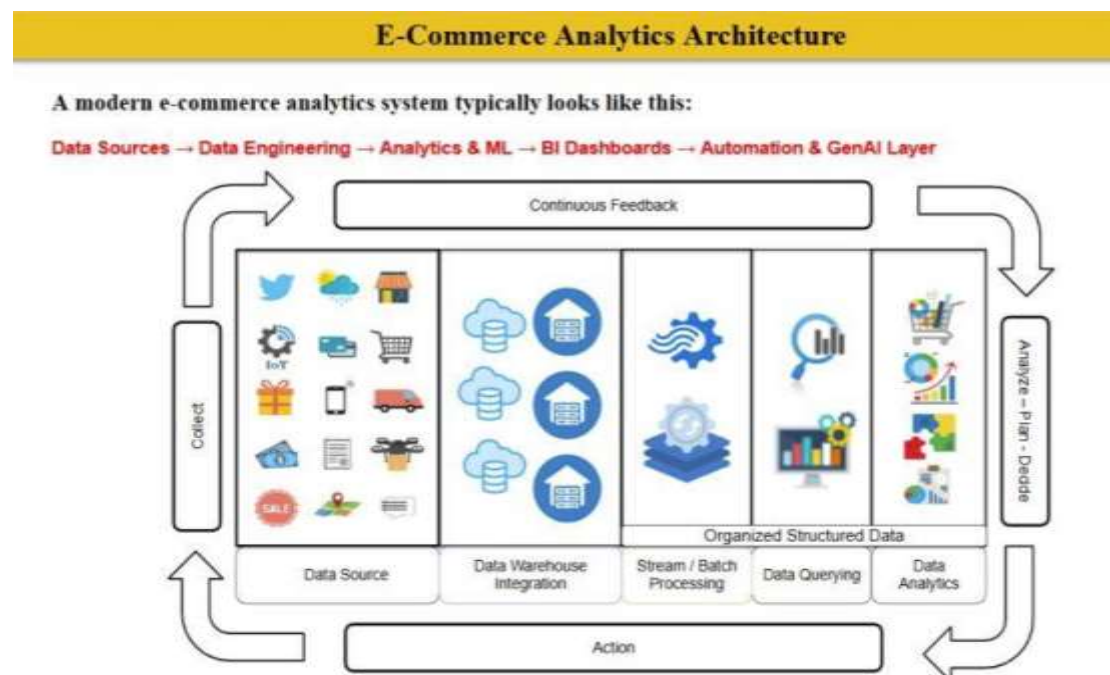
IV. Methodology

The project begins with collecting data from multiple e-commerce sources such as orders, payments, and delivery systems. The data is cleaned and preprocessed to remove inconsistencies and missing values. Data transformation is performed to structure it for analysis. The processed data is loaded into Power BI. Data modeling is

carried out to establish relationships between datasets. Key performance indicators such as SLA compliance, delivery time, and order completion rate are defined. Customer feedback metrics are also analyzed. Interactive dashboards are created using charts and graphs. Filters and slicers are added for dynamic exploration. SLA tracking is implemented by comparing estimated and actual delivery dates. The system is tested for accuracy and performance. Finally, the dashboard is deployed for use by stakeholders.

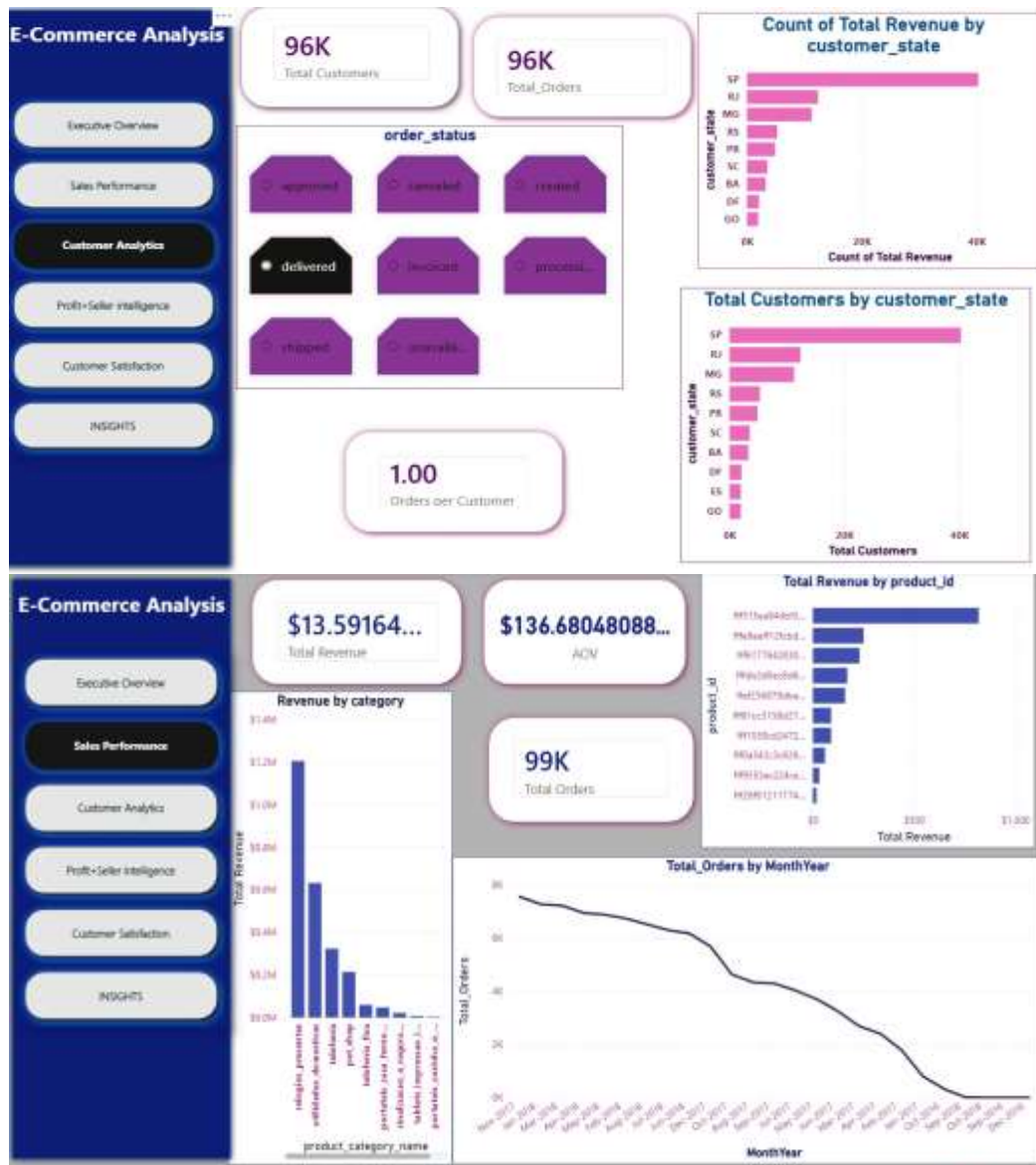
System Architecture

The system architecture consists of multiple layers for efficient data processing and visualization. The first layer is the Data Source Layer, which includes customers, orders, payments, and delivery systems. The second layer is the Data Preprocessing Layer, where data cleaning and transformation are performed. The third layer is the Data Integration Layer, combining data from multiple sources. The fourth layer is the Data Storage Layer, where processed data is stored. The fifth layer is the Data Analysis Layer, where KPIs and SLA 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 explore insights. The system supports real-time updates. It ensures data accuracy and consistency. The architecture is scalable and flexible. Overall, it provides a complete solution for e-commerce analytics.



V. Result and Output





VI. Conclusion

The Skincare Analysis and Recommendation Platform marks a revolutionary advancement in personalized skincare technology. By utilizing advanced AI and machine learning, the platform provides precise and tailored skincare advice, addressing various skin concerns such as acne, pigmentation, scars, dullness, wrinkles, hydration levels, and dark circles. This system processes high-resolution images to deliver accurate skin assessments, ensuring users receive highly personalized and effective recommendations.

The platform excels in offering customized skincare routines, factoring in individual skin types, environmental conditions, and specific skin issues. Its user-friendly interface features visual aids like statistical bars and health scores, making it easy for users to understand their skin conditions. The design ensures accessibility across devices, allowing users to access routines and track progress conveniently.

Data privacy is a critical aspect, with robust security measures like data encryption and secure authentication protocols in place, complying with regulations such as GDPR and HIPAA. Integration with virtual dermatology services adds professional validation to AI-driven recommendations, blending technology with expert healthcare insights.

This platform empowers users by educating them about their skin health and guiding them through effective skincare routines. It reduces trial and error with products, saving time and money. As AI technology advances, the platform will continue to evolve, offering even more precise analyses and holistic skincare solutions, setting new standards in the skincare industry.

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