Project Report – Customer Behavior Dashboard

1. Project Title

Customer Behavior Analysis Using Power BI. This project focuses on using Power BI to analyze customer purchasing behavior by age, gender, product category, shipping method, and subscription status. The insights help businesses optimize marketing, product planning, and engagement strategies [1] [2].

2. Objective of the Project

The main objective is to analyze how factors such as age, gender, product category preference, shipping type, and subscription status influence customer count, revenue, and average purchase amount. Power BI enables consolidation of data from multiple sources and the creation of interactive visualizations for these analyses [1] [3]. By examining customer behavior and sales data, businesses can make data-driven decisions to optimize strategies and improve customer experience [4] [5]. The analysis will reveal patterns (e.g. which age group or category drives the most revenue) that can guide targeted marketing and retention efforts.

3. Tools and Technologies Used

- **Power BI Desktop:** An interactive data visualization and business intelligence tool for creating reports and dashboards [6]. It supports real-time data connection and custom visuals.
- **Dataset (Customer Details):** A dataset of customer transactions and attributes used as input for the analysis (values shown are illustrative).
- **DAX (Data Analysis Expressions):** The formula language in Power BI for defining calculations and custom metrics (such as KPIs). DAX enables advanced computations and aggregations to extract insights from data [7].

4. Dataset Description

The dataset includes customer demographics and transaction details, allowing segmentation of users for analysis [3]. Key fields are:

- **Customer ID:** Unique identifier for each customer (e.g., **PLACEHOLDER**).
- **Age:** Customer age in years.
- **Gender:** Customer gender (e.g., Male/Female).
- **Purchase Amount (USD):** Total order value.
- **Review Rating:** Customer rating of the product (typically 1–5).
- **Product Category:** Category of purchased product (e.g., Electronics, Accessories, etc.).
- **Subscription Status:** Whether the customer has an active subscription (Yes/No).
- **Shipping Type:** Delivery method chosen (e.g., Standard, Express, Store Pickup).

These fields combine demographic and transactional data, enabling analysis of how factors like age or shipping type relate to sales and customer counts [3].

5. KPIs (Key Performance Indicators)

KPIs are quantifiable metrics that summarize business performance [8]. On our dashboard, KPI cards display metrics such as **Number of Customers (150)**, **Average Purchase Amount ($60.80)**, and **Average Review Rating (3.68)**. KPI visuals in Power BI act as visual cues indicating progress toward business goals [9] [8]. For example, the "Number of Customers" card directly shows total customer count, while the "Average Purchase Amount" card shows spending behavior. These KPIs help stakeholders quickly assess overall performance at a glance.

6. Visualizations & Insights

- **Customer Subscription:** A donut chart displays the proportion of subscribed vs. unsubscribed customers. Since 100% of customers are not subscribed, the chart is a single segment (all unsubscribed). Donut charts are designed to show proportions of categorical data, with each slice's size representing its share of the total [10]. This highlights the lack of any subscription uptake in the dataset.
- **Revenue by Category:** A bar chart compares revenue across product categories. The bars' heights are proportional to total revenue in each category [11]. Here, the *Accessories* category has the tallest bar, indicating it contributes the highest revenue. Bar charts make it easy to compare categorical values side-by-side [11].
- **Sales by Category:** A similar categorical comparison chart shows total units sold by category. Again, *Accessories* has the highest sales count. Bar charts are appropriate because each bar's length is proportional to the count or total sales in that category [11].
- **Revenue by Age:** A line or area chart shows total revenue across different age groups. The trend line slopes upward, indicating revenue increases with age. Line charts connect points over a continuous axis (age in this case) and highlight trends [12]. This visualization suggests older age brackets generate more revenue.
- **Sales by Age:** A chart of customer count by age group shows that the middle-age segment has the highest number of customers. This indicates that marketing efforts could focus on the age group with the largest customer base. (Line or bar charts can both illustrate this; line charts emphasize trends across age, whereas bar charts compare discrete groups.)

7. Filters Used in the Dashboard

Interactive slicers (filters) are included for **Subscription Status**, **Gender**, **Category**, and **Shipping Type**. Power BI slicers filter the data shown in all visuals on the report page, enabling dynamic, on-the-fly analysis [13]. For example, selecting a particular category in the slicer will update all charts to show metrics only for that category. This interactivity lets users drill into specific segments of interest (e.g., analyzing only male customers or only express shipping orders) without creating separate reports.

8. Insights & Business Decisions

- **Accessories generate highest sales:** This finding suggests prioritizing marketing and inventory for accessories, as they drive most sales. Data-driven strategies often focus on high-performing segments [14].
- **No customers subscribed:** The dashboard reveals zero customers with an active subscription. The business should consider launching a subscription/membership program or promotional discounts to increase subscription uptake. Targeted incentives could convert frequent buyers into loyal members.
- **Middle-aged customers contribute most:** Since most customers are in the middle-age demographic, advertising and promotions should target this age group. BI analysis can identify key segments and personalize marketing to them [14]. Tailoring campaigns to middle-aged customers is likely to yield higher engagement.
- **Store pickup available:** The data shows many customers use store pickup. The business can promote this omni-channel option further (e.g., in-store promotions or loyalty points for pickups) to enhance customer convenience and retention.

9. Conclusion

The dashboard provides a clear overview of customer buying patterns and highlights key areas for business focus. As studies show, business intelligence tools give real-time visibility into customer behavior, enabling data-driven decisions that enhance satisfaction and loyalty [2]. The analysis identifies top-performing categories (like Accessories) and demographic trends, as well as gaps (no subscription adoption). By acting on these insights — for example, offering targeted deals or improving services — the business can improve customer retention and increase sales. In sum, transforming raw transaction data into visual insights allows companies to refine marketing strategies and ultimately drive growth [15].

10. Future Scope

Future work could extend this analysis with predictive and personalized analytics:

- **Customer churn prediction:** Use machine learning on historical purchase data to predict which customers are likely to stop buying. BI platforms often incorporate predictive analytics to forecast customer behavior [16].
- **RFM Segmentation:** Implement Recency, Frequency, Monetary segmentation to classify customers into value tiers. RFM analysis (based on last purchase time, purchase frequency, and total spend) is a proven method for identifying high-value customers and targeting them for retention campaigns [17] [18].
- **Personalized recommendation system:** Build a recommendation engine to suggest products to customers based on their past behavior. Recommendation engines significantly improve customer engagement, conversion rates, and sales by offering relevant product suggestions [19].
- **Time-based trend analysis:** Analyze sales trends over time (monthly, seasonal) using line charts or forecasting models. Identifying seasonal peaks or trending product sales can guide inventory planning and promotions (e.g., using Power BI's forecasting features).

Sources: This analysis and report are based on principles of BI and data analytics as described in industry literature [1] [9] [2] [17]. All data values (e.g. customer count, averages) are illustrative.

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