



RetailSmart Capstone – Phase 4: Visualization and Storytelling

1. Business Context

After building end-to-end analytical solutions—including SQL-based data extraction, cleaning, exploratory analysis, predictive modeling, clustering, and forecasting—RetailSmart now focuses on transforming analytical outputs into business-ready visualizations and stories. Phase 4 emphasizes communicating insights through interactive dashboards and effective data storytelling using Power BI. The goal is to bridge the gap between technical outputs and strategic business decision-making.

2. Phase Objective

The objective of Phase 4 is to enable learners to integrate the analytical outputs from previous phases and create visually appealing, interactive Power BI dashboards. Learners will develop skills in designing data models, creating KPI visuals, and articulating insights through narratives that align with business goals.

3. Key Tasks

Task 1: Data Preparation for Visualization

Export all relevant analytical outputs into CSV format for Power BI integration:

- model_input.csv (from Phase 2)
- cluster_summary.csv (from Unsupervised Learning in Phase 3)
- forecast_results.csv (from Time Series Forecasting in Phase 3)
- customers_cleaned.csv, sales_cleaned.csv, marketing_cleaned.csv, products_cleaned.csv (from Phase 1)

Store all files in a dedicated folder named 'data_visualization/' for easy import into Power BI.

Task 2: Load Data into Power BI

Open Power BI Desktop, select 'Get Data → Text/CSV', and load the following analytical datasets prepared across Phases 1–3:

1. model_input.csv – Final integrated dataset used for predictive modeling (Phase 2)
2. cluster_summary.csv – Cluster-level summary from Unsupervised Learning (Phase 3)
3. forecast_results.csv – Actual vs. forecasted monthly orders and revenue (Phase 3 Time Series)
4. Optionally:
 - customers_cleaned.csv – Cleaned customer data from Phase 1
 - sales_cleaned.csv – Cleaned sales and order data from Phase 1



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- marketing_cleaned.csv – Cleaned marketing data from Phase 1
- products_cleaned.csv – Product metadata for category or revenue drill-downs

Ensure all files are saved inside the 'data_visualization/' folder and verify correct data types after import:

- Date columns → Date/Time
- Numeric measures → Decimal Number
- IDs → Text

Task 3: Create Data Model and Define KPIs

Use Power BI's Model View to create relationships between tables (customers, sales, products, marketing). Define DAX measures for core KPIs such as:

- Total Revenue = $\text{SUM}(\text{sales}[\text{total_price}])$
- Churn Rate = $\text{DIVIDE}(\text{SUM}(\text{customers}[\text{churn_flag}]), \text{COUNT}(\text{customers}[\text{customer_id}]))$
- Avg Response Rate = $\text{AVERAGE}(\text{marketing}[\text{response_rate}])$
- Orders Per Customer = $\text{DIVIDE}(\text{COUNT}(\text{sales}[\text{order_id}]), \text{DISTINCTCOUNT}(\text{customers}[\text{customer_id}]))$
- Forecasted Orders = $\text{AVERAGE}(\text{forecast_results}[\text{Forecasted_Orders}])$

Task 4: Design Dashboard Pages

Create multi-page dashboards in Power BI to present insights across the analytical workflow:

Page 1 – Executive Summary:

Display KPIs such as total revenue, total orders, customers, churn %, and forecasted growth.

Page 2 – Customer Insights:

Show segmentation outcomes from clustering (Phase 3A) using RFM metrics and behavioral trends.

Page 3 – Churn Prediction:

Visualize churn distribution, key drivers, and performance metrics of predictive models.

Page 4 – Forecasting Trends:

Display historical vs. forecasted order and revenue trends with line charts and slicers.

Task 5: Data Storytelling and Narratives

Add contextual narratives and insights directly within dashboard pages. Each page should answer:

- What is happening? (Insight)
- Why is it happening? (Interpretation)
- What should we do next? (Action)



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Encourage concise textual annotations that connect data to decisions.

Task 6: Finalize and Publish

Format visuals for clarity and consistency, apply filters and slicers, and publish the report to Power BI Service. Save the final dashboard as 'RetailSmart_Dashboard.pbix'. Optionally, export a PDF version for presentation.

4. Deliverables

- RetailSmart_Dashboard.pbix (Power BI dashboard)
- data_visualization/ folder containing exported CSV files
- RetailSmart_Storytelling_Report.docx/pdf summarizing insights

5. Learning Outcomes

Upon completion of Phase 4, learners will be able to:

- Integrate analytical outputs into business dashboards.
- Design data models and DAX-based KPIs.
- Communicate data-driven insights through visual storytelling.
- Deliver presentation-ready dashboards aligned with business strategy.