RETAIL SALES MONITORING DASHBOARD FOR U.S. CHAIN STORES

1. Project Background

The client was a U.S.-based retail chain with 120+ stores nationwide, dealing in clothing, electronics, and household items. Their internal BI system lacked the interactivity and real-time performance required for day-to-day decision-making. Regional managers relied heavily on weekly static Excel reports, which were often delayed, redundant, and lacked drill-down capabilities.

The client needed a centralized, browser-based dashboard that allowed both high-level overviews and location-specific deep dives — all built in a cost-effective environment without deploying a full-scale enterprise solution.

2. Objectives

- Build an interactive dashboard using R Shiny to visualize real-time sales, returns, discounts, and category performance.

- Enable region-wise, store-wise, and product-wise filtering for granular monitoring.

- Provide comparative insights like YoY and MoM growth across categories.

- Implement a permission-based access layer for corporate vs. regional users.

- Automate data refresh and simplify dashboard maintenance.

3. Data & Integration

- **Data Sources**: PostgreSQL transactional database, flat files (returns and refunds), and Google Sheets for promotions data.

- **Data Preprocessing**:

  o Merged tables on store ID, date, and product categories.

  o Standardized missing values, fixed time formats, and handled inconsistencies in SKU codes.

  o Applied filters to exclude damaged/return-initiated SKUs from core sales metrics.

4. Technology Stack

- **Backend**: R, dplyr, tidyr, lubridate, DBI

- **Dashboard Framework**: R Shiny

- **Visualization**: plotly, ggplot2, DT (for dynamic tables)

- **Deployment**: RStudio Connect (on-premise)

- **Security**: Auth0 integration for role-based access

5. Key Features Implemented

5.1. Real-Time Sales KPIs

- Daily/weekly/monthly sales

- Number of invoices, average transaction size

- Net revenue (adjusted for refunds)

5.2. Store-Level Performance Map

- Interactive U.S. map with store pins, colored by performance score

- Click to drill down into store-wise performance

5.3. Category-Wise Trends

- Interactive time-series comparison of top 5 categories

- YoY and MoM comparison widgets

5.4. Returns & Discount Impact

- Ratio of returned items to sold items

- Heatmap of discounts vs. conversion rate

5.5. Dynamic Filters

- Region, store, product category, date range, day of week, promotion type

5.6. Executive Summary Tab

- At-a-glance visuals tailored for leadership

- Export to PDF via RMarkdown integration

6. Results & Business Value

- Reduced reporting lag from **5 days to real-time**.

- Enabled regional managers to track and act on sales drops the **same day**.

- Store performance ranking helped identify and fix underperforming branches.

- Improved visibility into return patterns, reducing avoidable refunds by **14%**.

- Streamlined weekly leadership reporting with one-click PDF export.

7. Challenges and Solutions

- **Challenge**: PostgreSQL data was not indexed by time, slowing performance. **Solution**: Created time-indexed materialized views refreshed hourly.

- **Challenge**: Non-technical users struggled with filters. **Solution**: Designed a "Quick Filters" preset for common views (e.g., "Top Stores by Sales Last 7 Days").

- **Challenge**: Handling peak load during board meetings. **Solution**: Pre-cache heavy plots and leverage Shiny's reactive triggers smartly.

8. Future Scope

- Integrate customer loyalty data to show customer-level metrics.

- Incorporate predictive analytics (e.g., sales forecast, stock-out risks).

- Add mobile-friendly version using shinyMobile for on-the-go managers.