Final Report

1.INTRODUCTION

1.1 Project Overview

The Strategic Product Placement Analysis project focuses on enhancing in-store and online retail sales through smart, data-driven visualizations. The primary objective is to evaluate the impact of product placements on customer behavior and sales performance using Tableau dashboards and analytical tools. Through user behavior analysis, store layout optimization, and interactive filtering, the project provides insights that help businesses make informed decisions on product visibility and arrangement.

1.2 Purpose

The purpose of this project is to:

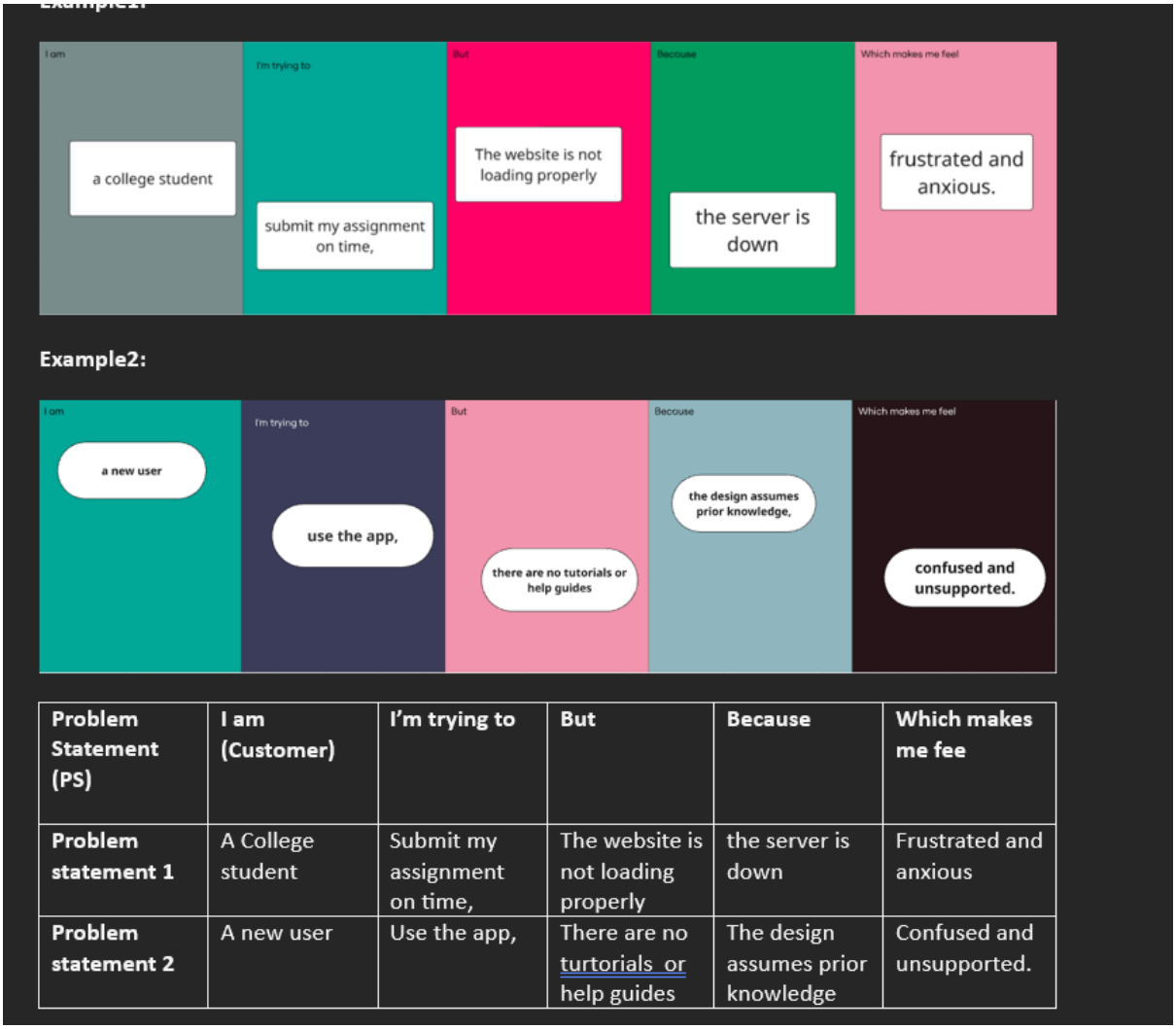
- Assist retail managers and marketing analysts in understanding the correlation between product placement and sales.
- Provide a real-time visualization system to track product performance.
- Help identify the most effective store zones and shelf positions to boost sales.
- Enhance customer experience by reducing time spent searching for products.
- Deliver a scalable and user-friendly analytics dashboard to support faster, more accurate business decisions.

2.IDEATION PHASE

2.1 Problem Statements

Retail Manager: Wants to improve sales but lacks visual tools → feels unsure

1. **Marketing Analyst**: Tries to assess placement impact but data is unclear → feels disconnected

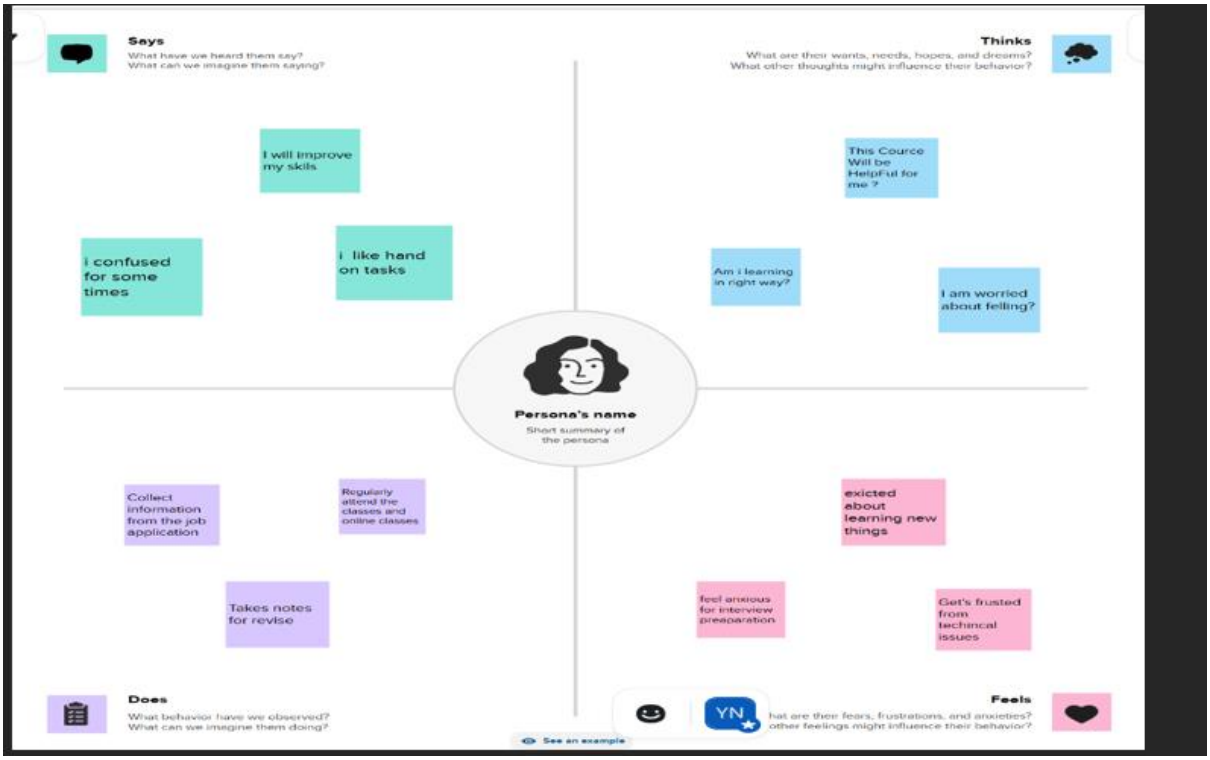


Problem Statement (PS)	I am (Customer)	I'm trying to	But	Because	Which makes me fee
Problem statement 1	A College student	Submit my assignment on time,	The website is not loading properly	the server is down	Frustrated and anxious
Problem statement 2	A new user	Use the app,	There are no turtorials or help guides	The design assumes prior knowledge	Confused and unsupported.

2.2Empathy Map –

Project: *Strategic Product Placement Analysis*

- **Says**: "We need data-driven insights", "Visualization must be clear"
- **Thinks**: "How can I boost sales with better placement?"
- **Does**: Analyzes reports, adjusts store layouts
- **Feels**: Frustrated with delays, excited by insights
- **Pain Points**: Lack of real-time tools, unclear impact of placement
- **Goals**: Improve visibility, faster decisions, better layout strategy

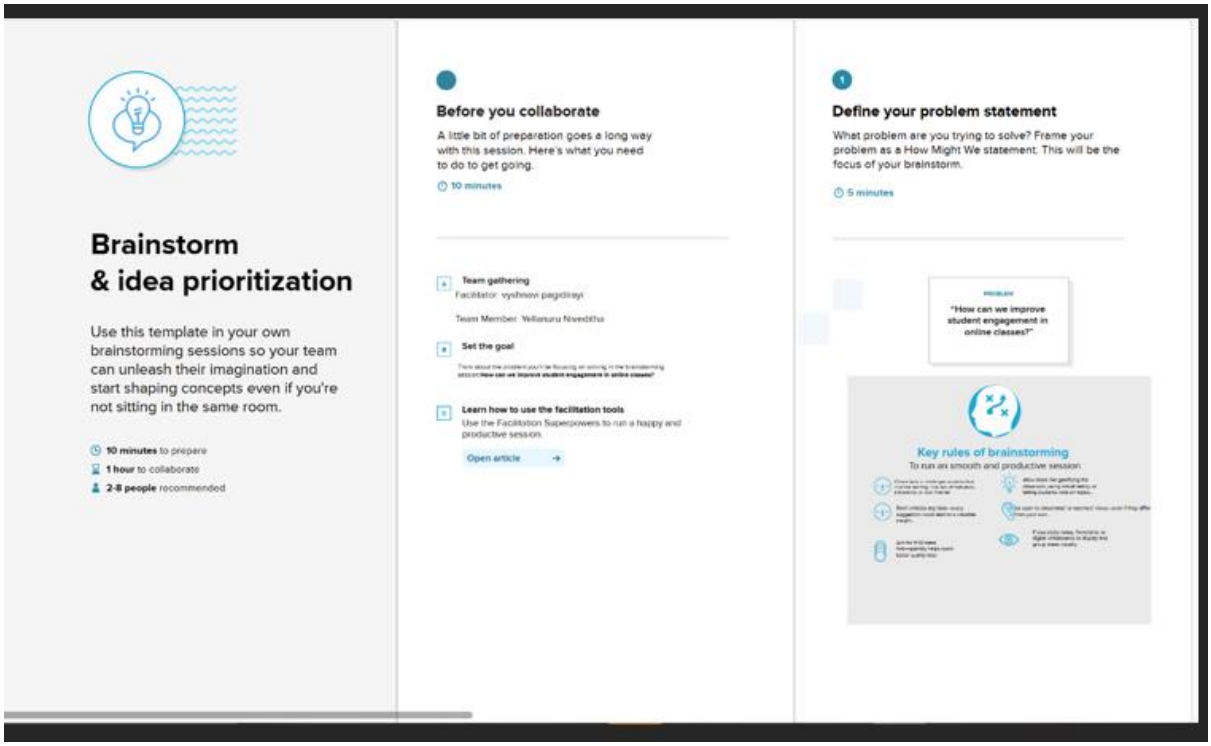


2.3 Brainstorming – Summary

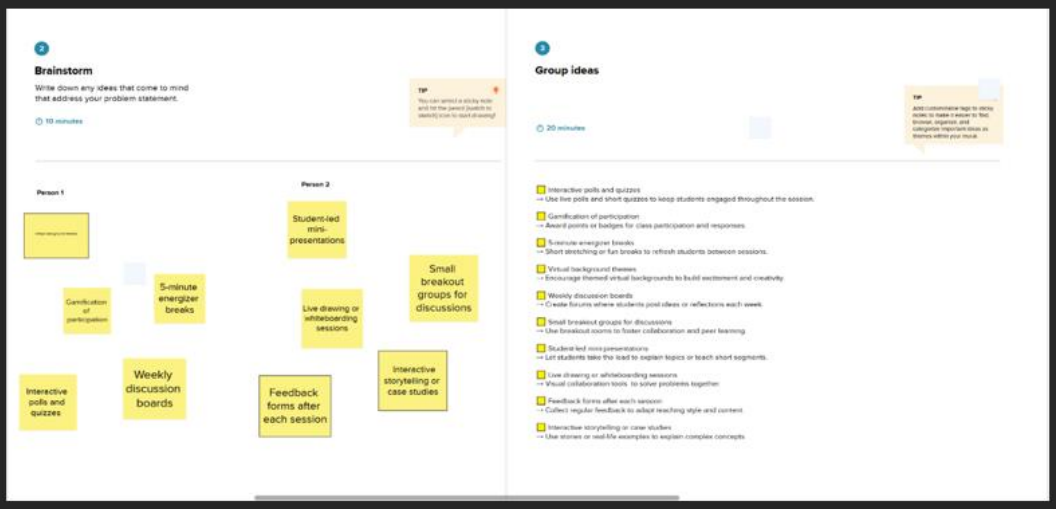
Date: 21-06-2025
Project: *Strategic Product Placement Analysis*

- **Step 1 – Problem**: No proper visualization of placement impact
- **Step 2 – Ideas**:
    - Heatmaps in Tableau
    - Filters by season/time/customer
    - Real-time dashboards
- **Step 3 – Final Picks**:

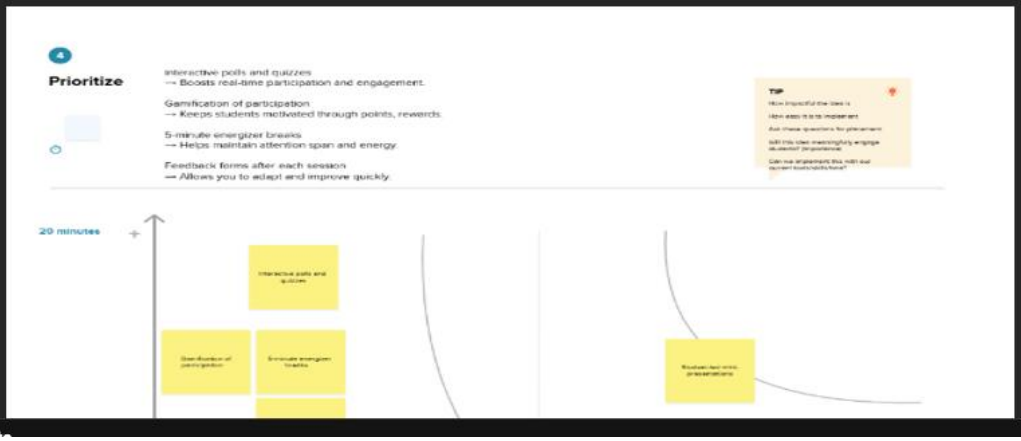
1. Interactive Tableau dashboards
2. Embedded behavior visualizations
3. Real-time alerts on sales dips



Step-2: Brainstorm, Idea Listing and Grouping



Step-3: Idea Prioritization



3.REQUIREMENT ANALYSIS

3.1 customer journey map

3.2 solution requirement

1. Functional Requirements (FRs):

- **FR-1:** User Registration (via Form, Gmail, LinkedIn)
- **FR-2:** Confirmation (via Email, OTP)
- **FR-3:** Data Cleaning (removal of typos, null values, type validation)
- **FR-4:** Dashboards
    - Bar Chart: Sales by category (Clothing highest)
    - Stacked Bar: Our prices > competitor
    - Heat Map: Clothing front display has highest sales
    - Bubble Chart: Low aisle foot traffic yields highest sales
    - Text Box: Promotions increase sales, especially in Food

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□ 2. Non-Functional Requirements (NFRs):

- **Usability:** Intuitive UI for mobile & web
- **Security:** Encrypted data & secure login
- **Reliability:** Fault-free operations
- **Performance:** Load <2s (normal), <5s (peak)
- **Availability:** 99.9% uptime
- **Scalability:** Should support growing users/data

3.3 data flow diagram

4. User Stories:

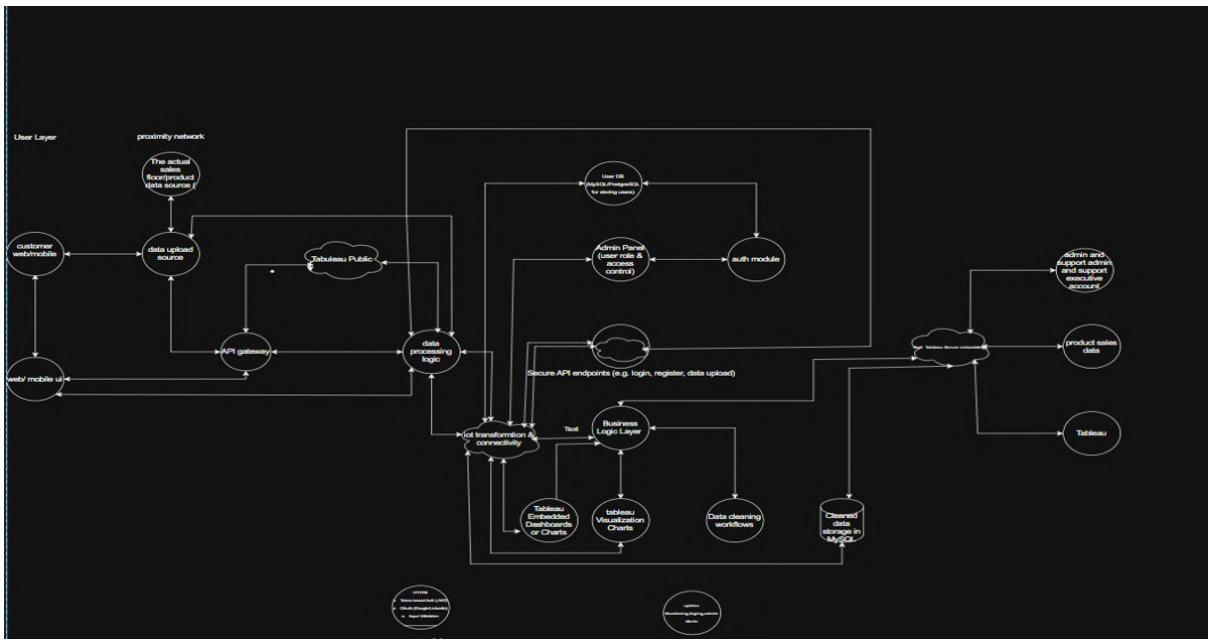
- **Mobile Users:** Quick registration, onboarding tips, error-free forms, fast login, dashboard with goals
- **Web Users:** Access to detailed analytics
- **Support Execs:** Easy ticket handling

- **Admin:** System monitoring with uptime and bug tracking

3.4 technology stack

3. Technology Stack & Infrastructure:

- **Frontend/UI:** HTML, CSS, JS, Angular/React
- **Backend:** Node.js, Flask, Spring Boot
- **Data Handling:** Python, Microservices
- **Database:** MySQL / PostgreSQL / Cloud SQL
- **Storage:** Amazon S3, Azure Blob
- **Analytics/ML:** Spark, TensorFlow, Scikit-learn
- **Infrastructure:** Docker, Kubernetes, AWS
- **Security:** OAuth 2.0, JWT, HTTPS
- **Performance:** CDN, Redis caching, Load testing tools
- **Testing:** Jest, JUnit, Selenium

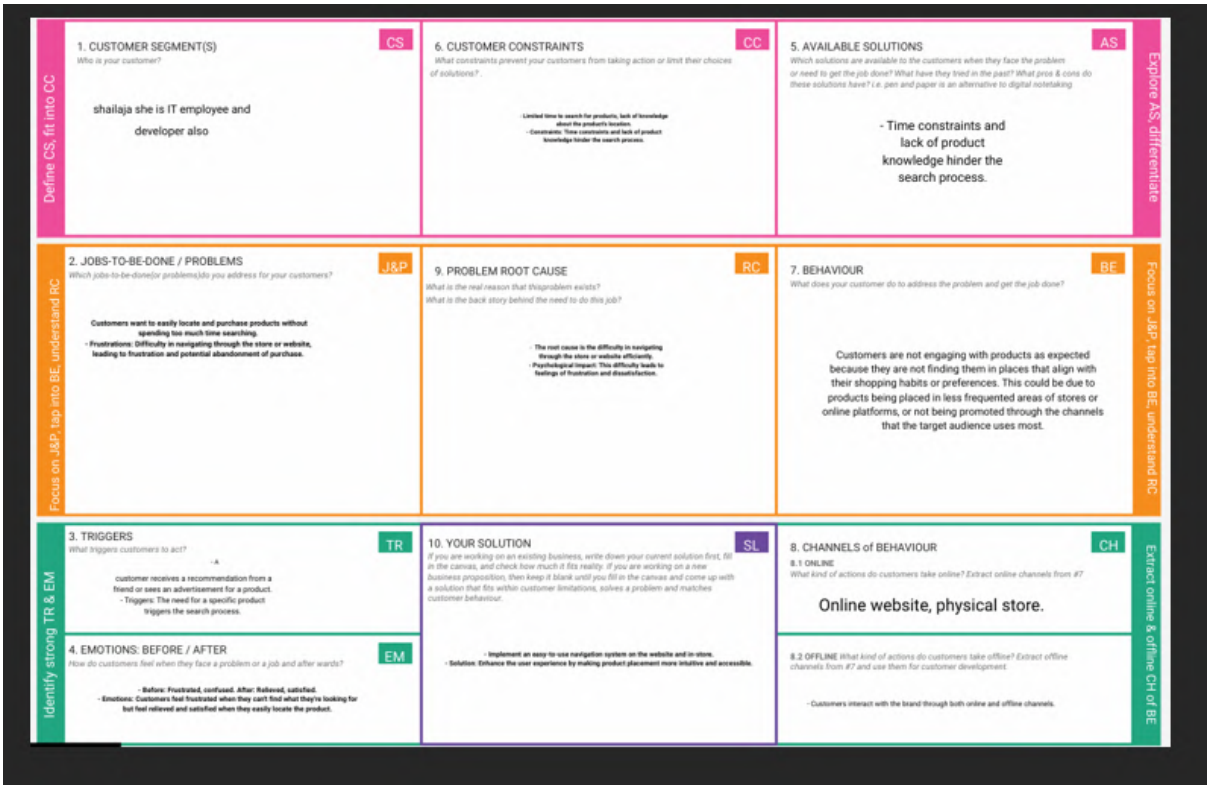


4.PROJECT DESIGN

4.1 problem solution fit

Problem–Solution Fit:

- **Problem:** Customers struggle to find products quickly due to poor navigation and limited knowledge, both online and offline.
- **Solution Fit:** A smart navigation system based on user behavior to simplify product discovery and improve satisfaction.
- **Purpose:** Build trust, solve real problems, increase user engagement, and enhance communication.



4.2 proposed solution

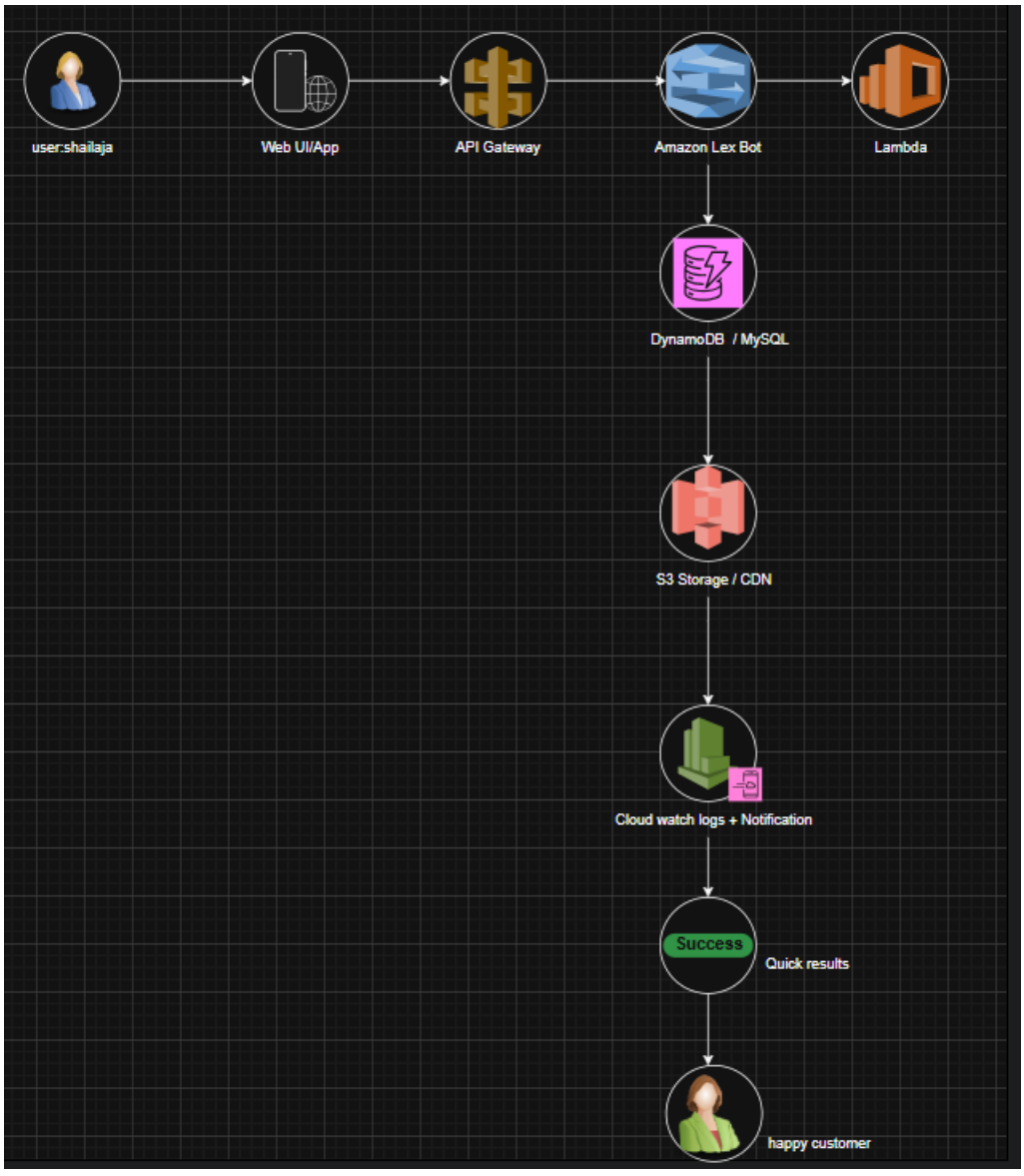
Proposed Solution:

- **Idea:** Develop a user-friendly digital + physical navigation system for stores and websites.
- **Unique Element:** Combines customer behavior, personalized recommendations, and interactive product maps.
- **Impact:** Reduces frustration, saves time, increases satisfaction (especially for busy users like IT professionals).
- **Revenue Model:** Boost sales, reduce abandonment, offer premium AI-based features and analytics services.
- **Scalability:** Easily adaptable across retail, grocery, bookstore, and e-commerce platforms globally.

4.3 solution architecture

Solution Architecture:

- **Frontend:** React (Web), Flutter (Mobile)
- **Input Handling:** Amazon Lex (voice/text) via API Gateway
- **Processing:** AWS Lambda for backend logic and product search
- **Database:** DynamoDB / MySQL for product details
- **Storage:** Amazon S3 & CDN for static content (images/logs)
- **Monitoring:** AWS CloudWatch for performance alerts
- **Outcome:** Fast, accurate, and frustration-free product search; results in a satisfied user



5.PROJECT PLANNING & SCHEDULING

5.1 project planning

Product Backlog & Sprint Planning:

Sprint	Feature	Stories (USN)	Description	Points	Priority	Assigned
Sprint 1	Registration/Login	USN-1 to USN-4	Email/password registration, email confirmation, secure login, Google login	1–2	High–Medium	Niveditha, Vyshunavi
Sprint 2	Dashboard	USN-5, USN-6	Interactive dashboard, filters with dropdowns/slicers	3 each	High	Niveditha, Vyshunavi
Sprint 3	Feedback	USN-7, USN-8	Submit feedback, receive thank-you/reward	1–2	Medium–Low	Niveditha, Vyshunavi
Sprint 4	Insights/Support	USN-9, USN-10	Personalized insights, contact support	1–3	Medium	Niveditha, Vyshunavi

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📊 **Sprint Progress & Velocity:**

- **Sprint-1:** 8 Story Points completed in 5 days (on time)
- **Sprint-2:** 16 Story Points completed in 5 days (on time)
- **Average Velocity: 12 points/sprint**

6.FUNCTIONAL AND PERFOMANCE TESTING

6.1 Performance testing

1. Data Rendered

- A structured table shows product sales, shelf position, and performance levels.
    - Example: Cola (Eye-level) – Sales: 500 – High Performance.

⚙️ **2. Data Preprocessing**

- **Null Checks**: Verified no missing values.
- **Standardization**: Formatted columns uniformly.

- **Encoding**: Converted shelf position/performance into numeric types.
- **Normalization**: Applied to sales values.

🎯 3. Filter Usage (Interactive Dashboard)

- Filters used: Demographics, Product Category, Product Position.
- Dashboards update insights based on filter combinations.
- Key insights from filters:
    - Young adults prefer clothing at the front (Avg sales: 1,971).
    - Electronics perform best on end-caps.
    - Families buy clothing more than electronics (1,821 vs. 1,540).
    - Food performs moderately in aisle placements (Avg sales: 1,662).

📊 4. Calculation Fields

- **Total Fields Used**: 3
    1. **Price** – base product price
    2. **Competitor Price** – used for pricing gap analysis
        - Formula: [Price] - [Competitor'sPrice]
    3. **Sales Volume**
        - Total: SUM([Sales Volume])
        - Average: AVG([Sales Volume])
    - Bonus: Sales performance category classification:

IF [Sales Volume] >= 1800 THEN "High"

ELSEIF >=1600 THEN "Medium"

ELSE "Low"

☑ 5. Dashboard Visuals (6 Main Charts)

1. **Avg Sales vs Category**: Clothing leads (~1.83K); Food lowest.
2. **Demographics vs Sales**: Young Adults top buyers (~1.16M).
3. **Price vs Sales by Position**: Front placement = higher sales.
4. **Foot Traffic Impact**: High traffic = highest sales.
5. **Sales by Position**: Front store = better performance.
6. **Seasonal Sales**: Clothing & Food improve seasonally.

🔹 6. Story & Filter Design

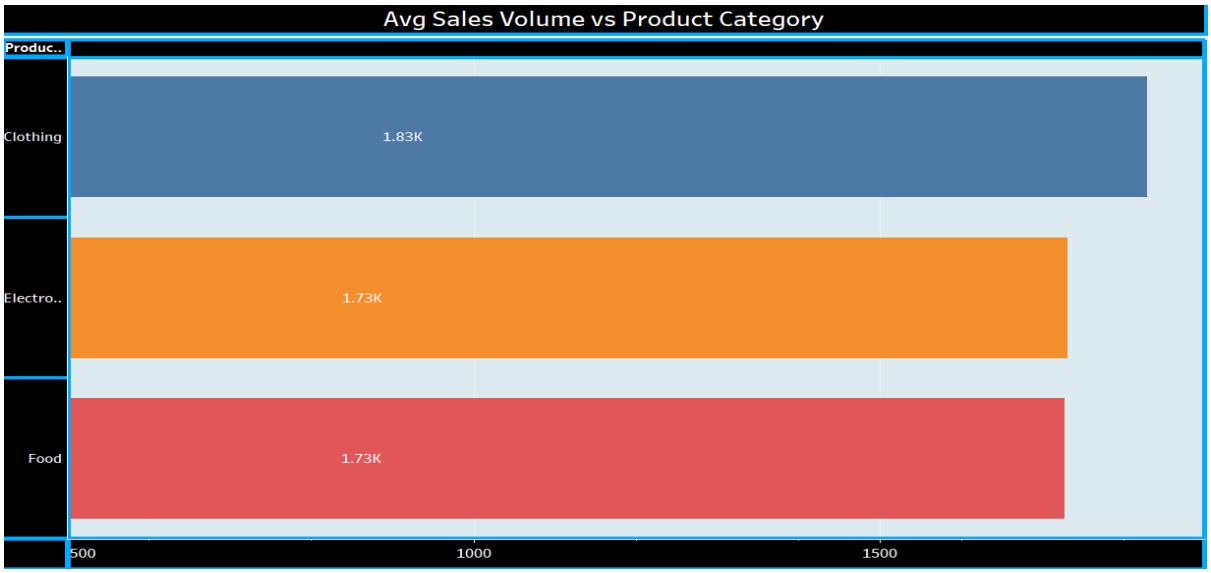
- Dashboards enable slicing by:
    - **Demographics** (e.g., Students, Families)
    - **Product Category**
    - **Shelf Position** (Front, Aisle, End-cap)

7.RESULTS

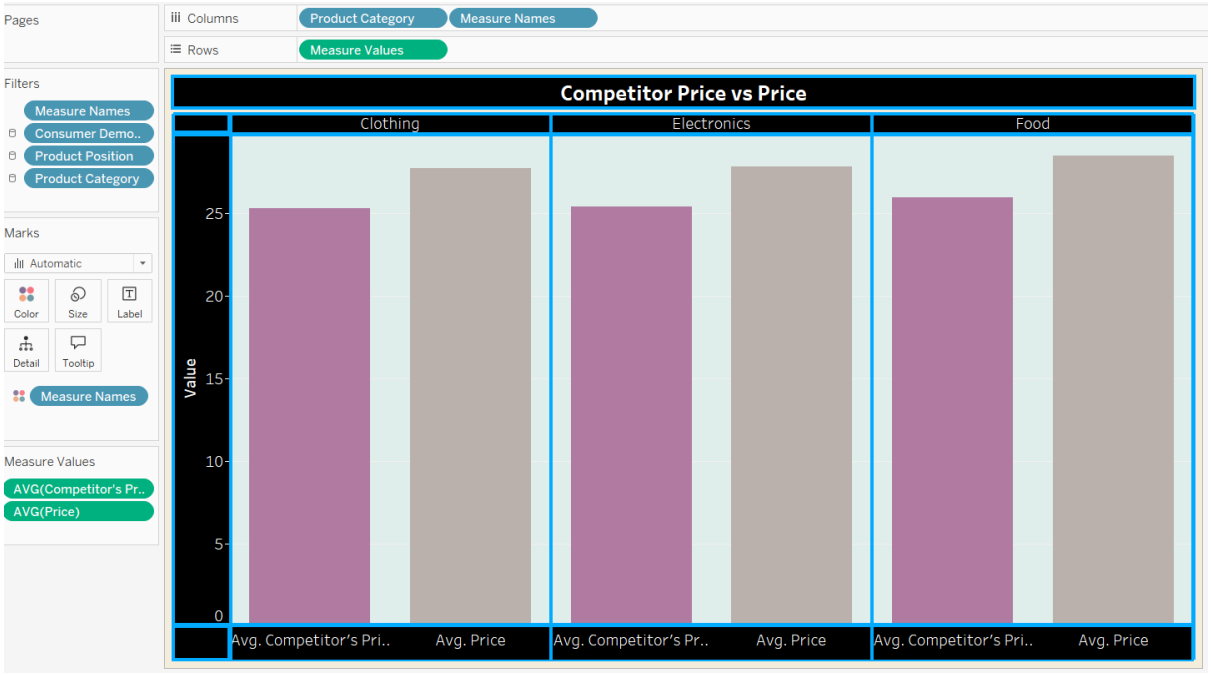
7.1 output screen shorts

CHARTS USED OF DASHBOARD

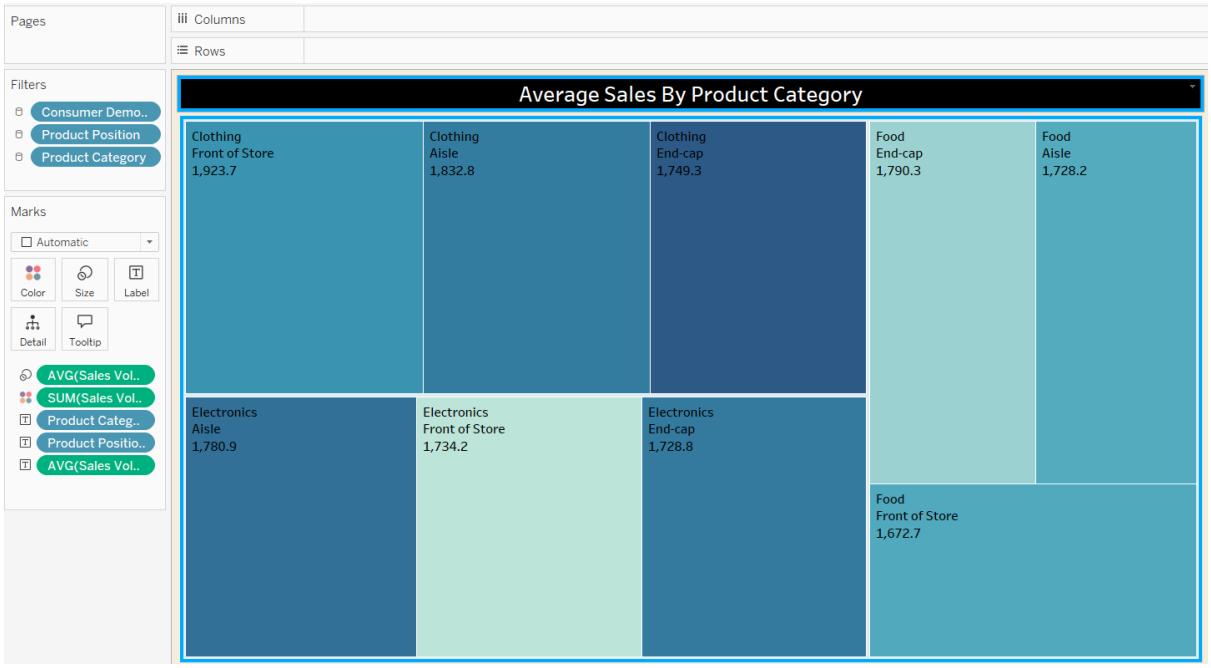
1.Avg Sales Volume vs Product Category(barchart)



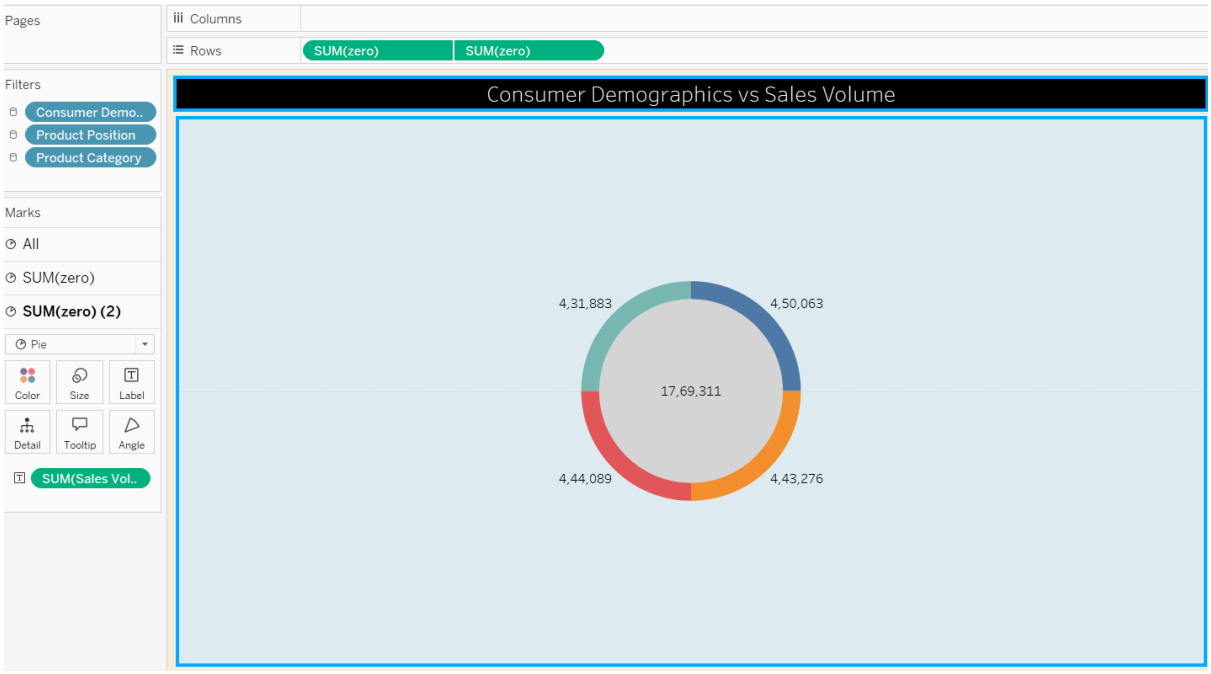
2.Competetor Price vs Price(stack bar chart)



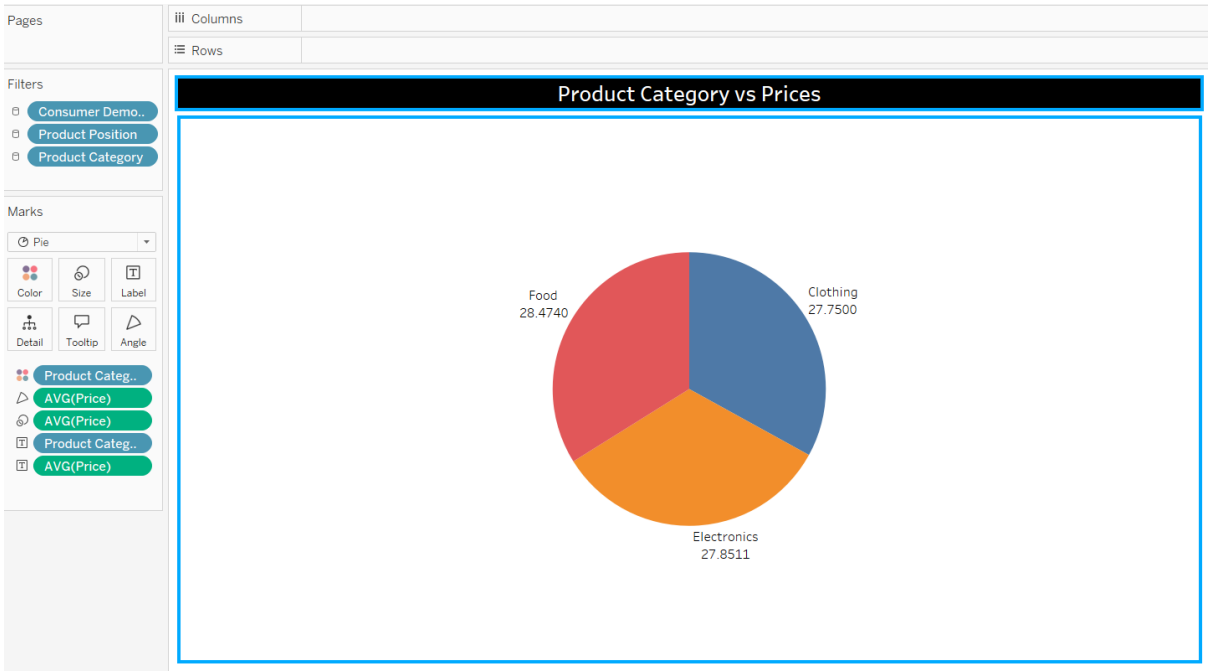
3.Avg Sales by Product Category(heat chart)



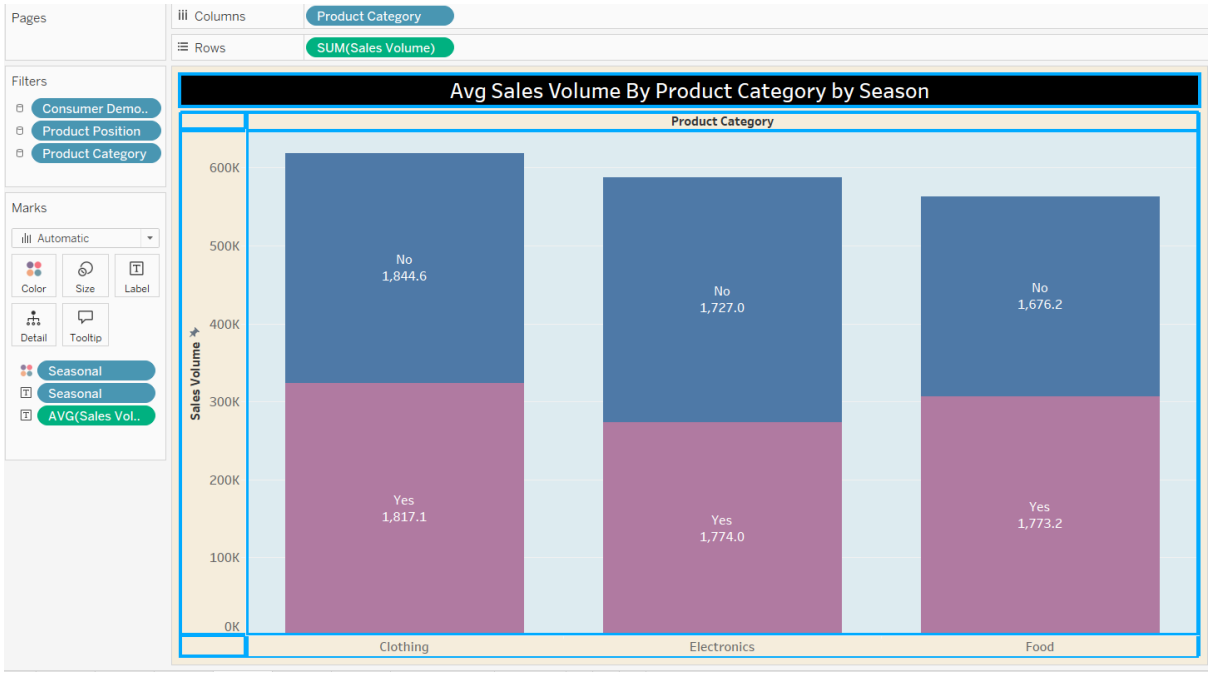
4.Customer Demographics vs Sales Volume(donut chart)



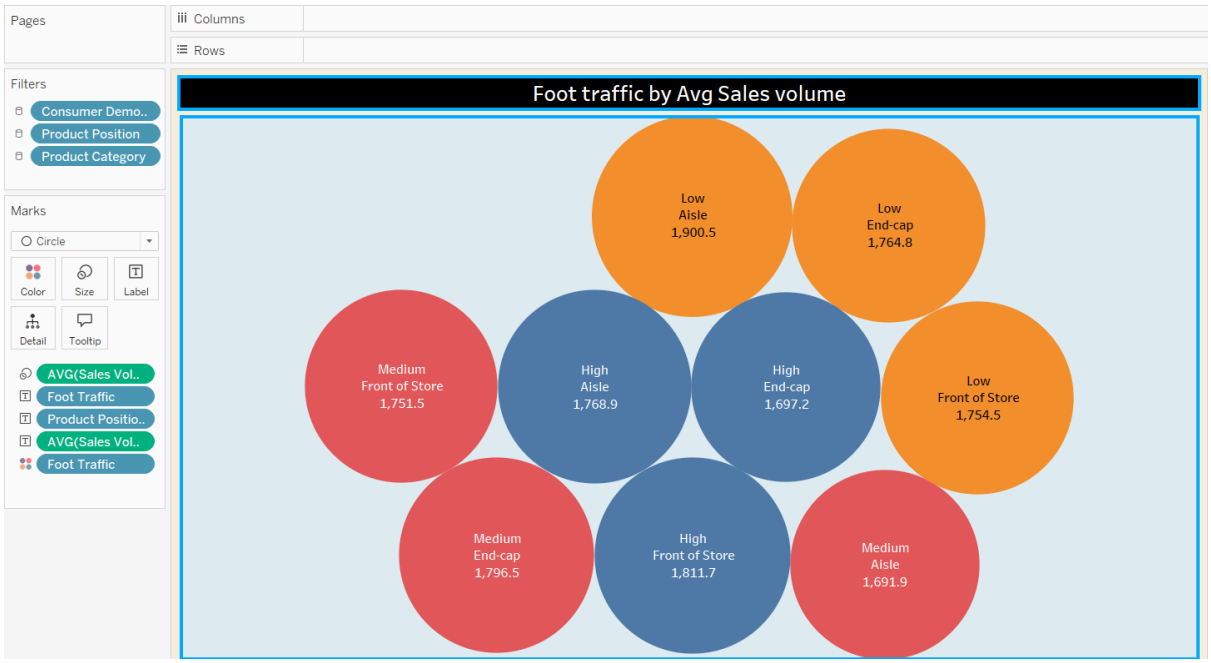
5.Product Category vs Price(pie chart)



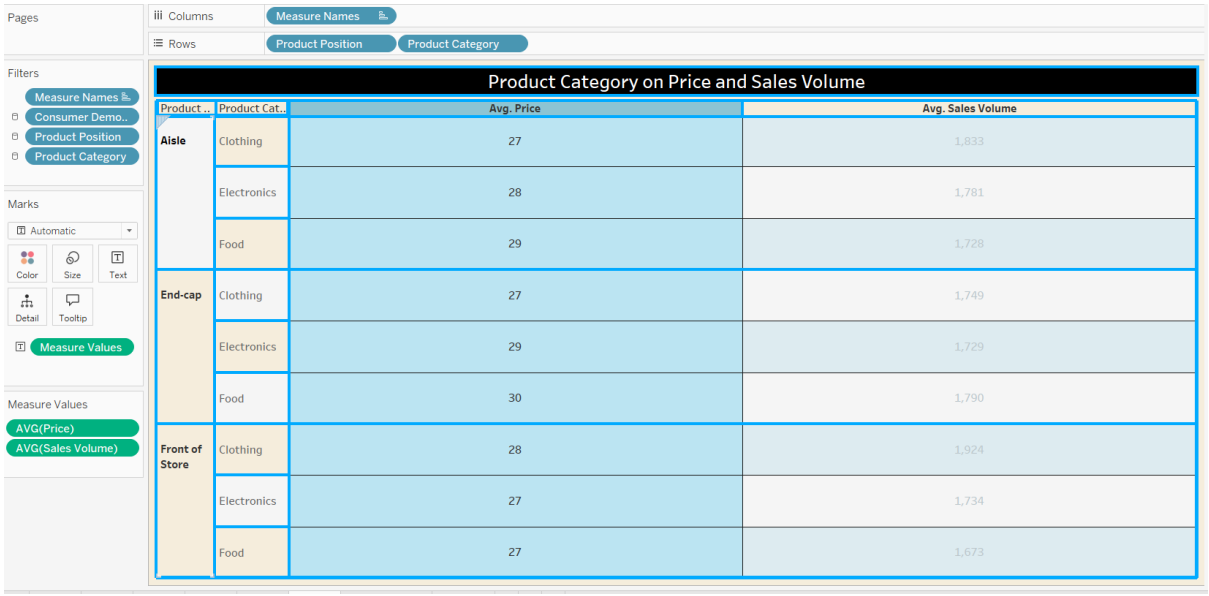
6.Avg Sales Volume by Product Category By seasonal(bar chart)



7.Foot Traffic by Avg Sales Volume(bubble chart)

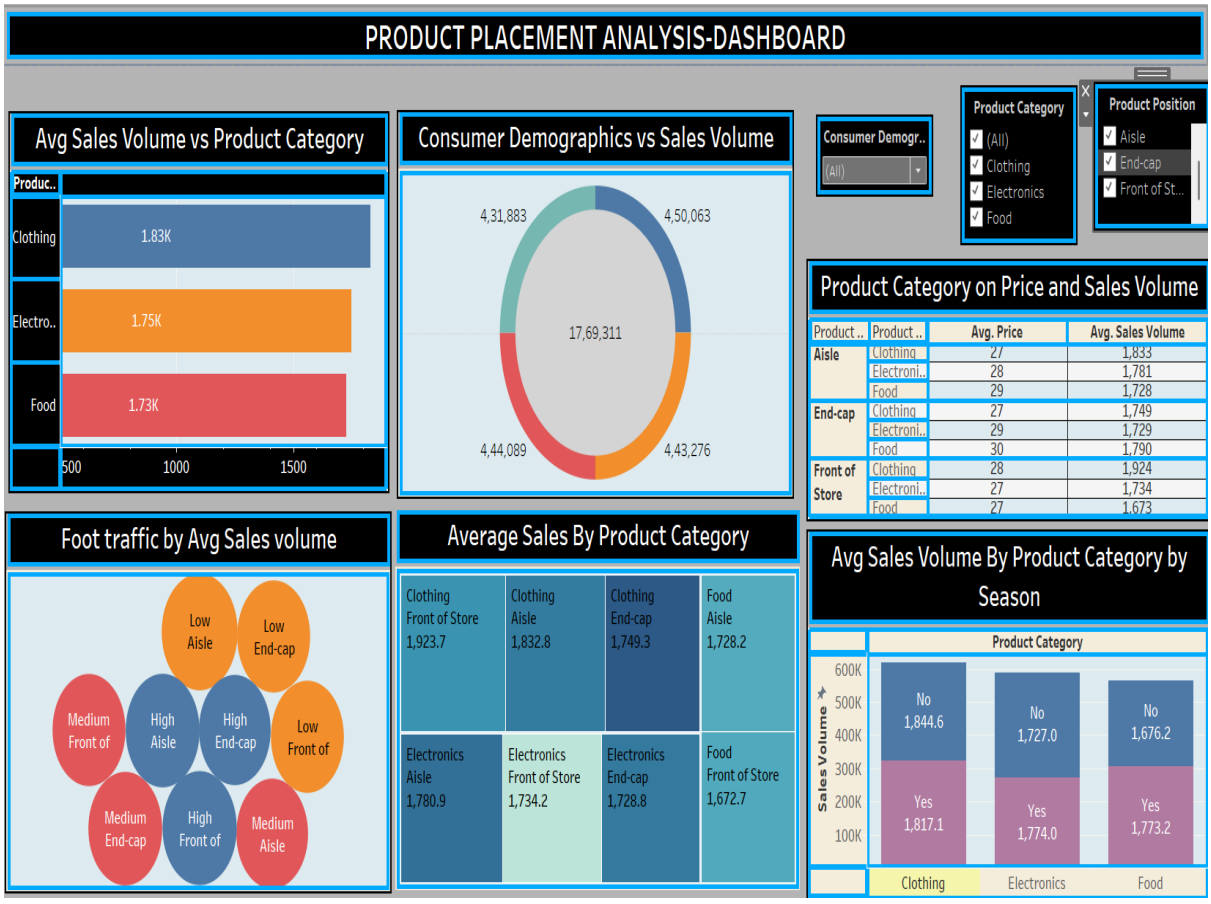


8.Product Category On Price and Sales Volume(table chart)

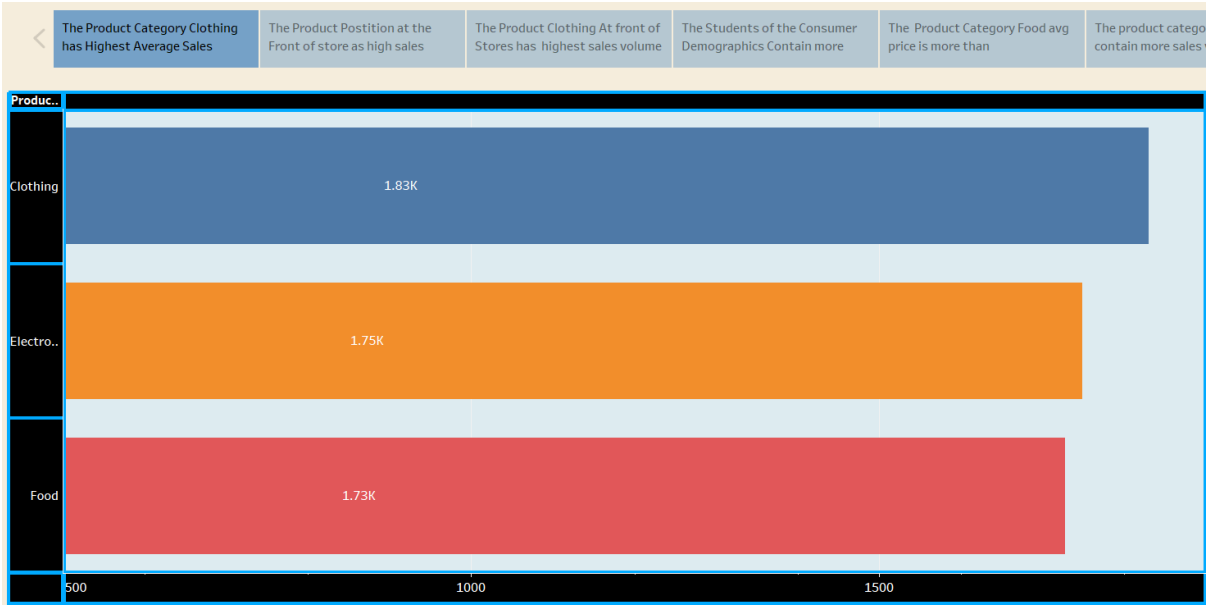


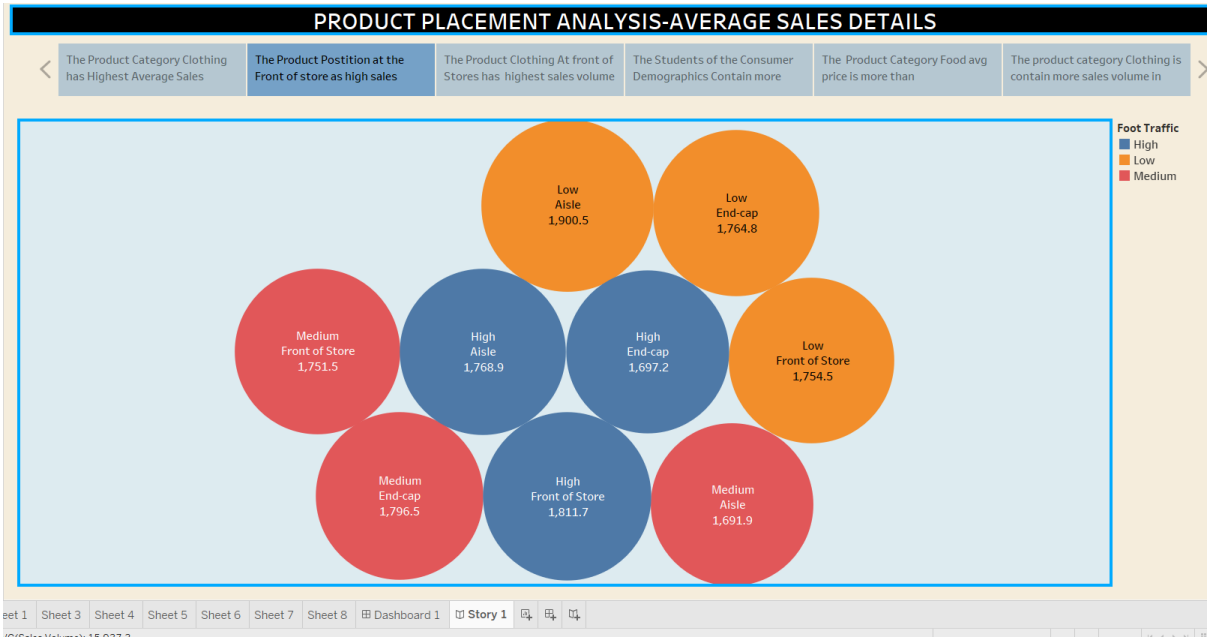
DASHBOARD

Product Placement Analaysis



STORIES


The Product Category Clothing has Highest Average Sales
The Product Postition at the Front of store as high sales
The Product Clothing At front of Stores has highest sales volume
The Students of the Consumer Demographics Contain more
The Product Category Food avg price is more than
Produc..
Clothing
1.83K
Electro..
1.75K
Food
1.73K
500
1000
1500


PRODUCT PLACEMENT ANALYSIS-AVERAGE SALES DETAILS
The Product Category Clothing has Highest Average Sales
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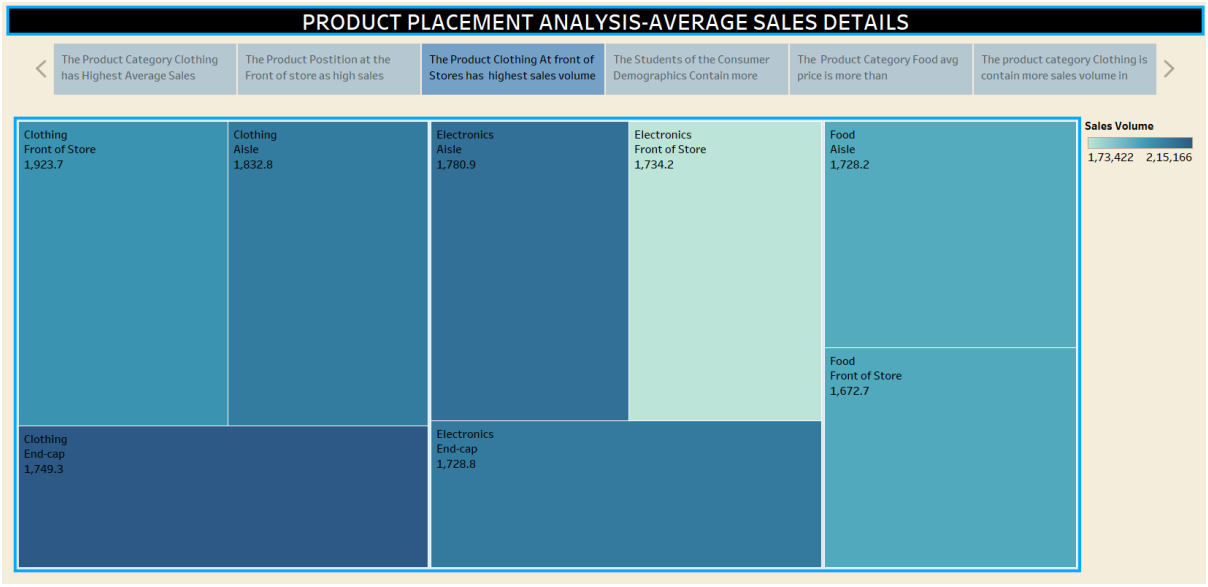
The Product Clothing At front of Stores has highest sales volume
The Students of the Consumer Demographics Contain more
The Product Category Food avg price is more than
The product category Clothing is contain more sales volume in
Foot Traffic
High
Low
Medium
Low Aisle 1,900.5
Low End-cap 1,764.8
Medium Front of Store 1,751.5
High Aisle 1,768.9
High End-cap 1,697.2
Low Front of Store 1,754.5
Medium End-cap 1,796.5
High Front of Store 1,811.7
Medium Aisle 1,691.9
Sheet 3
Sheet 4
Sheet 5
Sheet 6
Sheet 7
Sheet 8
Dashboard 1
Story 1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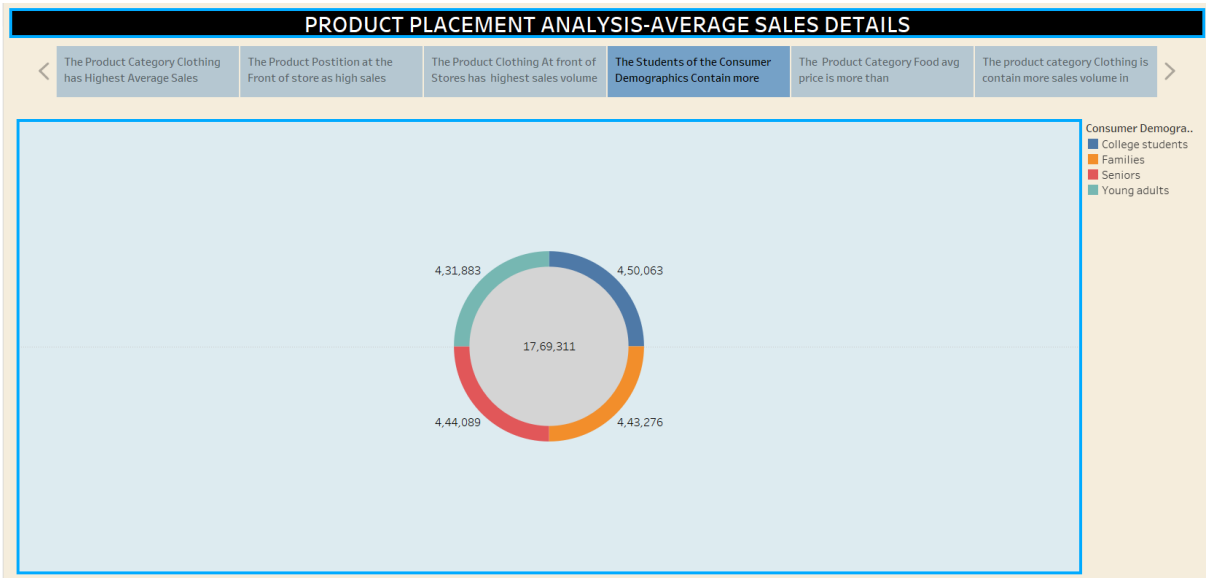
The Product Category Food avg price is more than
The product category Clothing is contain more sales volume in
Clothing
Front of Store
1,923.7
Clothing
Aisle
1,832.8
Electronics
Aisle
1,780.9
Electronics
Front of Store
1,734.2
Food
Aisle
1,728.2
Food
Front of Store
1,672.7
Clothing
End-cap
1,749.3
Electronics
End-cap
1,728.8
Sales Volume
1,73,422
2,15,166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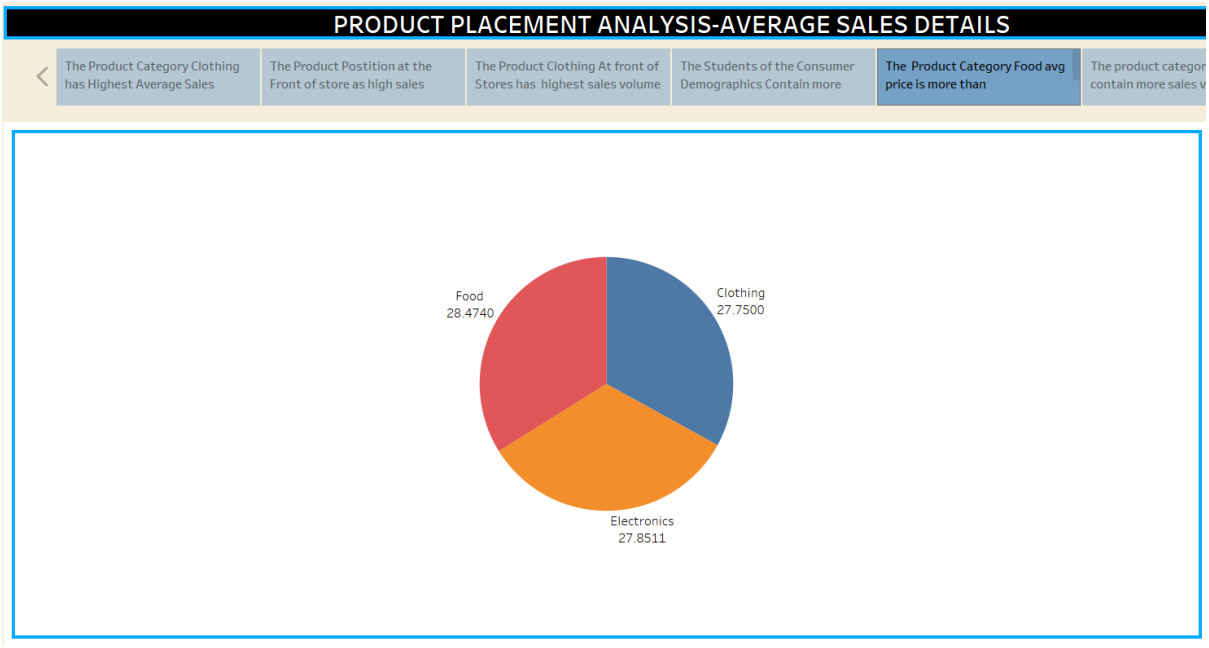
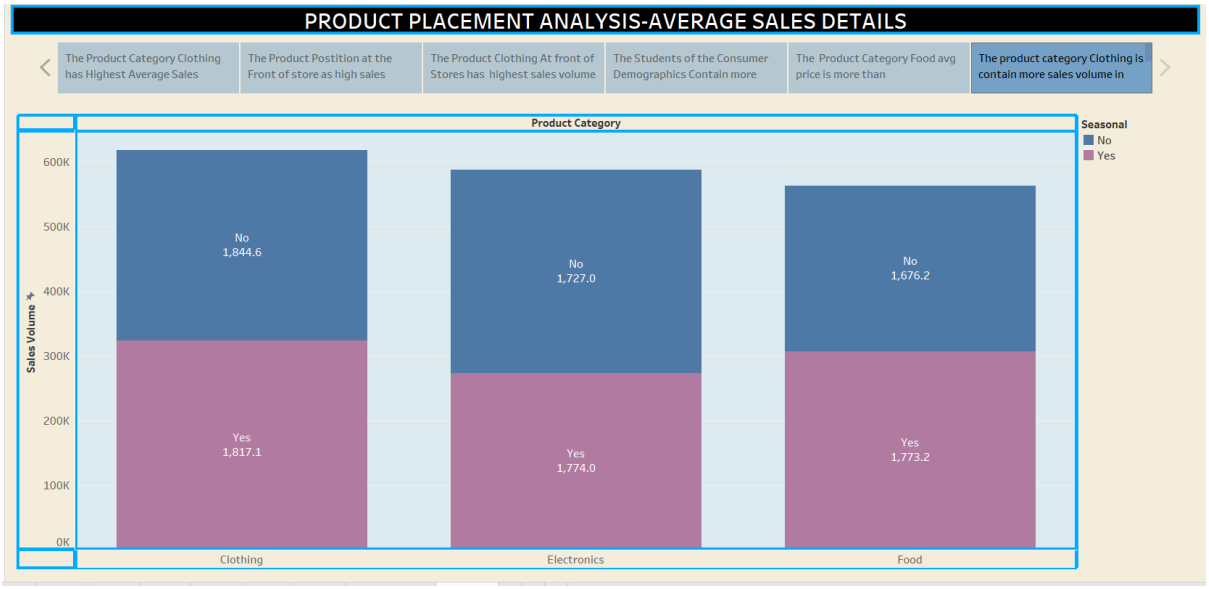
4,31,883
4,50,063
17,69,311
4,44,089
4,43,276
Consumer Demogra..
College students
Families
Seniors
Young adults





ADVANTAGES & DISADVANTAGES

Advantages:

- 📊 **Data-driven decisions**: Helps retail managers make layout changes based on real insights.
- ⚡ **Real-time insights**: Dashboards update instantly with filter changes.
- 💡 **Improved sales**: Visualizations show that proper placement directly boosts sales.
- 📱 **Multi-platform support**: Works on both mobile and web interfaces.

- 🎯 **Personalized analytics**: Interactive dashboards enable detailed exploration by user types.
- 🔐 **Secure & scalable**: Designed with modern security (OAuth 2.0, HTTPS) and scalable infrastructure (AWS, Docker).

Disadvantages:

- ⚠️ **Requires clean data**: Errors in data collection can reduce effectiveness.
- 🧠 **Learning curve**: Some users may need initial training to understand dashboard filters and visuals.
- 💰 **Infrastructure cost**: Hosting real-time dashboards and machine learning services can be expensive.
- 🌐 **Internet dependency**: Cloud-based tools require a reliable internet connection for performance.

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9. CONCLUSION

The **Strategic Product Placement Analysis** project successfully demonstrates how interactive Tableau dashboards can uncover valuable insights from sales data. With features like real-time filtering, competitor comparison, and customer demographic analysis, the solution empowers retail and marketing professionals to make informed decisions that drive revenue growth. This system not only simplifies product placement but also enhances user engagement and shopping satisfaction across physical and digital platforms.

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10. FUTURE SCOPE

- 🤖 **AI-based Recommendations**: Integrate machine learning to automatically suggest optimal product placements.
- 📱 **Mobile App Integration**: Build a dedicated app for retail managers and staff with real-time dashboard alerts.
- 🛒 **E-commerce Expansion**: Extend insights to online product placement and digital catalogs.
- 🌍 **Global Rollout**: Scale the system for use across international retail chains and supermarket networks.
- 📡 **IoT Integration**: Use in-store sensors for footfall tracking and product interaction analysis.

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11. APPENDIX

Tools Used:

- Tableau (for dashboard creation)
- Python, SQL (data preprocessing)
- React, Flutter (UI components)
- AWS (hosting and performance)

Key Charts:

- Avg Sales Volume vs Product Category
- Competitor Price Comparison
- Demographics vs Sales
- Foot Traffic Heatmaps