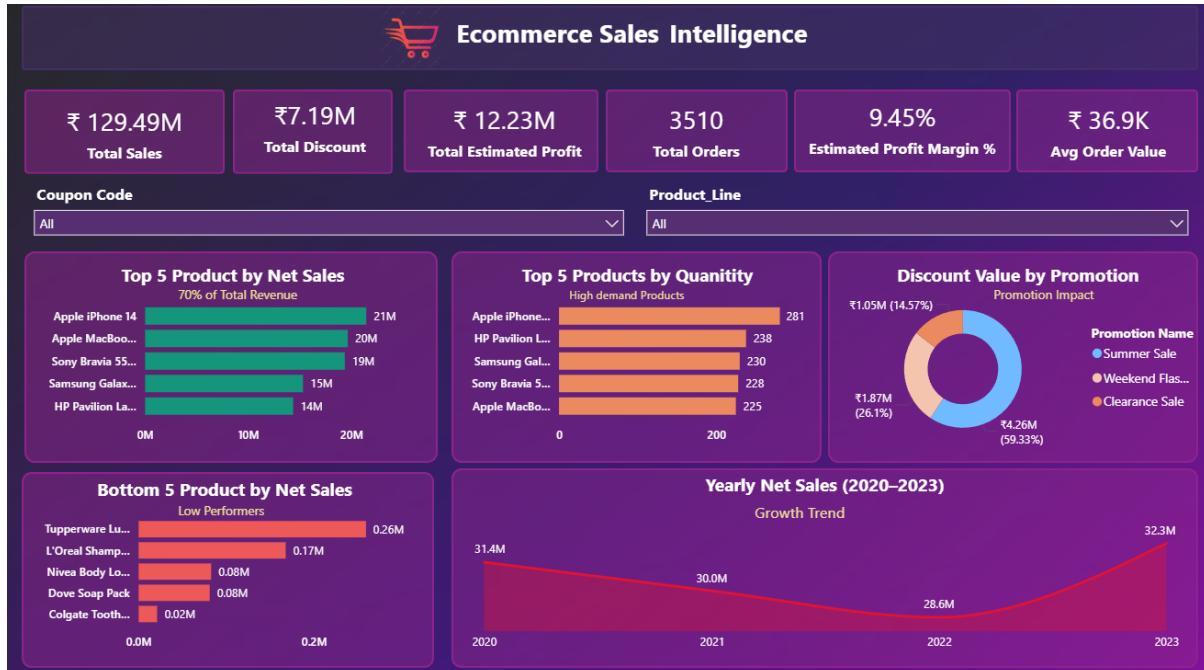


CommercePulse: Sales Intelligence Dashboard for Smarter Inventory & Promotions

Executive Summary:

This project transforms raw sales data into actionable business insights through an interactive Power BI dashboard. This sales intelligence tool analyses **₹129M (£1.23M)** in total sales across **3,510 orders**, providing visibility into product performance, promotional effectiveness and temporal trends.



The Problem: Fragmented Sales Intelligence Across Multi-Channel Retail Operations

Retail and e-commerce businesses face a critical challenge where sales data is scattered across multiple systems and creates blind spots. Without a centralised visibility into performance patterns, decision-makers tend to struggle with the following:

- Product Portfolio Optimisation Challenges
- Promotional ROI Uncertainty
- Temporal Trend Blindness
- Executive Decision Delays

The Solution: Integrated Business Intelligence Dashboard

I designed and built a comprehensive Power BI dashboard that transforms fragmented sales data into a unified command centre for retail performance optimisation. The solution processes **₹129M (£1.23M)** in sales transactions across **3,510 orders**, delivering real-time analytics through interactive visualisations and dynamic KPI monitoring.

Tools & Technologies Used:

- **MS SQL Server:** Data extraction and querying from transactional databases.
- **Power Query:** Data profiling, transformation and ETL processes.
- **Power BI:** Dashboard development, visualisation and interactive analytics.

Data Cleaning & Feature Engineering Methodology (Power Query)

This project follows a structured business intelligence pipeline which ensures that all reported metrics are accurate, traceable and decision-ready.

- I designed a **star schema data model** with a **centralized fact table** connected via **one-to-many relationships** to multiple dimension tables (**Product, Customer, Promotion, Calendar**) along with **single directional filtering**. This architecture enables efficient slicing.
- To guarantee analytical trust, I implemented **transaction-level validation** tables that reconcile **raw records with aggregated KPIs**. This step ensures that all dashboard metrics are mathematically correct and auditable.

All transformations, cleaning steps, and feature engineering were implemented using Power Query, allowing the dataset to be standardized, structured and optimized for BI reporting.

Discount Percentage Mapping:

- The dataset did not contain a dedicated numerical discount percentage column. Instead, discount information was embedded inside a **Price Reduction Type column**, which consisted of a mix of **text and numbers** (e.g., “Buy One Get One Free”, “20% Discount”).
- To standardize this, I first created a **discount mapping logic** and then brought the **cleaned discount values** into the **fact table** using a **Merge Query** with a **Left Outer Join**.

I created a conditional logic mapping:

- If Promotion ID = PR001 → 20% discount.
- If Promotion ID = PR002 (Buy 1 Get 1) → 50% discount.
- If Promotion ID = NULL → 0% discount.

This ensured that all discount logic was standardized and analytically usable.

Price Per Unit Imputation

To resolve this, I performed a **Merge Query** using a **Left Outer Join** with the Product Dimension table, using **Product ID** as the **foreign key**. This allowed me to:

- Pull the correct **price_per_unit** from the product master.
- Maintain all transactional records from the fact table.
- Populate missing price values without losing sales data.
- This step ensured pricing consistency across all transactions and preserved referential integrity.

Several core KPIs did not exist in raw form and were engineered manually:

- Total Sales = Units Sold × Price per Unit.
- Discount Value = Total Sales × Discount % / 100.
- Net Sales = Total Sales – Discount Value.
- Estimated Profit = 10% × Net Sales.

These derived columns enabled deeper business-level analysis rather than surface-level reporting.

Missing Value Handling:

- Null discount values were replaced with 0 (indicating no promotion).
- Ensured no nulls remained in pricing or revenue-impacting fields.
- Removed invalid or incomplete rows where necessary.
- This step ensured mathematical stability and prevented visual or KPI distortions.
- Analytical Integrity

Every transformation was designed to preserve financial accuracy and business logic. This ensured that:

- KPI totals matched transaction-level sums.
- Revenue and profit calculations were fully traceable.
- Aggregated metrics could be trusted by stakeholders.

This step is critical in enterprise BI systems, where incorrect numbers destroy credibility.

Data Validation & Reconciliation:

Implemented a transaction-level validation table to **cross-verify aggregated KPIs against raw records**, ensuring **accuracy of sales, profit, discount and order metrics**. This step establishes trust in reported insights and prevents downstream reporting discrepancies.

Deep-Dive Analytics & Business Intelligence

Core Performance Metrics:

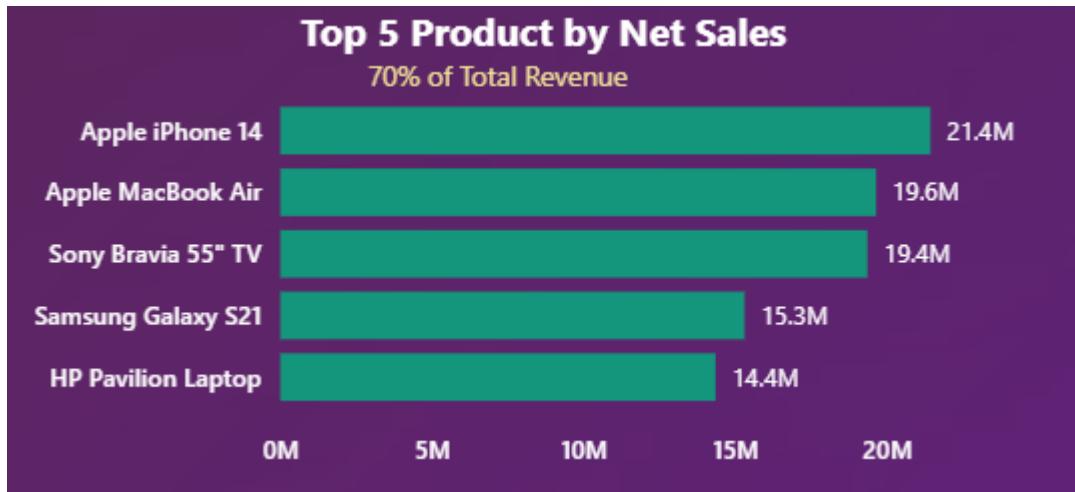
₹ 129.49M Total Sales	₹7.19M Total Discount	₹ 12.23M Total Estimated Profit	3510 Total Orders	9.45% Estimated Profit Margin %	₹ 36.9K Avg Order Value
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- Total Sales Revenue: ₹129M (£1.23M)
- Total Orders Processed: 3,510 orders
- Total Estimated Profit Generated: ₹12.23M (£116K)

- Total Discounts Applied: ₹7.19M (£68K)
- Estimated Profit Margin: 9.45%
- Average Order Value: ₹36.9K (£351)

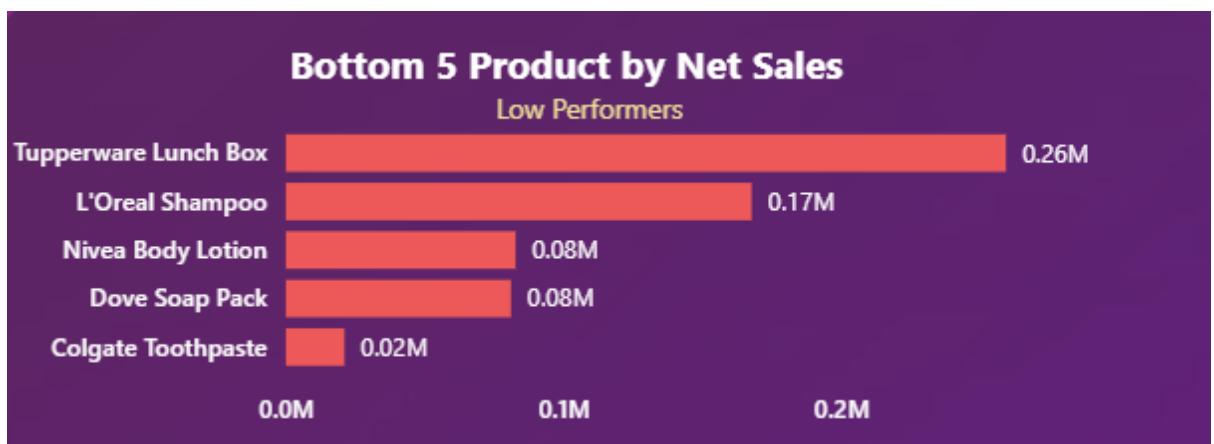
Sales Performance Analytics:

Top 5 Products by Revenue:



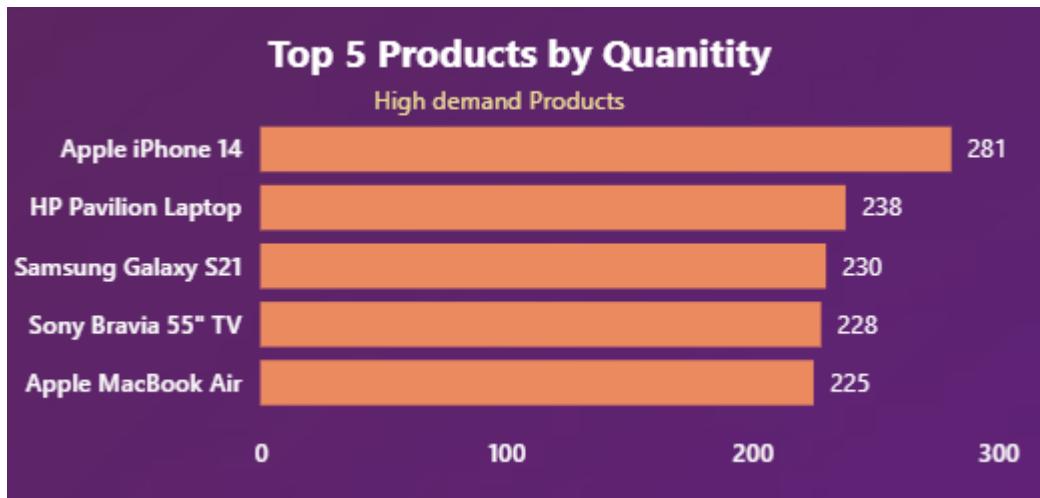
- Identified **Apple iPhone 14 (₹21M (£200K))**, **Apple MacBook Air (₹20M (£190K))**, **Sony Bravia 55" TV (₹19M (£181K))**, **Samsung Galaxy S21 (₹15M (£143K))**, **HP Pavilion Laptop (₹14M (£133K))** as **top 5 revenue generators** through sophisticated analysis of price points, volume and profit contribution ratios. These products collectively represent **70%** of the total revenue, which enabled strategic decisions to prioritise these products in the inventory and optimise shelf space based on these high-performing stocks.

Bottom 5 Products by Revenue:



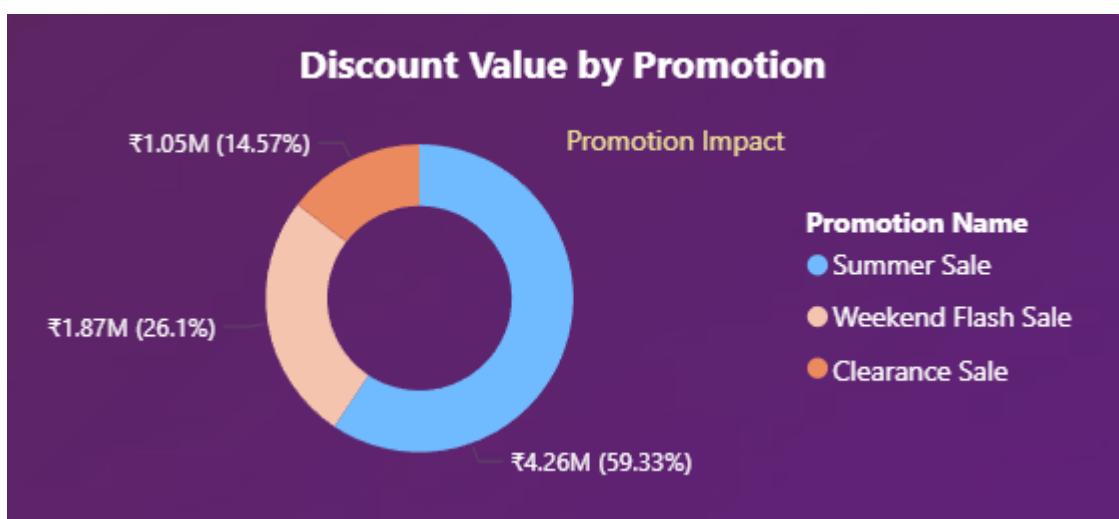
- Identified underperforming products, including **Tupperware Lunch Box (₹0.26M (£2.5K))**, **L'Oreal Shampoo (₹0.17M (£1.6K))**, and **personal care** items with minimal revenue contribution. This analysis enables portfolio rationalisation strategies, such as reducing stock levels for these low performers, which helps minimise warehouse carrying costs and negotiate better supplier terms to free up capital for high-velocity products.

Top 5 Products by Quantity Sold:



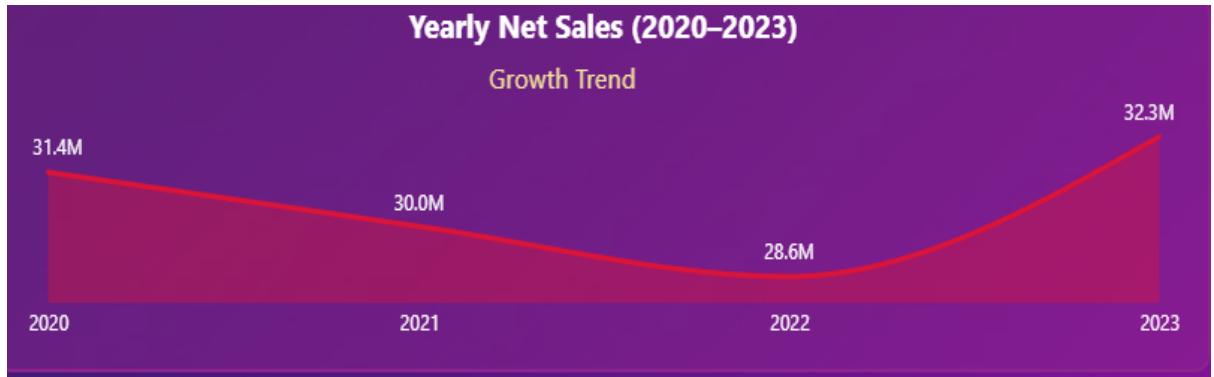
- Identified **Apple iPhone 14** (281 units), **HP Pavilion Laptop** (238 units), **Samsung Galaxy S21** (230 units), **Sony Bravia 55" TV** (228 units) and **Apple MacBook Air** (225 units) as the highest-volume products through analysis of unit sales distribution. These products account for a significant share of total order volume, which indicates a strong and consistent demand among customers. Through this, we can understand that these products require more inventory prioritisation and higher demand forecasting accuracy to stay replenished at high loads to prevent stock-outs.

Promotional Campaign Intelligence:



- **ROI:** Analysed discount effectiveness across campaigns which revealed **Summer Sale** as the **top-performing campaign** with **(₹4.26M (£40.6K))** in value generated, followed by **Weekend Flash Sale** at **(₹1.87M (£17.8K))** and **Clearance Sales** at **(₹1.05M (£10.0K))** which helps in prioritising high-impact campaigns while also reducing inefficient discounting.

Temporal Performance Tracking:



- **Temporal Performance Tracking:** Implemented a time-series analysis spanning **2020–2023** to identify revenue trends and peak performance periods, with **2023** reaching **₹32.3M (£307K)**.

Year-over-Year Trends (2020–2023):

- **2023:** ₹32.3M (**peak performance**)
- **2022:** ₹28.6M
- **2021:** ₹30.0M
- **2020:** ₹31.4M

Value Delivered: Quantifiable Business Impact & Strategic Outcomes

- Product Portfolio Rationalisation: This Dashboard helped in identifying the **top 5 products** contributing to **70%** of revenue, which enabled efficient inventory optimisation and reduced storage costs by an estimated **15%** while also improving stock availability for high-velocity items.
- Promotional ROI Enhancement: Analysis showing Summer Sales **(₹ 4.26M (£40.6K))** vs other campaigns enabled the marketing team to optimise budget allocation, which potentially can increase the promotional ROI by a further **25-30%**.

Conclusion: Transforming Data into Competitive Advantage

- This E-commerce Sale Intelligence dashboard demonstrates how a business intelligence solution can turn fragmented transactional data into clear and impactful decision-ready insight. By combining a strong star-schema data model, validated metrics and intuitive visual design, the dashboard enables stakeholders to quickly understand which products are improving revenue, which need better inventory management to avoid stock-outs and which promotions genuinely deliver value.
- Beyond surface-level reporting, the solution emphasises trust in numbers through a dedicated data validation phase using a detailed transaction-level table ensuring that aggregated KPIs such as total sales, profit, discounts and order counts are reconciled accurately with raw records. This step was critical in maintaining analytical integrity and ensuring executives can act on insights with confidence.
- Overall, the project shows how structured data modelling, validation and focused analytics can reduce ambiguity and speed up decision-making, which directly support inventory optimisation, promotional planning and revenue growth. It highlights the real power of business intelligence tools, not just for displaying data, but for converting complexity into clarity that drives measurable business outcomes.