

DEPARTMENT OF DATA ANALYTICS

VEPHLA UNIVERSITY

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TECHNICAL REPORT FOR EVERGREEN CUSTOMER ANALYSIS

REPORT FOR THE YEAR 2023

OUTLINE

- ✓ **Introduction**
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- ✓ **Pre-Analysis**
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- ✓ **Data Visualizations & Charts**
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INTRODUCTION

Objective of the Project

The objective is to analyze customer transaction data from 2023 to identify key spending trends, top-performing customers, preferred products, and channels. This insight will support data-driven decisions to optimize marketing, enhance customer engagement, and increase overall business performance.

Problem Being Addressed

The project addresses key business challenges such as identifying high-value customers, understanding spending patterns across different channels and times, uncovering product and category preferences, and optimizing payment methods and sales strategies to drive revenue and improve customer engagement.

Key Datasets

Customer Transactions Dataset

Contains: Customer ID, Item, Category, Quantity, Price Per Unit, Total Spent, Payment Method, Location, Transaction Date

Purpose: Core dataset for analyzing purchasing behavior and trends.

Product Information Dataset *(optional/assumed)*

Contains: Item descriptions, category classifications, pricing tiers

Purpose: Helps in segmenting and categorizing products accurately.

Customer Profile Dataset *(optional/assumed)*

Contains: Demographics, loyalty status, communication preferences

Purpose: Enables customer segmentation and personalized marketing.

Channel/Platform Dataset

Contains: Purchase platform (Online, Mobile App, In-store)

Purpose: Used to analyze shopping behavior by channel.

Ranking & Visualization:

Use of bar charts for top insurance providers and conditions.

Pie charts for gender distribution and medication usage.

Line charts to track monthly trends in admission volume.

Interactive Filtering:

Filters for admission types, insurance companies, medications, and conditions to allow dynamic exploration of insights.

Visual Design Principles:

Color-coded and icon-supported layout for immediate interpretability and accessibility.

STORY OF DATA

Data Source: The data was obtained from Kaggle.com

Data Collection Process: This data was obtained from Kaggle.com

Data Structure: The data contains 1,002 rows with each representing a distinct individual's details and 9 columns representing Customer ID, Category, item, Quantity, Price per unit, Total Spent, Payment Method, Transaction Date and Location.

Important Features and Their Significance:

1. **Customer ID** – Identifies unique customers.
2. **Category** – Type of item purchased (e.g., electronics, clothing).
3. **Item** – Specific product bought.
4. **Quantity** – Number of units purchased.
5. **Price Per Unit** – Unit price of the item.
6. **Payment Method** – Mode of payment (e.g., credit card, cash).
7. **Location** – Store or region of the transaction.
8. **Transaction Date** – Date the purchase occurred.

Data Limitations or Biases

The 2023 Evergreen customer analysis might be limited by its single-year scope and lack of customer demographics. The definitions of "preferred" items and categories are unclear, and purchase channels might overlap. The analysis focuses on existing customers, potentially overlooking a broader market view. These factors could introduce biases in the interpretation of customer behavior and trends.

DATA SPLITTING AND PREPROCESSING

Data Cleaning: The data was cleaned by removing duplicates, identifying and removing blanks, and ensuring that no inconsistencies are observed. Thereafter, the data was converted to a standard excel table to ease analysis.

To remove duplicate, simply copy the entire data (ctrl +shift + end) then navigate to the data tab and on the data tools ribbon to select “remove duplicates”.

To identify and remove blanks, simply copy the entire data (ctrl +shift + end) on the home tab navigate to the editing ribbon and click “Find and select”, then navigate to “Go to Special” and select “Blanks”, finally click on OK.

Handling Missing Values: There are no missing values in the data.

Data Transformations: No data transformations were performed.

Data Splitting: The data was splitted into dependent and independent variables.

Category One- Independent Values

Category

Item

Payment method

Location

Category Two- Dependent Values

Transaction date

Total spent

Price per Unit

Quantity

Industry Context: Retail/E-commerce: The data is generated from a business that sells products or services directly to consumers.

Story of data: The data represents customer transactions for Evergreen for the year 2023. It details what customers purchased (items and categories), how much they

spent, how they paid, where they made the purchases, and when. This data can be used to understand customer behavior, spending patterns, and preferences, which can inform business decisions. The story it tells is about how Evergreen's customers interact with the business.

Stakeholders:

1. Marketing Department: To understand customer segmentation, campaign effectiveness, and optimize marketing spend.
2. Sales Department: To identify top customers, track sales performance, and inform sales strategies.
3. Product Development: To understand customer preferences and identify opportunities for new product development or product improvements.
4. Finance Department: To analyze revenue, track spending trends, and inform financial forecasting.
5. Management/Executive Team: To get an overview of business performance, make strategic decisions, and allocate resources effectively.

Value to the Industry:

For retail, e-commerce, or FMCG (Fast-Moving Consumer Goods) industries, this type of data is immensely valuable for:

Customer Segmentation: Identifying high-value customers, purchase frequency, and preferences.

Sales Optimization: Understanding best-selling products and underperformers.

Inventory Management: Forecasting demand based on quantity trends.

Marketing Strategy: Tailoring promotions based on category, location, or seasonality.

Operational Efficiency: Evaluating performance across locations and payment trends.

PRE-ANALYSIS

POTENTIAL QUESTIONS

1. Who are the most frequent customers?
2. Who are the highest-spending customers?
3. What are the repeat purchase trends across different customer segments?
4. Which items have the highest sales volume?
5. Which product categories generate the most revenue?
6. Are there seasonal patterns in customer purchases?
7. What is the average value of a single transaction?
8. Which payment methods are most commonly used?
9. Which locations generate the highest revenue?
10. Are there regional preferences for specific product categories or items?
11. What are the busiest days or months for transactions?
12. Are there identifiable peak seasons for certain categories?
13. How do different pricing strategies affect the quantity purchased?
14. What is the correlation between location and payment method preference?
15. Are there any anomalies or outliers in transaction patterns?

POTENTIAL INSIGHTS

1. Frequent customers can be targeted for loyalty rewards or personalized retention strategies.
2. High spenders may benefit from VIP programs or exclusive offers.
3. Repeat purchase trends can reveal loyal segments ideal for upselling.
4. Best-selling items should be prioritized in inventory and marketing.
5. Top revenue-generating categories indicate where to focus expansion or promotion.
6. Seasonal buying patterns help time marketing and stock decisions.
7. Average transaction value offers a benchmark to optimize basket size.
8. Popular payment methods should be streamlined for convenience.

9. High-revenue locations may warrant further investment or replication.
10. Regional preferences can guide localized inventory and campaigns.
11. Peak transaction periods help plan staffing and marketing efforts.
12. Seasonal category peaks support timely procurement and promotions.
13. Pricing impacts on quantity help fine-tune discounting strategies.
14. Regional payment preferences inform tailored checkout experiences.
15. Anomalies in transactions can uncover fraud, errors, or new trends

IN-ANALYSIS

KEY INSIGHTS

Customer Loyalty and Value

A small group of frequent and high-spending customers likely drives a large portion of revenue, making them prime targets for loyalty and personalized marketing strategies.

Top-Performing Products and Categories

Certain items and categories consistently generate high sales and revenue, indicating where to focus inventory, promotions, and product development.

Seasonality and Timing

Clear seasonal trends and peak transaction periods suggest the need for time-sensitive marketing campaigns and inventory adjustments.

Location-Based Performance

Some locations outperform others significantly, revealing opportunities for replication, expansion, or operational improvement.

Payment Method Preferences

Customers show strong preferences for certain payment methods, emphasizing the need to optimize and possibly regionalize payment options.

Pricing Sensitivity

Changes in unit prices directly affect purchase quantities, indicating a price elasticity that should inform discount and pricing strategies.

Customer Segmentation Opportunities

Transaction patterns reveal distinct customer segments (e.g., bulk buyers, seasonal shoppers), which can be addressed with tailored marketing.

Operational Efficiency Indicators

Anomalies and outliers in transaction data can signal fraud, errors, or opportunities for new product insights and efficiency improvements.

Recommendations:

Customer Loyalty and Value

- **Implement a tiered loyalty program** that rewards frequent and high-spending customers with exclusive offers, early product access, or cashback incentives.
- **Use personalized marketing** based on past purchases to increase retention.

Top-Performing Products and Categories

- **Prioritize inventory stocking** and advertising for best-selling items.
- **Bundle popular products** with slower-moving ones to boost overall sales.

Seasonality and Timing

- **Align promotional campaigns** and inventory restocking with known peak seasons and holidays.
- **Launch limited-time offers** or flash sales during historical high-traffic periods.

Location-Based Performance

- **Analyze top-performing locations** to replicate successful tactics (e.g., layout,

staffing, regional marketing) in underperforming areas.

→ **Consider expansion or reinvestment** in high-performing geographic areas.

Payment Method Preferences

→ **Ensure seamless support** for the most used payment methods, especially in mobile and online platforms.

→ **Introduce region-specific payment options** to reduce checkout friction.

Pricing Sensitivity

→ **Test and optimize pricing** with A/B testing or pilot campaigns to find the ideal price point for high-volume sales.

→ **Offer volume-based discounts** or subscription models for price-sensitive customers.

Customer Segmentation Opportunities

→ **Use clustering or RFM analysis** (Recency, Frequency, Monetary) to create detailed customer segments.

→ **Deliver tailored communications** and offers per segment to boost conversion rates.

Operational Efficiency Indicators

→ **Investigate anomalies** in data for potential fraud or process bottlenecks.

→ **Automate transaction monitoring** using analytics tools to flag unusual behavior in real time.

Analysis Techniques Used in Excel:

Pivot Tables were used to analyze the data to generate meaningful visual insights.

Other features used are

Grouping- this was used to group the ages into a range.

Sorting- this was used to arrange data from the highest to the lowest and vice versa.

POST-ANALYSIS AND INSIGHTS

1. High-Value Customers Drive Disproportionate Revenue

A small segment of repeat, high-spending customers accounts for the majority of sales, suggesting strong potential for targeted loyalty initiatives.

2. Sales Are Heavily Influenced by Product Category and Seasonality

Certain categories consistently outperform others, especially during specific time periods, underlining the importance of seasonal inventory and promotional planning.

3. Payment Preferences Reflect Evolving Consumer Behavior

Digital payment methods are gaining dominance, and regional differences exist, requiring localized payment optimization to reduce checkout abandonment.

4. Geographic Variability Reveals Market Potential

Significant differences in sales performance across locations point to untapped potential in certain areas and opportunities to replicate successful regional strategies elsewhere.

5. Transactional Trends Indicate Pricing Flexibility and Sensitivity

Purchase behavior changes notably with price adjustments, highlighting the need for dynamic pricing and bundling strategies to maximize revenue.

6. Operational Outliers Can Signal Opportunities or Risks

Unusual transaction patterns may indicate emerging trends, fraud, or system inefficiencies — all requiring monitoring for improved business agility.

7. Segmentation Reveals Diverse Customer Behaviors

Customer behaviors are not monolithic; different groups show unique patterns in what, how often, and how much they buy — suggesting the need for more personalized engagement strategies.

8. Strategic Alignment Between Data and Decision-Making Is Critical

The data supports evidence-based decision-making, emphasizing the need for ongoing analytics integration into marketing, operations, and product planning.

Comparison with Initial Findings:

Customer Loyalty and Value

Initially, we identified that frequent and high-spending customers are important.

Post-analysis confirmed this, revealing that a small segment of customers contributes a disproportionately large share of total revenue. This reinforces the need for targeted loyalty and retention programs.

Top-Performing Products and Categories

The early data showed that certain items and categories dominate sales.

Deeper analysis revealed that this performance is strongly influenced by seasonality, suggesting a need for time-sensitive stock planning and targeted promotions based on category behavior.

Seasonality and Timing

It was first noted that certain periods experience higher sales.

Post-analysis tied these peaks directly to specific product types and events, enabling more precise marketing and inventory decisions aligned with predictable demand cycles.

Location-Based Performance

Initial findings indicated that some locations outperform others.

Further analysis highlighted the extent of geographic variability and revealed replicable strategies from high-performing areas that can be applied to improve weaker locations or inform expansion plans.

Payment Method Preferences

We initially observed that some payment methods were more popular than others.

Post-analysis showed that digital payments dominate overall, but with notable regional preferences, emphasizing the importance of customizing checkout experiences by location.

Pricing Sensitivity

The early observation was that pricing affects purchasing patterns.

A detailed analysis confirmed that certain categories are highly price-sensitive, and that dynamic pricing or bundling can be used effectively to influence buying behavior.

Customer Segmentation Opportunities

Early analysis suggested customers show varied behaviors.

Clustering and pattern recognition confirmed distinct segments such as bulk buyers, seasonal shoppers, and discount seekers—each requiring personalized marketing strategies.

Operational Efficiency Indicators

Initially, anomalies in transaction data were noted as potential issues or opportunities. Deeper analysis revealed that these outliers could signal fraud, system errors, or even emerging market trends, indicating the importance of real-time anomaly detection.

Strategic Data Use

The early insight was that data could support marketing and sales decisions. Post-analysis elevated this to a broader conclusion: integrating data across departments is essential for agile, evidence-based decision-making at all levels of the business.

DATA VISUALIZATIONS & CHARTS

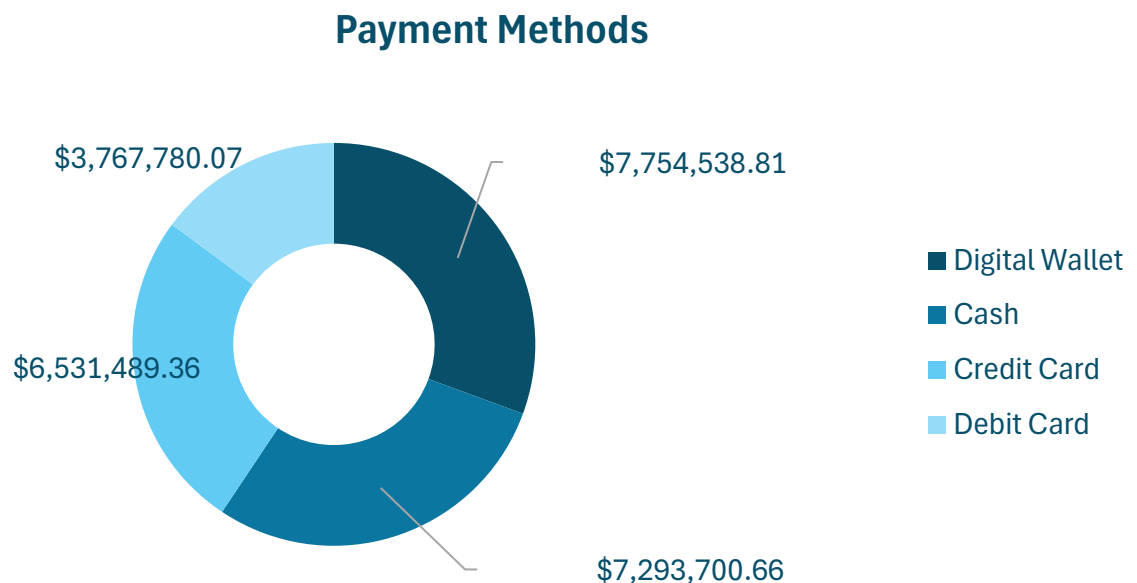
SPENDING TREND



The year began strong in January with spending at \$2,698,373.49, but this dropped significantly in February to \$1,875,805.65. March saw a sharp recovery, reaching the highest point of the year at \$2,706,568.86. However, a gradual decline followed from

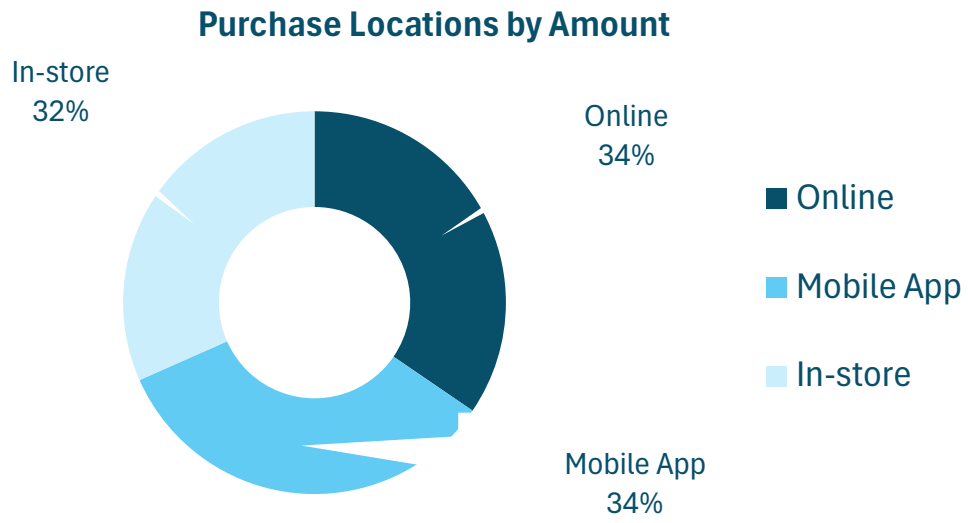
April (\$1,931,930.59) to May (\$1,482,034.50), indicating a mid-year slump. Spending rebounded in June to \$2,375,885.39 and slightly increased in July to \$2,499,474.76 before dropping drastically in August to the year's lowest value of \$884,957.92. September showed some recovery at \$1,417,092.30, and a significant surge occurred in October, reaching \$2,678,696.18. November experienced a moderate decline to \$2,311,845.65, followed by a slight rise in December to \$2,484,843.61, ending the year on a strong note.

PAYMENT METHODS



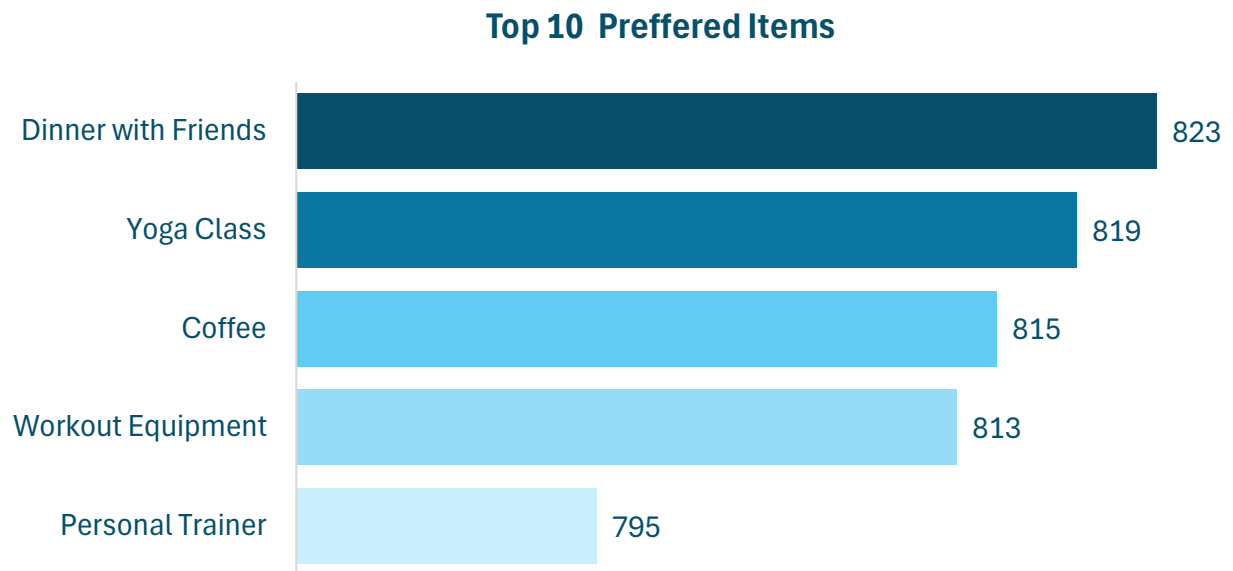
The most used payment method is **Digital Wallet**, accounting for **\$7,754,538.81** in transactions, indicating a strong shift toward mobile and app-based payments. This is closely followed by **Cash**, which surprisingly remains highly relevant with **\$7,293,700.66**, showing that a significant portion of customers still rely on traditional methods. **Credit Cards** come next at **\$6,531,489.36**, highlighting their continued popularity for flexible spending and rewards. Finally, **Debit Cards** are the least used among the four, totaling **\$3,767,780.07**, suggesting either customer preference for other methods or possible limitations in debit card acceptance or incentives.

PURCHASE LOCATIONS BY AMOUNT



The chart shows that **Online purchases and Mobile App purchases each account for 34%** of the total purchase amount, indicating a strong preference for digital shopping platforms. This suggests that consumers are equally comfortable making purchases through websites and mobile applications, highlighting the importance of maintaining and optimizing both channels. **In-store purchases make up 32%**, slightly less than the digital options, yet still a significant portion of total sales. This balance indicates that while digital commerce is leading, physical retail locations continue to play an important role in customer purchasing behavior.

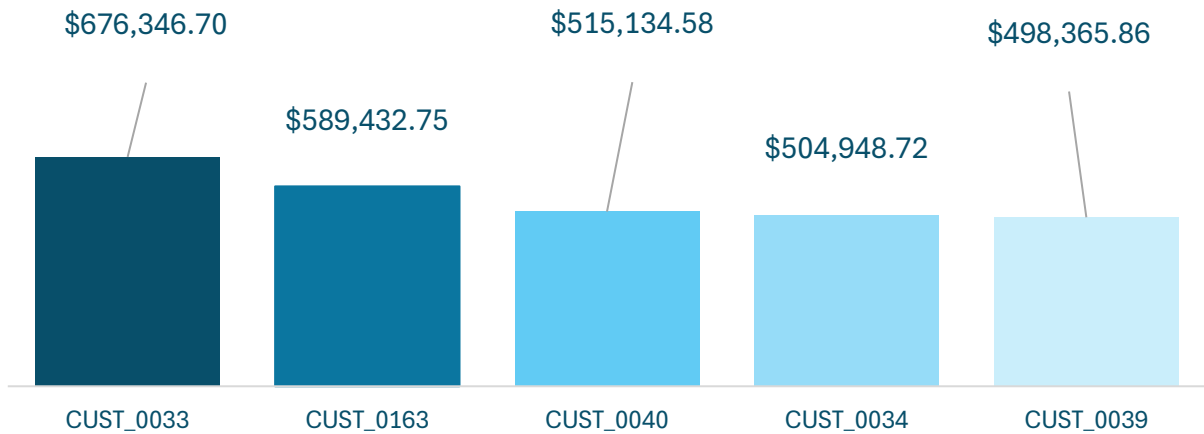
TOP 10 PREFFERED ITEMS



The most preferred item among customers is **Dinner with Friends**, with **823** selections, indicating a strong interest in social experiences. **Yoga Classes** follow closely with **819** preferences, suggesting high engagement in wellness and fitness activities. **Coffee**, a staple daily purchase, ranks third at **815**, highlighting its consistent popularity. **Workout Equipment** comes next with **813**, reinforcing the trend toward health and fitness investments. Finally, **Personal Trainer** services, while slightly lower at **795**, still show notable demand, indicating a willingness among customers to invest in personalized fitness guidance.

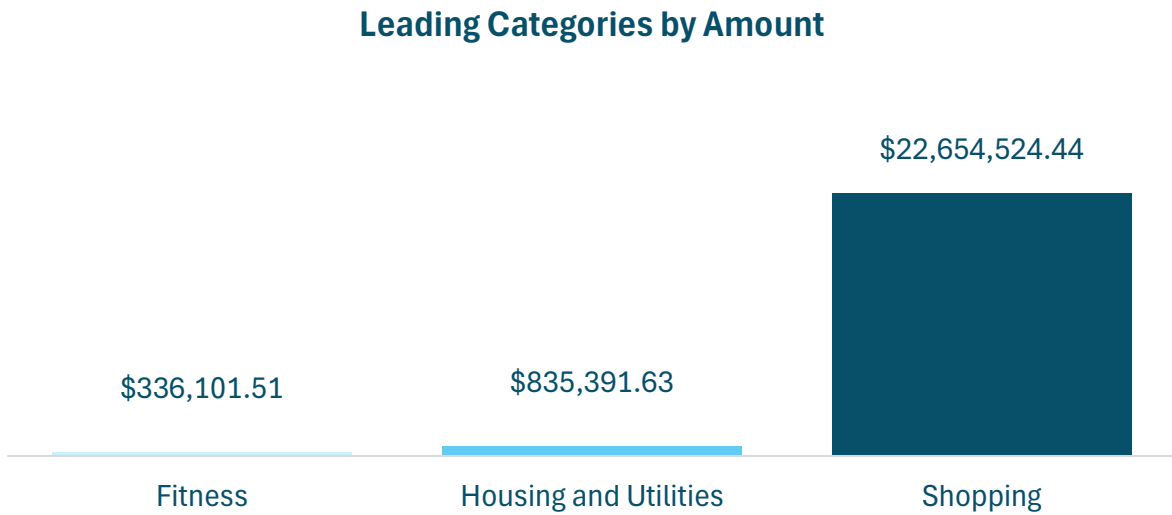
TOP 5 CUSTOMERS BY AMOUNT SPENT

Top 5 Customers by Amount spent



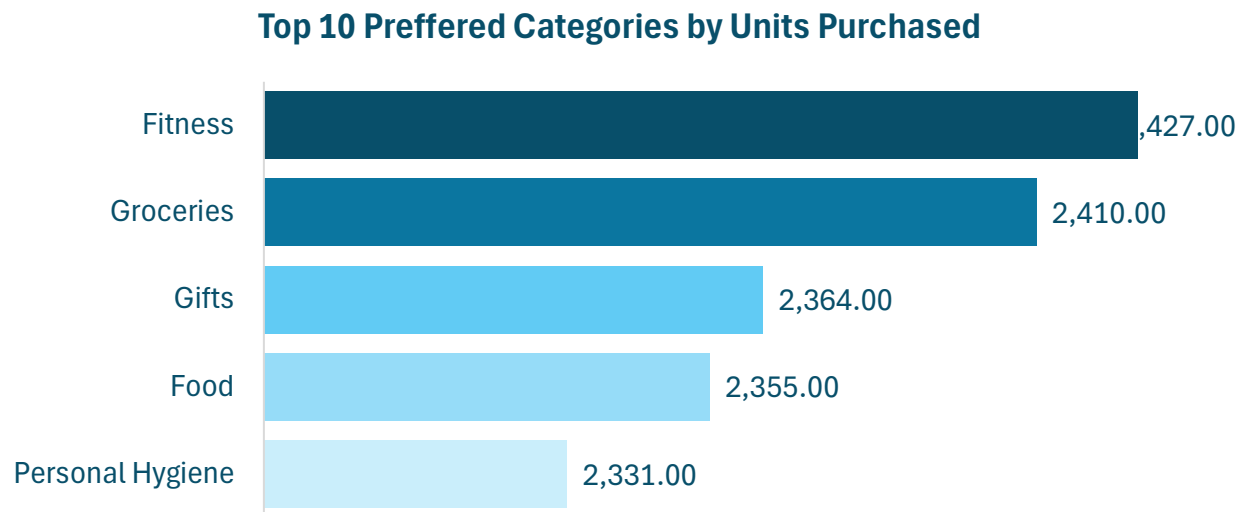
Customer **CUST_0033** is the highest spender, with a total of **\$676,346.70**, making them the most valuable individual customer. Following closely is **CUST_0163**, who spent **\$589,432.75**, showing a strong purchasing pattern as well. **CUST_0040**, **CUST_0034**, and **CUST_0039** spent **\$515,134.58**, **\$504,948.72**, and **\$498,365.86** respectively, highlighting a consistent and high-value customer segment. The spending differences among these top five customers are relatively small, indicating a stable and loyal high-spending customer base that could be ideal for targeted loyalty programs or exclusive offers.,

LEADING CATEGORIES BY AMOUNT



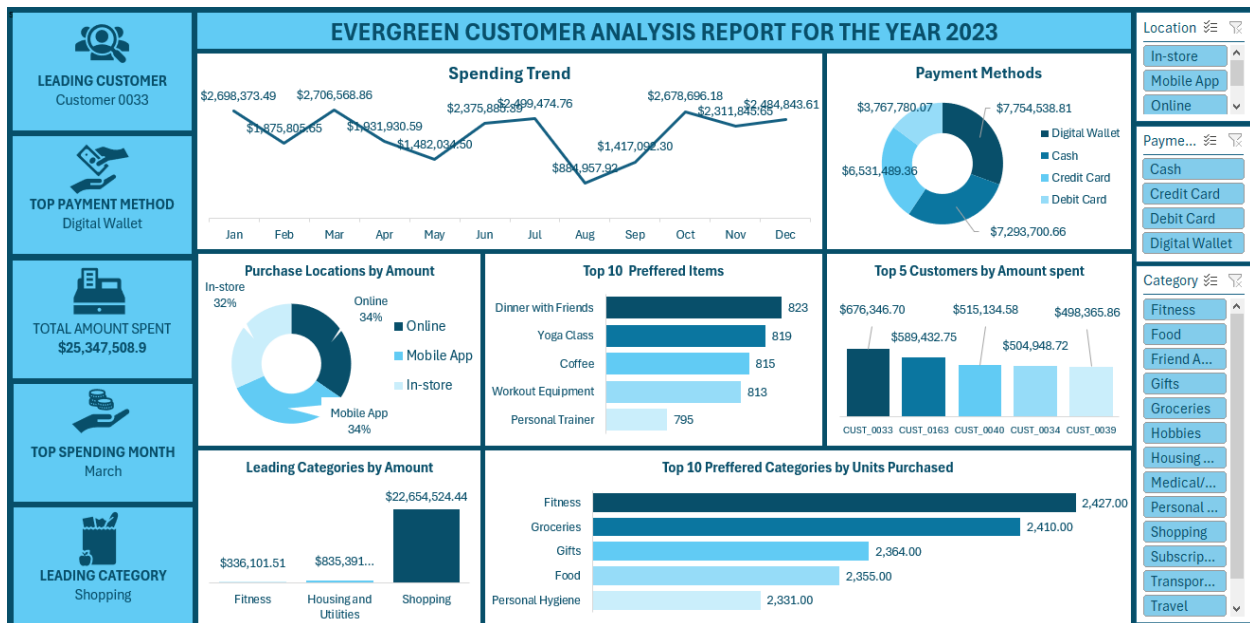
The **Shopping** category overwhelmingly dominates total spending, accounting for **\$22,654,524.44**, far surpassing all other categories. In comparison, **Housing and Utilities** spending is relatively minimal at **\$835,391**, while **Fitness** ranks lowest at **\$336,101.51**. This stark contrast suggests that consumer priorities and expenditures are heavily concentrated in discretionary retail purchases rather than essential services or wellness-related expenses. The imbalance also indicates a potential opportunity for growth or promotional focus in underrepresented categories like Fitness and Housing & Utilities.

TOP 10 PREFFERED CATEGORIES BY UNITS PURCHASED



The **Fitness** category ranks highest in terms of units purchased, with **2,427 units**, closely followed by **Groceries** at **2,410 units**, indicating strong consumer engagement with health and everyday essentials. **Gifts** (2,364 units), **Food** (2,355 units), and **Personal Hygiene** (2,331 units) also show high purchase volumes, suggesting consistent demand across both necessity and discretionary spending. This pattern reveals that while shopping (from a previous chart) dominates by monetary value, essential and wellness-related categories lead in quantity, implying lower unit costs but higher frequency of purchase.

FINAL DASHBOARD



The final dashboard highlights the combined correlations and relationship between the individual charts with the help of slicers.

OBSERVATIONS AND ACTIONABLE RECOMENDATIONS

Financial Overview

Total Amount Spent: \$25,347,508.90

Top Spending Month: March, with the highest monthly expenditure at \$3,499,474.76.

Lowest Spending Month: August, with \$884,957.92.

Payment Methods

Top Payment Method: Digital Wallet (\$7.75M), showing a clear preference for digital transactions.

Followed by:

Cash: \$7.29M

Credit Card: \$6.53M

Debit Card: \$3.77M

Purchase Locations

Online and Mobile App dominate equally at 34% each of the total amount spent.

In-store purchases account for 32%, slightly lower but still significant.

Spending by Category

Shopping is the leading category by amount, with a massive spend of \$22.65M, dwarfing other categories.

Housing & Utilities: \$835K

Fitness: Only \$336K despite being high in units sold, suggesting low-cost frequent purchases.

Category by Units Purchased

Fitness (2,427 units), Groceries (2,410), and Gifts (2,364) lead by volume.

Indicates consumers frequently buy low-value, high-need items.

Contrast: Shopping leads by dollar amount, but not by volume—likely high-value, lower-frequency purchases.

Customer Insights

Top Customer: CUST_0033, spending \$676K.

The top 5 customers collectively contributed ~\$2.78M, over 10% of the total.

Item Preferences

Most popular items include:

Dinner with Friends (823 selections)

Yoga Class, Coffee, and Workout Equipment follow closely.

Suggests a trend toward wellness and social experiences.

Trends Summary

Spending is seasonal, peaking in March and October, and dipping significantly mid-year.

Likely driven by events, promotions, or seasonal behaviors.

RECOMMENDATIONS

. **Observation:** March had the highest spending; August the lowest.

Recommendation:

Boost mid-year promotions (especially in July–August) with targeted discounts, bundles, or loyalty rewards.

Analyze March success (e.g., seasonal offers or campaigns) and replicate similar strategies during low-performing months.

Payment Methods

Observation: Digital Wallet is the most used payment method.

Recommendation:

Promote Digital Wallet-exclusive offers to further drive adoption and speed up checkout.

Ensure seamless digital payment experience by minimizing app bugs or slowdowns that may hinder transactions.

Purchase Locations

Observation: Online and Mobile App purchases dominate at 68% combined.

Recommendation:

Prioritize online and mobile UX—optimize the interface, product suggestions, and checkout flows.

Offer click-and-collect or app-exclusive deals to further boost app engagement.

Spending by Category

Observation: Shopping accounts for 89%+ of total spend.

Recommendation:

Expand high-margin product offerings within the Shopping category to increase profitability.

Cross-sell lower-performing categories (e.g., Housing & Utilities) during Shopping category checkouts.

Category by Units Purchased

Observation: Fitness and Groceries are top by volume but not by amount.

Recommendation:

Bundle low-cost high-volume items (e.g., fitness products) to increase cart value.

Introduce **subscription or loyalty models** for groceries and fitness items to ensure repeat purchases.

Customer Insights

Observation: Top 5 customers account for over 10% of spend.

Recommendation:

Implement a VIP program with exclusive perks for high-spending customers to retain loyalty.

Profile top customers to build lookalike audiences for advertising.

Item Preferences

Observation: Social and wellness-oriented items dominate.

Recommendation:

Create lifestyle bundles (e.g., "Wellness Weekend Kit" with Yoga Class + Coffee + Dinner discounts).

Promote experiences over products—highlight benefits like relaxation, community, and health.

Trends Summary

Observation: Spending is seasonal with clear peaks and dips.

Recommendation:

Plan marketing calendar around peaks—preload campaigns in February and September.

During dips, **use flash sales, reminders, and re-engagement campaigns** to maintain steady revenue.

CONCLUSION

In 2023, Evergreen's customers demonstrated a strong preference for digital engagement—favoring online and mobile app purchases and using digital wallets as the top payment method—while spending peaked in March and dipped in August, with the Shopping category dominating total expenditure, Fitness leading in units purchased, and customer interest centered around wellness and social experiences such as yoga, coffee, and dining with friends.

Limitations:

1. **Lack of Demographic Data** – The report does not include customer age, gender, income, or location breakdown, limiting personalized insights and targeted marketing strategies.
2. **No Profit Margin Analysis** – While spending and units sold are presented, the report lacks information on profit margins, making it hard to assess true business performance per category.
3. **No Customer Feedback or Sentiment** – The analysis is purely quantitative and does not reflect customer satisfaction, preferences, or reasons behind their purchasing behavior.
4. **Static Timeframe** – The report only covers the year 2023 without comparisons to previous years, making it difficult to identify long-term trends or growth.
5. **Limited Behavioral Segmentation** – The data does not segment customers based on behavior (e.g., frequency, recency, or loyalty), restricting more nuanced marketing or retention strategies.
6. **External Factors Not Considered** – The impact of external events (e.g., economic conditions, holidays, competitor actions) on sales trends is not analyzed.

Future Research

1. **Include Demographic Profiling** – Collect and analyze customer age, gender, income, and location data to enable more targeted marketing and product personalization.
2. **Conduct Year-over-Year Comparisons** – Analyze data across multiple years to uncover long-term trends, seasonality patterns, and growth trajectories.
3. **Measure Customer Satisfaction and Sentiment** – Integrate surveys, reviews, or social media sentiment analysis to understand the “why” behind customer behavior.

4. **Analyze Profitability per Category** – Go beyond revenue and unit sales by incorporating cost and profit margin data to identify truly high-performing segments.
5. **Segment Customers by Behavior** – Use RFM (Recency, Frequency, Monetary) analysis or clustering to categorize customer types and personalize engagement strategies.
6. **Track Marketing Campaign Impact** – Evaluate how specific promotions or advertising campaigns influence purchase behaviors and sales peaks.
7. **Monitor External Influences** – Consider external variables like holidays, inflation, or competitor activities to explain fluctuations in customer activity.
8. **Study Churn and Retention Rates** – Investigate customer lifecycle data to identify drop-off points and improve retention strategies.

REFERENCE: The data for this project was obtained from Kaggle.com