COMPREHENSIVE ANALYSIS REPORT

GLOBAL ELECTRONIC

COMPREHENSIVE ANALYSIS REPORT FOR GLOBAL ELECTRONICS

1. SUMMARY

The enclosed report provides a comprehensive analysis of Global Electronics' sales performance, customer demographics, product popularity, store operations, and profitability. Utilizing data from diverse sources, including sales transactions, customer profiles, and product details, this analysis unveils actionable insights designed to optimize operational efficiency, elevate customer satisfaction, and propel strategic growth. The report is presented through six distinct visualizations, equipping Global Electronics with the necessary tools to make informed decisions in the areas of marketing, inventory management, and expansion.

2. PROBLEM STATEMENT

- **Project Goal:** Conduct Exploratory Data Analysis (EDA) to uncover insights and provide actionable recommendations for Global Electronics.
- **Data Source:** Global Electronics provided datasets on customers, products, sales, stores, and currency exchange rates.
- **Business Objective:** Improve customer satisfaction, optimize operations, and drive business growth.

3. BUSINESS USE CASES

- **Business Goal:** Increase customer satisfaction and drive business growth.
- **Insight Application:** Tailor marketing campaigns, develop better products, plan effective promotions, decide on store expansions and optimizations, and understand the impact of currency exchange rates on sales.

- **Data Analysis Objective:** Identify key insights to enhance marketing strategies, optimize inventory management, and improve sales forecasting.

3. APPROACH FOR DATA ANALYSIS

The data analysis for Global Electronics was conducted in three primary stages: **Data Preparation, SQL Database Integration, and Data Visualization**. This systematic approach facilitated efficient data processing, seamless integration, and comprehensive visualization of the findings. Here's a detailed breakdown of the approach:

1. DATA PREPARATION:

In this initial stage, data from various sources, including customers, exchange rates, products, sales, and stores, was cleaned, transformed, and merged to create a unified dataset.

- **Data Loading:** Each dataset was loaded individually using pandas to handle and clean the data, ensuring consistency in encoding and data types.
- **Data Cleaning:**
  - ▸ Checked for missing values and inconsistencies across all columns, addressing these issues by filling, removing, or imputing values as needed.
  - ▸ Converted data types for columns such as CustomerKey, Order Date, and ProductKey to facilitate accurate calculations and efficient merging.
  - ▸ Ensured all currency and numeric fields (e.g., unit prices) were converted to standard formats for uniformity.
  - ▸ Cleaned categorical fields (e.g., Product Name, Store Location) to standardize naming conventions.
- **Feature Engineering:**
  - ▸ Created new fields, such as Age (calculated from customer birthdates) and Days Taken for delivery, to support advanced analysis.
  - ▸ Calculated Total Cost USD and Total Price USD to provide insights into product profitability and revenue generation.

2. SQL DATABASE INTEGRATION:

To manage data at scale, the cleaned and consolidated dataset was imported into a structured SQL database, allowing efficient querying for in-depth analysis.

- **SQL Table Creation:** A SQL table (GE_Data) was created within a MySQL database to store all relevant fields from the prepared dataset. Fields were chosen based on their importance for analysis, including Order Number, Product Name, Total Price USD, and more.

- **Data Insertion:** After defining the database schema, data from the unified master_df was iterated and inserted into SQL using prepared statements.

- **SQL Queries:** To extract specific business insights, ten SQL queries were executed to analyze key areas such as customer demographics, purchase behavior, product popularity, store performance, and overall profitability.
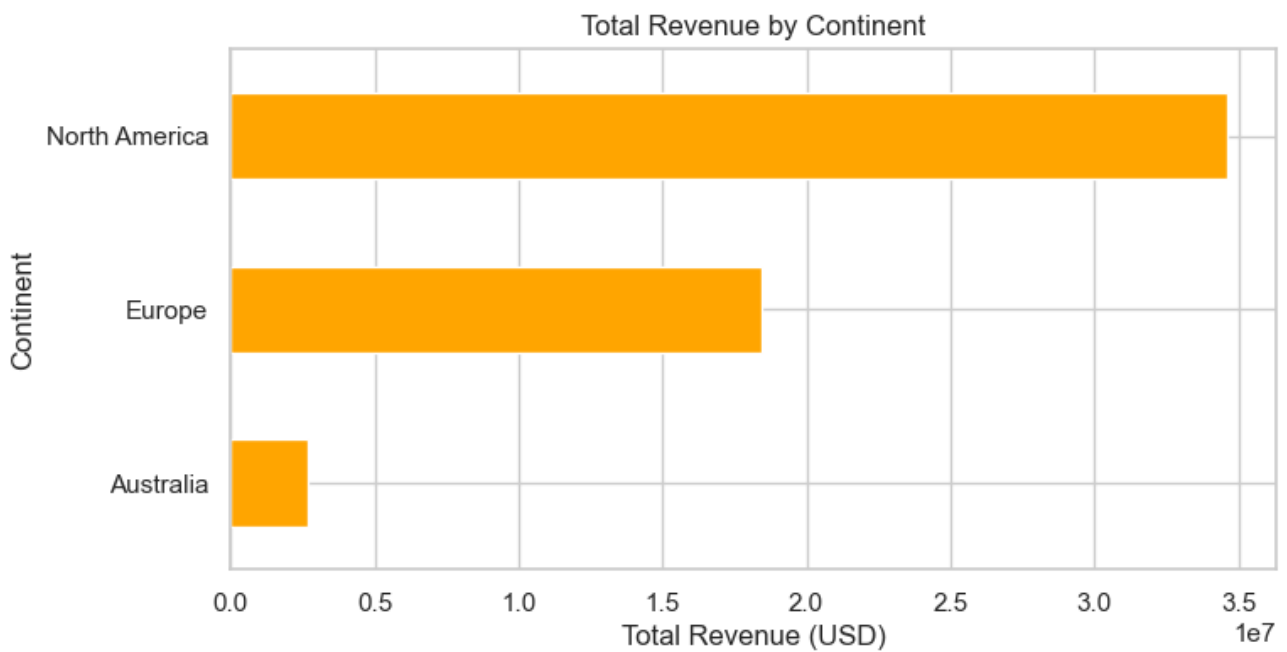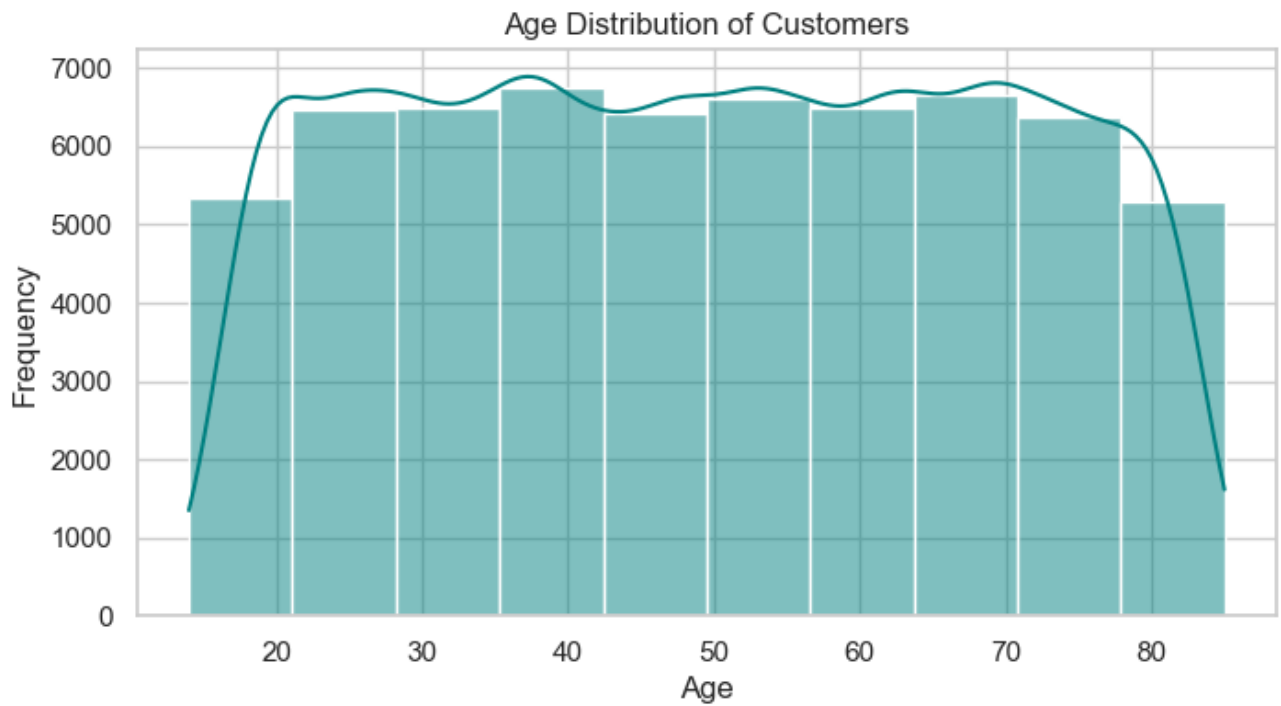
3. DATA VISUALIZATION:

Using Power BI, key insights were visualized to communicate findings effectively and support data-driven decision-making. Each visualization targeted a specific area of business interest for Global Electronics.

- **Connecting SQL to Power BI:** The SQL database was connected to Power BI, enabling direct import and analysis of the data in a visual format.

- **Creating Visualizations:** Visualizations were crafted to represent key metrics, such as:

  - ‣ Customer Age Distribution: Histogram showing the distribution of customer ages to understand demographic appeal.

  - ‣ Sales Trend Over Time: Line graph tracking sales trends to identify seasonal patterns and opportunities for promotional events.

  - ‣ Product Popularity: Bar chart displaying the top 5 products based on sales volume.

  - ‣ Sales by Store: Map visualization of store locations and their sales performance, highlighting high-performing regions.

  - ‣ Profit Margins by Product Category: Visual analysis of product profitability to inform cost management and pricing strategies.

  - ‣ Revenue by Continent: Pie chart illustrating revenue distribution by continent to guide regional marketing strategies.
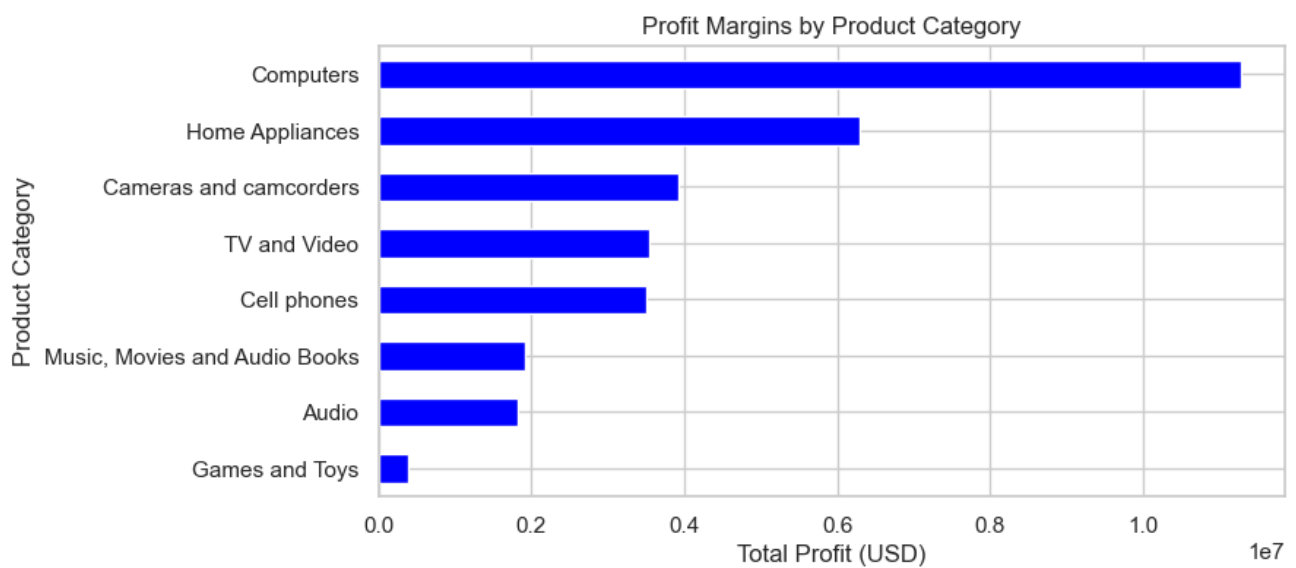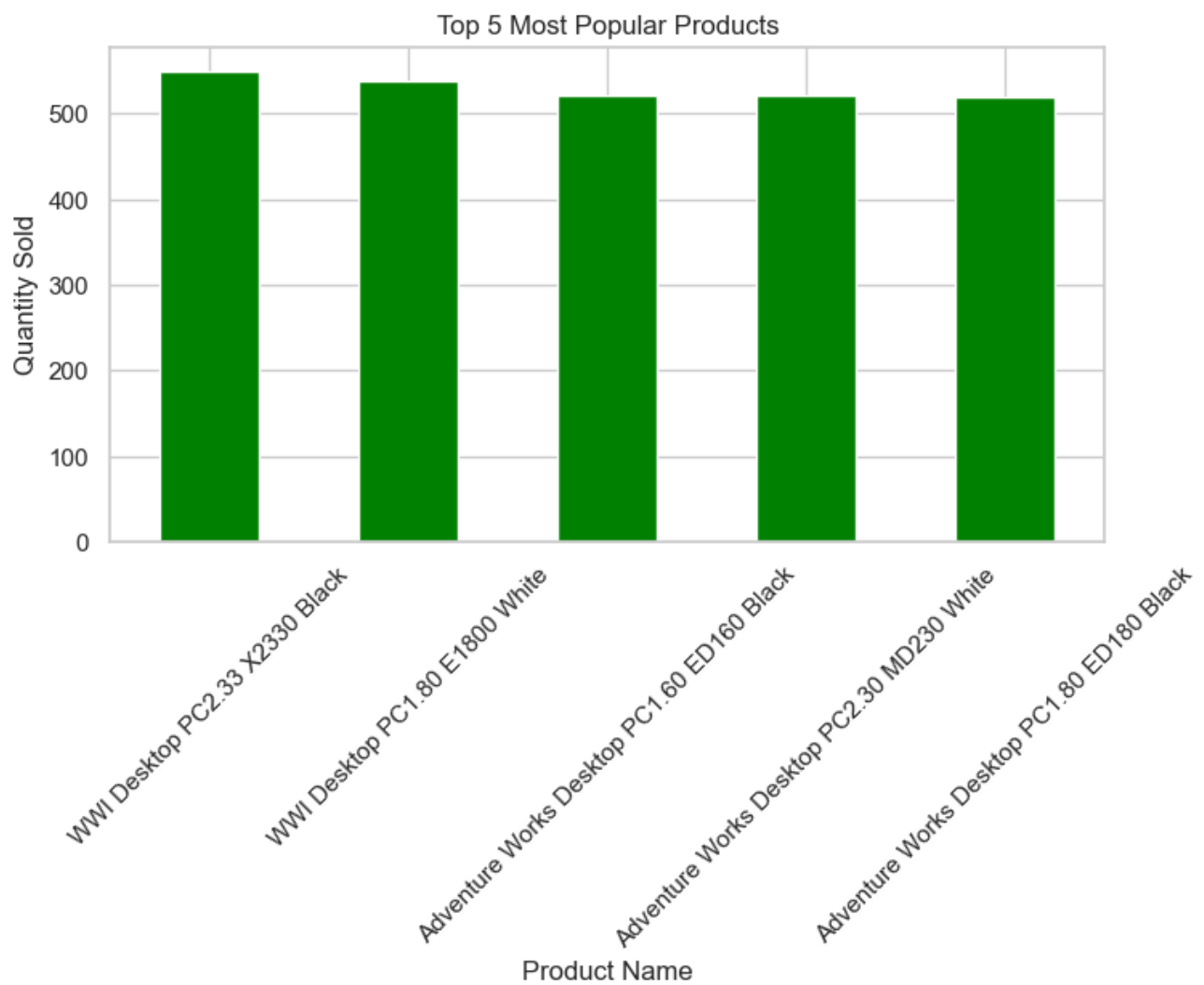
4. ANALYSIS AND KEY INSIGHTS

	Insight	Recommendation
Avg Customer Age	The average age of the customer base falls within the range of **40 and 60 years.**	Target marketing to this demographic with products that are age-appropriate and relevant to their needs.
Avg Order	The average number of orders per customer is **2.21.**	Increase purchase frequency by implementing loyalty programs or offering repeat purchase discounts.
Avg Store Area	The average store size is **1375.69 m²**.	Optimize store size based on performance data. Adjust the store's size to accommodate fluctuations in demand.
Avg Delivery Time	Average delivery time for Online orders is **4.53 Days**.	Optimize logistics to reduce delivery time, potentially partnering with faster delivery services.
Total Revenue	Total revenue across all sales is **55.75M USD**.	Enhance revenue generation through strategic cross-selling and bundling initiatives.
Online Sales	Total revenue from online sales is **11.4M USD**.	Allocate resources to enhance online sales channels and improve the overall online shopping experience.
Total Profit	Total profit is **32.66M USD**.	Identify and promote high-margin products, and evaluate low-margin products for possible removal.
Product Popularity	• **Most:** WWI Desktop PC2.33 X2330 Black. • **Least:** Adventure Works Chandelier M8150 Black	Prioritize stocking and promoting popular products, while re-evaluating the inventory of less popular items.
Top Brand	• **By Quantity:** Contoso • **By Revenue:** Adventure Works	Collaborate with prominent brands to secure exclusive access to their products or exclusive promotional offers.

5. VISUALIZATION

Age Distribution of Customers

Total Revenue by Continent

Yearly Sales Trend

Total Sales by Store

Top 5 Most Popular Products

Profit Margins by Product Category

5. CONCLUSION AND STRATEGIC RECOMMENDATIONS

Based on the analysis, Global Electronics is well-positioned to optimize growth through targeted marketing and strategic expansion. The actionable recommendations provided focus on maximizing high-demand products, increasing customer engagement during off-peak seasons, and tailoring inventory and marketing efforts to the age demographic with the highest purchasing activity.

1. **Inventory Optimization:** Align stock levels with top-selling products and high-performing stores to reduce stockouts and enhance customer satisfaction.

2. **Targeted Promotions:** Develop season-specific promotions and customer loyalty programs to stabilize revenue flow throughout the year.

3. **Profit Margin Improvements:** Adjust pricing or sourcing strategies for low-margin categories to protect profitability.

4. **Geographic Expansion:** Increase market share in high-growth regions by investing in localized campaigns and pricing adjustments.

This strategic approach will help Global Electronics enhance customer satisfaction, boost revenue, and strengthen its market position both domestically and internationally.