**Case Study: Retail Sales & Customer Insights Dashboard**

**1️. Background**

XYZ Retail, a mid-sized retail chain specializing in apparel, electronics, and household items, struggled with optimizing sales performance and understanding customer preferences. The company relied on traditional sales reports, but they lacked real-time analytics, leading to:

🔹 **Limited visibility into sales performance** across stores and online channels.  
🔹 **Poor customer insights**, making it difficult to personalize marketing efforts.  
🔹 **Inefficient inventory management**, resulting in frequent stockouts and overstocking.  
🔹 **Missed revenue opportunities** due to a lack of data-driven decision-making.

To tackle these challenges, XYZ Retail implemented a **Retail Sales & Customer Insights Dashboard** powered by a cloud-based data warehouse (Google BigQuery) and Power BI for advanced analytics. The goal was to optimize:

✔ Sales performance tracking  
✔ Customer segmentation & personalization  
✔ Inventory & stock management  
✔ Marketing effectiveness & trend analysis

**2️. Case Study Scope**

The project aimed to build a scalable analytics solution by integrating data from **POS systems, CRM platforms, and inventory management tools** into **Google BigQuery**, with interactive reporting in Power BI.

**Key Components**

🔹 **Sales Performance Tracking** – Analyzes revenue, profit margins, and store-wise performance.  
🔹 **Customer Insights & Segmentation** – Identifies purchase behavior, demographics, and trends.  
🔹 **Inventory & Stock Management** – Optimizes stock levels to prevent overstocking and stockouts.  
🔹 **Marketing Effectiveness** – Tracks the impact of promotions, discounts, and campaigns.

The primary objective was to **enhance decision-making with real-time insights**, leading to improved sales and customer satisfaction.

**3️. Key Activities**

**1️. Data Integration & ETL Process**

* Extract sales, customer, and inventory data from POS, CRM, and inventory systems using APIs & ETL pipelines.
* Transform and clean data using **Python (Pandas, NumPy) and SQL scripts**.
* Store structured data in **Google BigQuery** for scalable reporting.

**2️. Data Model Design**

The solution included key tables for structured analytics:

| **Table Name** | **Description** |
| --- | --- |
| **Customers** | Stores customer details & purchase history. |
| **Sales\_Transactions** | Tracks all sales from online and in-store purchases. |
| **Products** | Stores product details, pricing, and stock levels. |
| **Promotions** | Analyzes impact of discounts and marketing campaigns. |
| **Inventory\_Levels** | Tracks stock movements across stores and warehouses. |

**Attached DDL information**

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**3️. Data Analysis Using Python & SQL**

🔹 Load data into **Pandas** for preprocessing and trend analysis.  
🔹 Calculate **Customer Lifetime Value (CLV)** to identify high-value customers.  
🔹 Analyze **Sales Trends** (daily, weekly, seasonal performance).  
🔹 Evaluate **Inventory Turnover Rate** to optimize stock levels.  
🔹 Perform **Market Basket Analysis** for product recommendations.

**4️. Analytics & Reporting (Power BI Dashboards)**

1. **Sales Performance Dashboard** – Tracks revenue, profit, and top-selling products
2. **Customer Segmentation Dashboard** – Analyzes demographics and purchase trends.
3. **Inventory Optimization Dashboard** – Monitors stock levels and turnover rates.
4. **Marketing Effectiveness Dashboard** – Evaluates the success of discounts & promotions.

**4️. Results & Business Impact**

1. **15% increase in overall sales** by optimizing product pricing & promotion
2. **20% improvement in customer retention** through personalized marketing.
3. **30% reduction in stockouts & overstocking** due to better inventory planning
4. **Faster decision-making** through real-time analytics & automated alerts.

**5️. Conclusion**

By integrating **POS, CRM, and inventory systems** into a cloud-based data warehouse, XYZ Retail successfully optimized sales performance, improved customer insights, and enhanced inventory management