

PRODUCT PRICING VS SALES VOLUME ANALYSIS

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Abstract

The Product Pricing vs Sales Volume Analysis is a data-driven analytics system designed to examine the relationship between product prices and sales volume. Pricing is an important factor that can influence customer purchasing behavior, revenue generation, and overall business performance. Organizations often maintain large amounts of sales and pricing information, but manually analyzing the relationship between these variables can be difficult. The proposed system provides a centralized platform for analyzing pricing and sales patterns.

The system collects relevant information such as product name, product category, selling price, quantity sold, revenue, discount, sales date, and geographical or customer segments where available. The collected data is cleaned, processed, and organized to calculate useful business metrics. Price ranges can be compared with corresponding sales volumes to understand how sales change at different price levels.

The dashboard presents the analysis through interactive charts, graphs, tables, KPI cards, and comparison visualizations. A price-versus-sales-volume chart can help users observe whether higher or lower prices are associated with changes in sales quantity. Additional visualizations can show product-wise revenue, average selling price, sales volume trends, discount impact, and category-level comparisons.

The proposed system can support business managers, sales teams, and analysts in evaluating pricing performance. By comparing historical pricing and sales data, users can identify products with strong sales at particular price ranges and products whose sales volume changes significantly after price adjustments. The system provides analytical information rather than automatically determining the ideal selling price.

Overall, the Product Pricing vs Sales Volume Analysis provides a centralized and visual approach to understanding pricing and sales relationships. It reduces manual data analysis and helps users identify important patterns in product performance. The system can be further enhanced with price elasticity estimation, demand forecasting, scenario analysis, and machine-learning-based pricing recommendations.

I. Introduction

Pricing plays an important role in determining how customers respond to products and services. A change in product price can influence the quantity customers purchase, revenue generated, and competitiveness within a market. Businesses therefore need to understand the relationship between pricing decisions and sales volume. Analyzing historical sales and pricing information can provide useful insights for evaluating pricing strategies.

Traditional sales analysis often relies on spreadsheets, sales reports, accounting systems, and manually prepared summaries. Pricing information and sales data may be stored in different systems, making it difficult to compare them efficiently. When a business manages a large number of products and transactions, manually calculating and comparing prices with sales volumes becomes increasingly time-consuming.

A pricing and sales analysis dashboard can provide a centralized platform for combining these datasets. The system can collect product prices, quantities sold, revenue, discounts, and dates from authorized business sources. Analytical processes can then compare pricing levels with sales volumes and generate meaningful business indicators.

Data visualization makes the relationship between pricing and sales easier to understand. Scatter plots can show the relationship between price and quantity sold, while line charts can display sales-volume changes over time. Bar charts can compare product performance, and KPI cards can summarize total revenue, units sold, average price, and other important indicators.

The primary objective of the proposed system is to provide a clear and interactive platform for analyzing product pricing and sales volume. It can help businesses evaluate pricing patterns, compare products, identify changes in demand, and support evidence-based pricing decisions. The system does not guarantee a causal relationship between price and sales because other factors such as promotions, seasonality, competition, product availability, and customer preferences can also influence sales.

II. Literature Survey

Pricing and sales analysis has been widely studied in business analytics, marketing, economics, and revenue management. Price is one of the important factors that can influence customer demand, although its impact varies according to product category, market conditions, customer preferences, competition, and other factors. Historical sales data can therefore be analyzed alongside pricing information to understand observed purchasing patterns.

Price elasticity of demand is a commonly used concept for studying the relationship between price changes and changes in quantity demanded. It provides an indication of how sensitive demand is to changes in price. Businesses can use historical observations to estimate demand sensitivity, although such estimates need to account for other factors that may influence sales.

Sales-volume analysis is another important component of product analytics. Businesses commonly examine units sold, revenue, average selling price, discounts, and sales growth across products and time periods. Comparing these indicators can help identify products with strong sales performance and products that may require further analysis.

Promotional discounts can also influence the relationship between price and sales volume. A product may experience increased sales during promotional periods even when its effective selling price is lower. Therefore, pricing analysis should consider discounts and promotional activities when interpreting historical sales patterns.

Seasonal demand, product availability, and marketing campaigns may also influence sales independently of price.

Data visualization and business-intelligence dashboards provide useful tools for examining pricing and sales relationships. Scatter plots, trend charts, comparison graphs, and interactive filters can help analysts explore large datasets more efficiently. Users can examine specific products, categories, regions, or time periods instead of manually preparing separate reports.

Based on these approaches, the proposed Product Pricing vs Sales Volume Analysis combines sales data processing, pricing analysis, trend analysis, and visualization into a centralized platform. It allows users to compare product prices with sales volumes and examine related business indicators. The system can support pricing evaluation and sales planning while recognizing that observed relationships do not necessarily prove direct causation.

III. System Analysis

The system analysis identifies the requirements and operations of the Product Pricing vs Sales Volume Analysis system. The system collects authorized product pricing and sales transaction information from suitable business sources. The collected data may include product name, category, selling price, quantity sold, revenue, discount, date, and other relevant attributes. The system validates the collected information to identify missing, duplicate, or inconsistent records. Cleaned data is stored in a centralized database for efficient analysis. The system calculates metrics such as total sales volume, average selling price, revenue, discount rate, and product-level performance. Pricing and sales information is grouped according to product, category, region, and time period. Analytical processes compare price levels with corresponding sales volumes. Trend analysis identifies changes in prices and sales across different periods. The dashboard displays the results using KPI cards, charts, graphs, tables, and interactive filters. Users can select products, categories, price ranges, and time periods for detailed analysis. The resulting insights support pricing evaluation, sales planning, and business decision-making.

Existing System

In many organizations, pricing and sales information is maintained using spreadsheets, sales-management systems, accounting software, and manually prepared reports. Product prices may be stored separately from detailed sales transaction information. Analysts often need to combine these datasets before examining the relationship between price and sales volume. Manual calculations can require considerable time and may introduce errors. Static reports may show sales totals but provide limited analysis of how sales change at different price levels. Comparing multiple products or categories can also require additional data preparation. Historical price changes may be difficult to compare with corresponding sales changes when information is distributed across different sources. The impact of discounts and promotional periods may also be difficult to evaluate using basic reports. As the number of products and transactions increases, manual analysis becomes increasingly complex. Managers may therefore lack a clear visual representation of pricing and sales relationships. A

centralized dashboard can provide a more efficient approach to combining and analyzing these business metrics.

Disadvantages of Existing System

- Pricing and sales data may be stored separately.
- Manual data consolidation requires significant effort.
- Higher possibility of calculation errors.
- Difficult to analyze large sales datasets.
- Limited visualization of price-volume relationships.
- Difficult to compare products quickly.
- Historical pricing analysis may require manual processing.
- Discount effects may be difficult to analyze.
- Static reports provide limited interactive analysis.
- Sales trends may not be easily connected with pricing changes.
- Manual report preparation consumes time.
- Difficult to identify important pricing patterns efficiently.

Proposed System

The proposed Product Pricing vs Sales Volume Analysis provides a centralized platform for collecting, processing, analyzing, and visualizing product pricing and sales information. The system collects authorized data containing product prices, quantities sold, revenue, discounts, categories, and sales dates. The collected information is validated and cleaned before being stored in a centralized database. The system calculates important metrics such as total sales volume, average selling price, revenue, discount percentage, and product-level performance. Pricing and sales records are grouped according to products, categories, regions, and time periods. The analytics module compares different price levels with corresponding sales volumes. The dashboard presents the relationship through scatter plots, line charts, bar charts, tables, and KPI cards. Users can filter the results by product, category, price range, discount, and reporting period. Historical analysis helps users observe how sales volume changes alongside observed price changes. Additional factors such as promotions and seasonality can be included to improve interpretation of the results. The system provides analytical insights rather than automatically determining a single optimal price. Overall, the proposed system supports pricing evaluation, sales analysis, demand understanding, and business planning.

Advantages of Proposed System

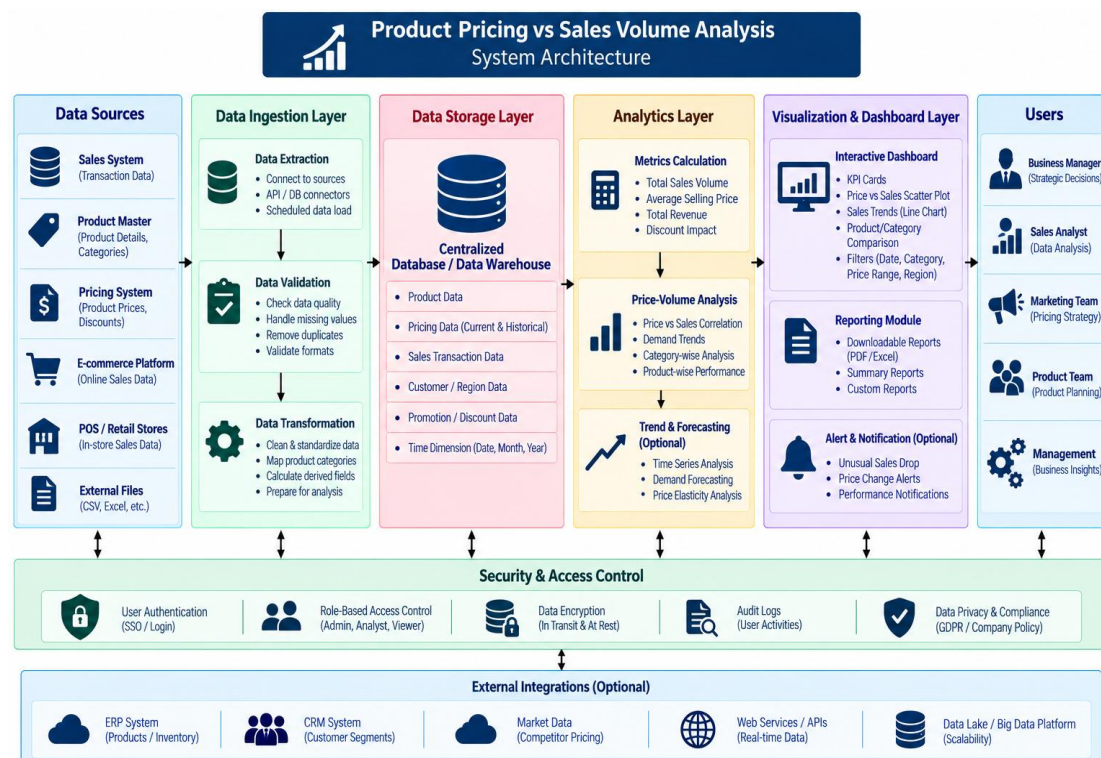
- Centralized pricing and sales analysis.
- Automated calculation of sales metrics.
- Clear visualization of price-volume relationships.
- Supports product-wise analysis.
- Supports category-wise comparison.
- Provides historical pricing and sales trends.
- Helps identify changes in sales volume at different price levels.
- Supports discount and promotion analysis.
- Reduces manual report preparation.
- Makes large sales datasets easier to analyze.

- Provides interactive filtering and visualization.
- Supports data-driven pricing evaluation.
- Can be extended with demand forecasting.
- Can support price elasticity and scenario analysis.

IV. Methodology

The methodology begins with collecting authorized product pricing and sales information from business systems and approved data sources. The collected information may include product name, category, selling price, quantity sold, revenue, discount, sales date, and region. The raw data is validated to identify missing, duplicate, or inconsistent records. Data preprocessing is performed to clean, standardize, and organize the collected information. The processed records are stored in a centralized database for efficient retrieval and historical analysis. The system calculates total sales volume, average price, revenue, discount rate, and other relevant business metrics. Pricing and sales records are grouped by product, category, price range, region, and time period. Analytical methods are used to compare price levels with observed sales volumes. Trend analysis is performed to identify changes in pricing and sales over time. The dashboard converts the results into KPI cards, scatter plots, line charts, bar charts, tables, and reports. Users can apply filters to examine specific products, categories, price ranges, or periods. The resulting insights support pricing evaluation, sales planning, demand analysis, and business decision-making.

System Architecture



The system architecture consists of multiple layers responsible for collecting, processing, storing, analyzing, and presenting product pricing and sales information. The Data Source Layer contains authorized sources such as sales systems, product-

management systems, billing systems, e-commerce platforms, and approved data files. The Data Collection Layer retrieves pricing and sales information through secure APIs, database connections, or scheduled data imports. The Data Processing Layer validates, cleans, transforms, and standardizes the collected records. The processed information is stored in the Centralized Database Layer, which maintains current and historical product, pricing, and sales records. The Analytics Layer calculates sales volume, average selling price, revenue, discount rate, and other relevant indicators. The Price-Volume Analysis Module compares observed prices with corresponding sales quantities and identifies patterns in the available data. The Trend Analysis Module examines pricing and sales changes across different time periods. The Dashboard Layer presents the results through KPI cards, scatter plots, line charts, bar graphs, tables, and interactive filters. Users can select products, categories, regions, price ranges, and reporting periods for detailed analysis. The Reporting Module generates analytical summaries and downloadable reports for authorized users. Appropriate authentication and role-based access controls can protect business and sales information. The architecture can be extended with price elasticity analysis, demand forecasting, scenario simulation, machine-learning models, and automated alerts.

V. Result and Output



VI. Conclusion

The Product Pricing vs Sales Volume Analysis provides a centralized and effective solution for analyzing the relationship between product pricing and sales performance. The system brings together important information such as product prices, sales

volume, revenue, discounts, product categories, and sales periods into a structured analytical platform.

The dashboard helps business managers and analysts understand how changes in observed prices are associated with changes in sales volume through scatter plots, trend charts, comparison graphs, KPI cards, and detailed tables. Product-wise and category-wise analysis makes it easier to identify high-performing products and price ranges associated with stronger sales.

The proposed system reduces the effort required to manually combine pricing and sales information and provides faster access to meaningful business insights. It supports pricing evaluation, sales planning, demand analysis, and data-driven decision-making. However, observed price-sales relationships should be interpreted carefully because factors such as promotions, seasonality, competition, product availability, and marketing activities can also influence sales.

Overall, the Product Pricing vs Sales Volume Analysis provides a useful foundation for improving pricing and sales strategies. Future enhancements can include price elasticity estimation, demand forecasting, what-if pricing simulations, machine-learning models, automated alerts, and real-time integration with sales and product-management systems.

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