**Customer Details Transaction Details**

**Problem Statement:**

The goal is to analyze customer transactions and demographics to derive insights that can guide business decisions. This project aims to uncover patterns in customer behavior, transaction trends, and product performance. The analysis will focus on understanding customer purchasing habits, product preferences, and key business metrics such as revenue and profit margins. Furthermore, this project will lay the foundation for predictive modeling using machine learning to identify potential customer churn, high-value customers, and forecast future sales trends.

**Key Metrics to Analyze:**

**Customer Segmentation and Demographics:**

* **Customer Distribution by Wealth Segment**: Analyze how different wealth segments (Mass Customer, Affluent Customer, High Net Worth) contribute to transactions.
* **Customer Age Distribution**: Group customers by age to determine the most active demographic groups.
* **Customer Tenure**: Calculate customer tenure to understand customer loyalty and behavior over time.

**Transaction Analysis:**

* **Total Transactions**: Number of transactions over time (monthly/quarterly trends).
* **Online vs Offline Transactions**: Percentage and trends of online vs in-store transactions (online\_order).
* **Order Status Analysis**: Distribution of order\_status (Approved, Cancelled, etc.) to identify bottlenecks in processing or cancellations.
* **Average Transaction Value**: Calculate the average transaction value to assess how it varies across different customer segments or product lines.
* **Brand Preferences**: Identify which brands are most preferred by different segments of customers.
* **Product Categories**: Understand which product\_class and product\_line are most purchased.

**Revenue and Profit Analysis:**

* **Total Revenue**: Sum of list\_price for all transactions, broken down by product, customer segment, or time period.
* **Profit Margins**: Difference between list\_price and standard\_cost to assess profitability per product, product line, or brand.
* **Top Products by Revenue**: List of products generating the highest revenue.

**Customer Behavior Insights:**

* **Customer Purchase Frequency**: Calculate how frequently customers make purchases.
* **Customer Retention Rate**: Track repeat transactions by customer ID over a specific period.
* **High-Value Customers**: Identify customers with high purchase frequency and value.
* **Cross-Selling Opportunities**: Explore relationships between product purchases to suggest cross-selling strategies.

**Geographic Insights:**

* **State/Region Performance**: Analyze sales and customer demographics by state or region to identify geographical trends.
* **Average Order Value by State**: Compare the average transaction value across different states.

**Data Science / Machine Learning Applications:**

* **Customer Churn Prediction**: Use customer transaction data, demographics, and tenure to predict which customers are likely to stop purchasing.
* **Sales Forecasting**: Build predictive models using past sales data to forecast future revenue and sales volume.
* **Recommendation Systems**: Develop a system to recommend products based on customer demographics and past purchases.

**Customer Behavior Metrics:**

* **Customer Lifetime Value (CLV)**:
  + Estimate the total revenue generated by each customer based on their transaction history.
  + Focus on identifying the top customers contributing the most to sales.
* **Customer Tenure Analysis**:
  + Measure customer tenure and segment customers based on how long they have been associated with the company.
  + Identify if tenure affects the number of purchases or order value.
* **Customer Purchase Frequency**:
  + Track how often customers make purchases in a given timeframe (weekly, monthly, yearly).
  + Highlight customers with high purchase frequency.
* **Customer Segmentation by Wealth and Industry**:
  + Analyze how wealth segments (e.g., Mass Customer, Affluent Customer, High Net Worth) and industries (e.g., Manufacturing, Financial Services) are correlated with purchasing behavior.
  + Determine which segments have the highest transaction volumes and spending.

**Transaction Metrics:**

* **Total Revenue**:
  + Calculate the total revenue generated from all transactions.
  + Segment revenue by product category, customer demographics, and regions.
* **Average Order Value (AOV)**:
  + Analyze the average value of transactions to gauge customer spending behavior.
  + Segment AOV by product lines (e.g., Standard, Road) and brands (e.g., Trek Bicycles, Giant Bicycles).
* **Order Status Breakdown**:
  + Track the proportion of **approved** vs **canceled** orders.
  + Analyze if certain customer segments or product categories have higher cancellation rates.
* **Online vs Offline Orders**:
  + Compare revenue and transaction volumes from online orders vs offline orders.
  + Identify trends in customer preferences based on channels (online/offline).
* **Product Performance**:
  + Calculate total sales and profit margins per product, product line, and brand.
  + Highlight top-selling products and those with the highest profit margins.

**Demographic and Geographic Metrics:**

* **Top Regions by Sales**:
  + Identify which **states** and **cities** contribute the most to sales.
  + Analyze customer distribution and purchasing trends across different regions (e.g., NSW, VIC, QLD).
* **Customer Age Group Analysis**:
  + Group customers by age to see which age groups are the most active in making purchases.
  + Understand how age influences product preference and spending.
* **Gender-Based Sales Analysis**:
  + Compare the number of male vs female customers and their respective spending patterns.
  + Identify if there is any skew in gender when it comes to specific product categories or price ranges.

**Product and Pricing Metrics:**

* **Profit Margins by Product Category**:
  + Calculate profit margins by comparing the list price and standard cost for each product category.
  + Highlight the most profitable product lines (e.g., Standard, Road, Mountain).
* **Price Sensitivity**:
  + Analyze how different customer segments react to price changes.
  + Determine if higher or lower pricing affects customer purchase behavior in different wealth segments or regions.
* **Sales Trends Over Time**:
  + Track sales over time to identify any seasonality or monthly/quarterly trends.
  + Compare sales from different years or quarters to measure growth.

**Customer Transaction Overview:**

* Retrieve full customer details, including age, gender, wealth segment, and all their transactions.
* Identify customers with the most transactions and assess their demographic profiles.

**Geographical Transaction Distribution:**

* Determine the city or region with the highest number of transactions, based on customer address linked to purchases.

**Customer Lifetime Value (CLV):**

* Calculate the total revenue generated by each customer over time, highlighting the highest-contributing customers.

**Customer Churn Risk:**

* Identify customers who haven't made a purchase in the last 6 months, flagging them for potential churn.

**New vs. Existing Customers Spending Patterns:**

* Compare the spending habits of new customers with existing ones, tracking their transaction frequency and total spend.

**Age-Based Product Preferences:**

* Analyze product preferences across different age groups, determining which products are more popular among each group.

**State-wise Top Products:**

* Find the top-selling products for customers in each state, using their transaction and location data.

**Wealth Segment Contribution:**

* Analyze which wealth segment (e.g., Mass Customer, Affluent) contributes the most to total sales and transaction volume.

**Top Customers by Transaction Count:**

* Identify the top 10 customers based on the total number of transactions.

**Frequently Purchased Products Together:**

* Analyze which products are frequently bought together by customers, tracking purchase patterns.

**High-Value Purchases by Age Group:**

* Identify which age group tends to make the highest-value purchases, analyzing transaction amounts linked with customer age.

**Multiple Product Category Purchases:**

* Track customers who frequently make purchases from the same product category, assessing their loyalty to specific types of products.

**Loyal Customers by Location:**

* Highlight the cities with the most loyal customers, defined by high transaction frequency.

**New Customer Acquisition by City:**

* Analyze the number of new customers acquired from different cities over the last year, identifying areas driving customer growth.

**Wealth Segment and Purchase Patterns:**

* Analyze the buying patterns of different wealth segments to understand their preferences in terms of product categories and average transaction amounts.

**2. Transaction Metrics:**

**Total Revenue by Region and Customer Demographics:**

* Calculate the total revenue generated from all transactions, segmenting it by customer demographics and geographical regions.

**Average Transaction Value (ATV):**

* Analyze the average value of transactions, segmented by product line (e.g., Standard, Premium) and brand.

**Order Status Analysis:**

* Track the breakdown of approved vs. canceled orders, analyzing which customer segments or product categories have higher cancellation rates.

**Revenue from Online vs. Offline Sales:**

* Compare the total revenue and transaction volume from online vs. offline channels, identifying trends in customer preferences.

**Product Sales Performance:**

* Calculate total sales and profit margins by product, product line, and brand, highlighting the top-performing products and those with the highest profit margins.

**Customer Tenure and Revenue Correlation:**

* Analyze whether customer tenure (how long they’ve been associated with the company) correlates with their total transaction value or purchase frequency.

**Top Categories by Revenue:**

* Identify the product categories that contribute the most to overall revenue, helping prioritize inventory and marketing strategies.