Business Intelligence in E-commerce Sales: Product Performance Analysis in India (2018)

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Project Objectives

This project aims to analyze e-commerce product sales data in India from 2018 to:

- Evaluate Product Sales Performance: Identify total revenue, sales volume, and performance trends across various product categories and sub-categories.
- Analyze Product Profitability and Its Variations: Assess product profit, profit margins, and identify profitability variations based on product categories, sub-categories, payment methods, and comparisons between regions/states.
- Uncover Consumer Behavior Patterns Related to Payments: Understand payment method preferences and analyze their implications for operational costs or sales strategies.
- Provide Actionable Business Insights: Deliver data-driven insights to stakeholders for sales optimization, profitability enhancement, logistics management, and regional decision-making.

Data Source

Data Source: This analysis is based on a comprehensive e-commerce sales dataset, titled ‘Online Sales Data’, available on Kaggle.

Dataset Overview: This project utilizes an e-commerce sales dataset with the following characteristics:

Data Structure: Consists of two relational tables:

- details (7 columns): Records order details such as Order ID, Amount, Profit, Quantity, Category, Sub-Category, and PaymentMode.
- orders (5 columns): Contains general order information such as Order ID, Order Date, CustomerName, State, and City (with 500 unique Order IDs).

Data Time Range: Data is available for 2018.

Analysis Approach

- **Data Cleaning:** To ensure the integrity and accuracy of the analysis, a thorough data cleaning process was conducted. This stage involved comprehensive validation for potential null or empty values, utilizing methods such as Countblank checks. Furthermore, in-depth outlier analysis was applied to the quantity, amount, and profit columns through quartile calculations (Q1, Q3, IQR, Upper Quartile, Lower Quartile, Minimum, and Maximum values). A well-considered decision was made not to remove the identified outliers, as these values contain important business information that enriches the depth of our insights.

Unlocking Insights from E-commerce Sales

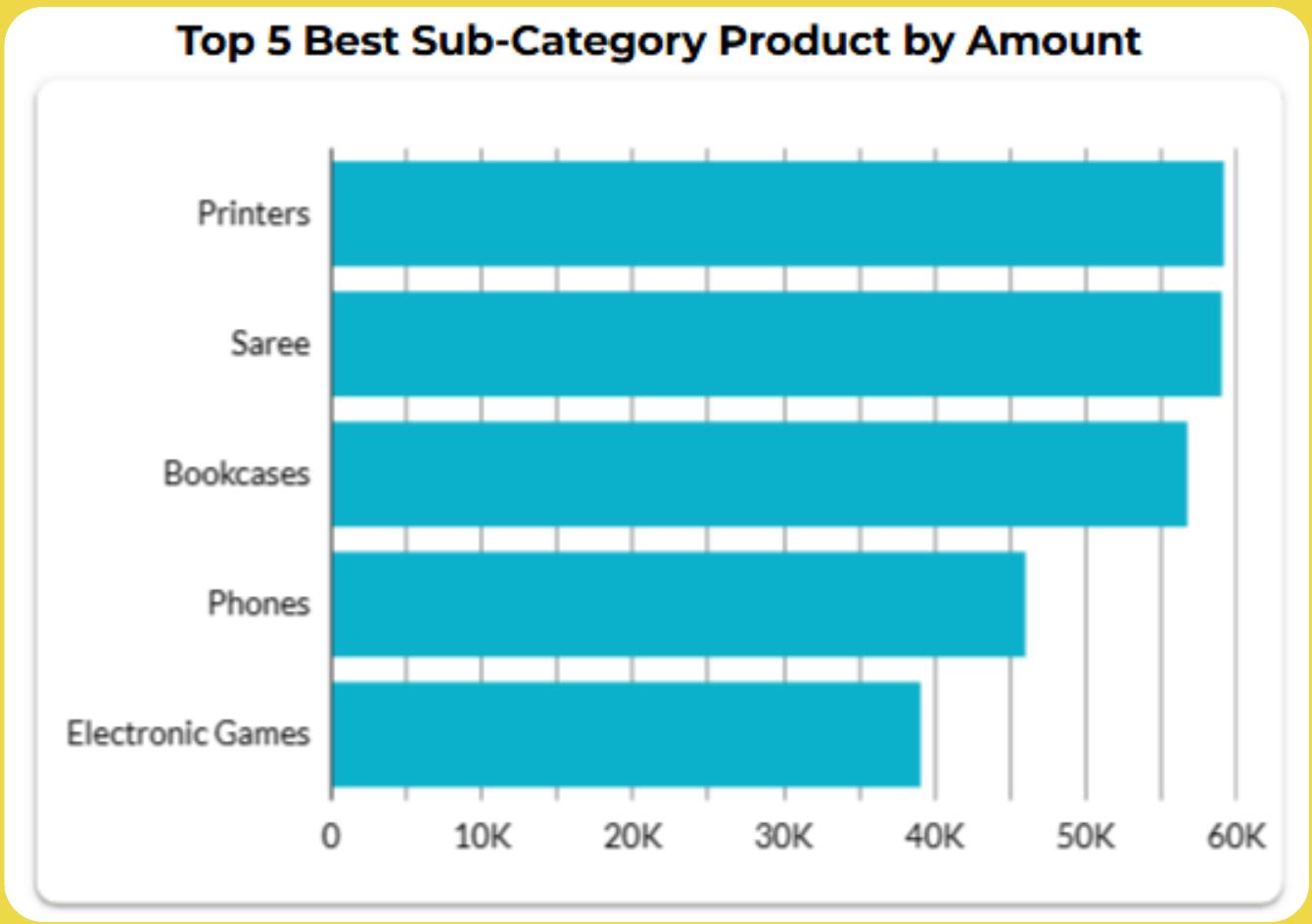
Top 5 Best Sub-Category Product by Amount

```sql
WITH details_base AS (
  SELECT
    CAST(`Order_ID` AS STRING) AS order_id,
    Amount AS total_amount,
    Profit AS total_profit,
    Quantity AS product_quantity,
    Category AS product_category,
    `Sub_Category` AS product_sub_category,
    PaymentMode AS payment_method
  FROM
    `dummy_project.details`
),
orders_base AS (
  SELECT
    CAST(`Order_ID` AS STRING) AS order_id,
    CAST(`Order_Date` AS DATE) AS order_date,
    CustomerName AS customer_name,
    State AS order_state,
    City AS order_city
  FROM
    `dummy_project.orders`
),
final_analysis_data AS (
  SELECT
    d.order_id,
    d.total_amount,
    d.total_profit,
    d.product_quantity,
    d.product_category,
    d.product_sub_category,
    d.payment_method,
    o.order_date,
    o.customer_name,
    o.order_state,
    o.order_city,
    CASE WHEN d.product_quantity > 0 THEN d.total_amount / d.product_quantity ELSE 0 END AS average_cost_per_product,
    CASE WHEN d.total_amount > 0 THEN ROUND(d.total_profit / d.total_amount, 4) ELSE 0 END AS profit_margin,
    CASE WHEN d.product_quantity > 0 THEN d.total_profit / d.product_quantity ELSE 0 END AS profit_per_product,
    CASE WHEN d.total_amount > 0 AND (d.total_profit / d.total_amount) >= 0.25 THEN 'High Profit' WHEN d.total_amount > 0 AND (d.total_profit / d.total_amount) >= 0.10 THEN 'Medium Profit' WHEN d.total_amount > 0 AND (d.total_profit / d.total_amount) >= 0 THEN 'Low Profit' ELSE 'Loss' END AS profit_status
  FROM
    details_base AS d
  JOIN
    orders_base AS o
  ON
    d.order_id = o.order_id
),
top_5_sub_category_by_amount AS (
  SELECT
    product_sub_category,
    SUM(total_amount) AS total_sales_amount
  FROM
    final_analysis_data
  GROUP BY
    product_sub_category
  ORDER BY
    total_sales_amount DESC
  LIMIT 5
)
SELECT 'Top 5 Best Sub-Category Product by Amount' AS Query_Description, t1.* FROM top_5_sub_category_by_amount AS t1;
```

Results

Row	Query_Description	product_sub_category	total_sales_amou...
1	Top 5 Best Sub-Category Produ...	Printers	59252
2	Top 5 Best Sub-Category Produ...	Saree	59094
3	Top 5 Best Sub-Category Produ...	Bookcases	56861
4	Top 5 Best Sub-Category Produ...	Phones	46119
5	Top 5 Best Sub-Category Produ...	Electronic Games	39168

- **Query Objective:** Identify the top five product sub-categories based on total sales value.
- **SQL operation:** Using the SUM() aggregation function on the total_amount column and grouping (GROUP BY) by product_sub_category. The results were then sorted (ORDER BY) in descending order and limited (LIMIT) to display only the top 5.
- **Data Analysis:** The results of this query will show which sub-categories are the biggest revenue contributors.



Insights

- **Niche Market Dominance:** The top-selling product, printers, is not a common consumer good. This indicates that the e-commerce platform has a strong capability in serving specific, well-defined market segments (such as students and SMEs).
- **Effectiveness of Consumer Segmentation:** The success of printer sales is driven by a highly specific consumer base. This highlights that a deep understanding of the needs, preferences, and price sensitivity of these segments is key to driving sales.
- **Importance of Product Customization:** The data shows different preferences in features and price points among different consumer segments (e.g., students are more price-sensitive, while SMEs may prioritize multifunctional features).

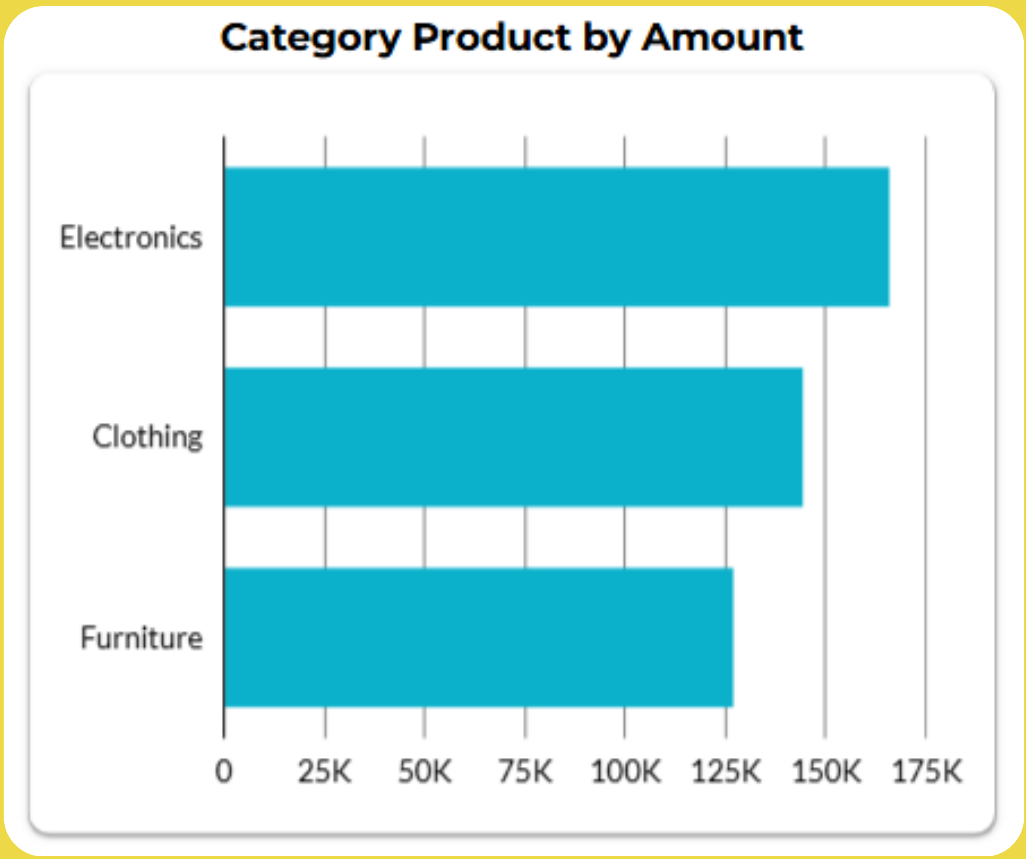
Category Product by Amount

```sql
WITH details_base AS (
  SELECT
    CAST(`Order_ID` AS STRING) AS order_id,
    Amount AS total_amount,
    Profit AS total_profit,
    Quantity AS product_quantity,
    Category AS product_category,
    `Sub_Category` AS product_sub_category,
    PaymentMode AS payment_method
  FROM
    `dummy_project.details`
),
orders_base AS (
  SELECT
    CAST(`Order_ID` AS STRING) AS order_id,
    CAST(`Order_Date` AS DATE) AS order_date,
    CustomerName AS customer_name,
    State AS order_state,
    City AS order_city
  FROM
    `dummy_project.orders`
),
final_analysis_data AS (
  SELECT
    d.order_id,
    d.total_amount,
    d.total_profit,
    d.product_quantity,
    d.product_category,
    d.product_sub_category,
    d.payment_method,
    o.order_date,
    o.customer_name,
    o.order_state,
    o.order_city,
    CASE WHEN d.product_quantity > 0 THEN d.total_amount / d.product_quantity ELSE 0 END AS average_cost_per_product,
    CASE WHEN d.total_amount > 0 THEN ROUND(d.total_profit / d.total_amount, 4) ELSE 0 END AS profit_margin,
    CASE WHEN d.product_quantity > 0 THEN d.total_profit / d.product_quantity ELSE 0 END AS profit_per_product,
    CASE WHEN d.total_amount > 0 AND (d.total_profit / d.total_amount) >= 0.25 THEN 'High Profit' WHEN d.total_amount > 0 AND (d.total_profit / d.total_amount) >= 0.10 THEN 'Medium Profit' WHEN d.total_amount > 0 AND (d.total_profit / d.total_amount) >= 0 THEN 'Low Profit' ELSE 'Loss' END AS profit_status
  FROM
    details_base AS d
  JOIN
    orders_base AS o
  ON
    d.order_id = o.order_id
),
category_product_by_amount AS (
  SELECT
    product_category,
    SUM(total_amount) AS total_sales_amount
  FROM
    final_analysis_data
  GROUP BY
    product_category
  ORDER BY
    total_sales_amount DESC
)
SELECT 'Category Product by Amount' AS Query_Description, t2.* FROM category_product_by_amount AS t2;
```

Results

Row	Query_Description	product_category	total_sales_amou...
1	Category Product by Amount	Electronics	166267
2	Category Product by Amount	Clothing	144323
3	Category Product by Amount	Furniture	127181

- **Query Objective:** Calculate the total sales value for each major product category.
- **SQL operation:** Same as before, using SUM() on total_amount but grouping (GROUP BY) by product_category. Results are sorted by highest total sales.
- **Data Analysis:** Provides a macro overview of sales performance at the category level.



Insights

- **Dominance of the Electronics Market:** Electronics is the best-selling product category with total sales of $166,267, significantly outperforming other categories. This shows a strong consumer preference for technology products on this e-commerce platform.
- **Untapped Potential of Other Categories:** Although clothing and furniture sales are ranked second and third, there is a significant sales gap compared to electronics. This indicates room to improve the performance of both categories to optimize their sales contribution.
- **Cross-Selling Opportunities:** Since electronics is the main category, there is a great opportunity to increase sales of clothing and furniture products through a cross-selling or bundling strategy.

Amount and Profit by Category

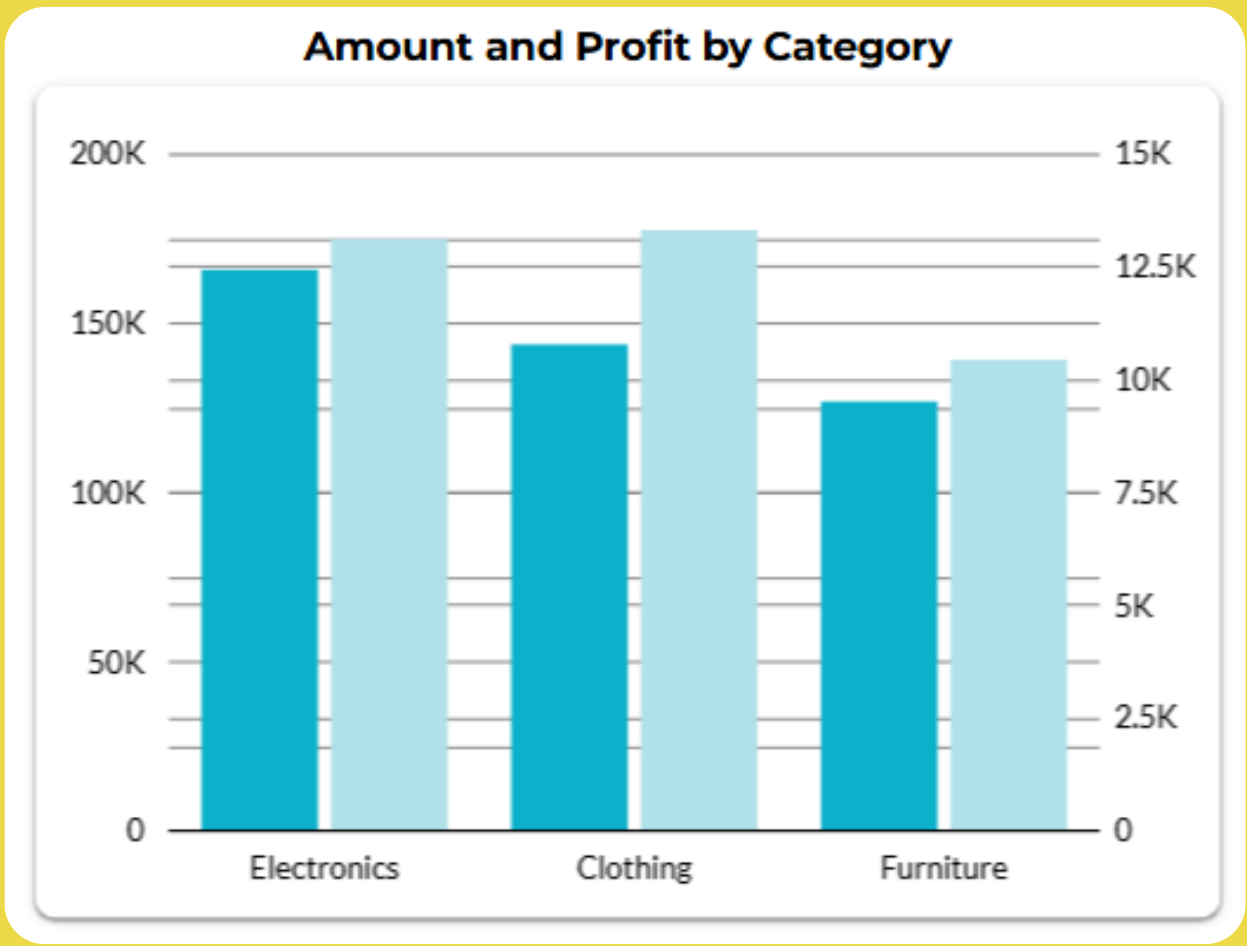
```sql
WITH details_base AS (
  SELECT
    CAST(`Order_ID` AS STRING) AS order_id,
    Amount AS total_amount,
    Profit AS total_profit,
    Quantity AS product_quantity,
    Category AS product_category,
    `Sub_Category` AS product_sub_category,
    PaymentMode AS payment_method
  FROM
    `dummy_project.details`
),
orders_base AS (
  SELECT
    CAST(`Order_ID` AS STRING) AS order_id,
    CAST(`Order_Date` AS DATE) AS order_date,
    CustomerName AS customer_name,
    State AS order_state,
    City AS order_city
  FROM
    `dummy_project.orders`
),
final_analysis_data AS (
  SELECT
    d.order_id,
    d.total_amount,
    d.total_profit,
    d.product_quantity,
    d.product_category,
    d.product_sub_category,
    d.payment_method,
    o.order_date,
    o.customer_name,
    o.order_state,
    o.order_city,
    CASE WHEN d.product_quantity > 0 THEN d.total_amount / d.product_quantity ELSE 0 END AS average_cost_per_product,
    CASE WHEN d.total_amount > 0 THEN ROUND(d.total_profit / d.total_amount, 4) ELSE 0 END AS profit_margin,
    CASE WHEN d.product_quantity > 0 THEN d.total_profit / d.product_quantity ELSE 0 END AS profit_per_product,
    CASE WHEN d.total_amount > 0 AND (d.total_profit / d.total_amount) >= 0.25 THEN 'High Profit' WHEN d.total_amount > 0 AND (d.total_profit / d.total_amount) >= 0.10 THEN 'Medium Profit' WHEN d.total_amount > 0 AND (d.total_profit / d.total_amount) >= 0 THEN 'Low Profit' ELSE 'Loss' END AS profit_status
  FROM
    details_base AS d
  JOIN
    orders_base AS o
  ON
    d.order_id = o.order_id
),
amount_and_profit_by_category AS (
  SELECT
    product_category,
    SUM(total_amount) AS total_sales_amount,
    SUM(total_profit) AS total_profit
  FROM
    final_analysis_data
  GROUP BY
    product_category
  ORDER BY
    total_sales_amount DESC
)
SELECT 'Amount and Profit by Category' AS Query_Description, t3.* FROM amount_and_profit_by_category AS t3;
```

Results

Job information | Results | Chart | JSON | Execution details | Execution graph

Row	Query_Description	product_category	total_sales_amou...	total_profit
1	Amount and Profit by Category	Electronics	166267	13162
2	Amount and Profit by Category	Clothing	144323	13325
3	Amount and Profit by Category	Furniture	127181	10476

- **Query Objective:** Analyze the total sales value (Amount) and total profit (Profit) for each product category.
- **SQL Operation:** Using SUM() on total_amount and SUM() on total_profit, then grouping (GROUP BY) by product_category.
- **Data Analysis:** In addition to total sales, this query adds a profit dimension. This allows direct comparison between sales volume and profitability per category.



Insights

- **Gap Between Sales and Profitability:** Although electronics products have the highest sales, their profitability (7.92%) is the lowest among the three main categories. This indicates a significant gap between sales volume and profit efficiency.
- **Significant Room for Improvement:** All product categories have profit margins below the healthy industry average (10-20%). The figures of 7.92%, 9.23%, and 8.24% indicate a substantial opportunity to optimize profitability and efficiency across the entire product line.
- **Importance of Cost Analysis:** The low margins, especially in the highest-selling category, suggest potential issues with cost structure (e.g., high COGS, operational, or logistics costs) or an overly competitive pricing strategy.

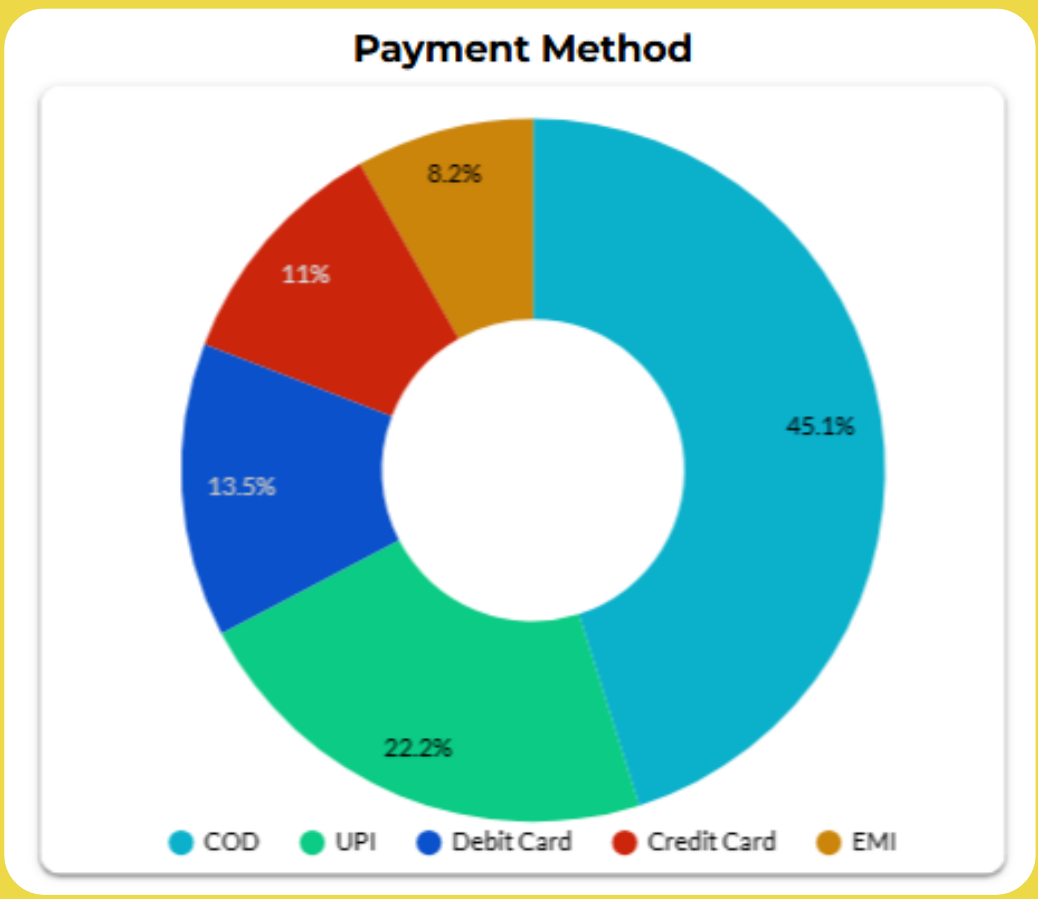
Payment Method

```sql
WITH details_base AS (
  SELECT
    CAST(`Order_ID` AS STRING) AS order_id,
    Amount AS total_amount,
    Profit AS total_profit,
    Quantity AS product_quantity,
    Category AS product_category,
    `Sub_Category` AS product_sub_category,
    PaymentMode AS payment_method
  FROM
    `dummy_project.details`
),
orders_base AS (
  SELECT
    CAST(`Order_ID` AS STRING) AS order_id,
    CAST(`Order_Date` AS DATE) AS order_date,
    CustomerName AS customer_name,
    State AS order_state,
    City AS order_city
  FROM
    `dummy_project.orders`
),
final_analysis_data AS (
  SELECT
    d.order_id,
    d.total_amount,
    d.total_profit,
    d.product_quantity,
    d.product_category,
    d.product_sub_category,
    d.payment_method,
    o.order_date,
    o.customer_name,
    o.order_state,
    o.order_city,
    CASE WHEN d.product_quantity > 0 THEN d.total_amount / d.product_quantity ELSE 0 END AS average_cost_per_product,
    CASE WHEN d.total_amount > 0 THEN ROUND(d.total_profit / d.total_amount, 4) ELSE 0 END AS profit_margin,
    CASE WHEN d.product_quantity > 0 THEN d.total_profit / d.product_quantity ELSE 0 END AS profit_per_product,
    CASE WHEN d.total_amount > 0 AND (d.total_profit / d.total_amount) >= 0.25 THEN 'High Profit' WHEN d.total_amount > 0 AND (d.total_profit / d.total_amount) >= 0.10 THEN 'Medium Profit' WHEN d.total_amount > 0 AND (d.total_profit / d.total_amount) >= 0 THEN 'Low Profit' ELSE 'Loss' END AS profit_status
  FROM
    details_base AS d
  JOIN
    orders_base AS o
  ON
    d.order_id = o.order_id
),
payment_method_summary AS (
  SELECT
    payment_method,
    COUNT(DISTINCT order_id) AS total_unique_orders,
    SUM(total_amount) AS total_amount_paid,
    SUM(total_profit) AS total_profit_generated
  FROM
    final_analysis_data
  GROUP BY
    payment_method
  ORDER BY
    total_amount_paid DESC
)
SELECT 'Payment Method' AS Query_Description, t4.* FROM payment_method_summary AS t4;
```

Results

Row	Query_Description	payment_method	total_unique_ord...	total_amount_paid	total_profit_gener...
1	Payment Method	COD	347	155181	12547
2	Payment Method	Credit Card	128	86932	12612
3	Payment Method	EMI	106	77881	4824
4	Payment Method	UPI	224	68641	3286
5	Payment Method	Debit Card	158	49136	3694

- **Query Objective:** Understand customer payment method preferences, including the number of orders and total sales/profit value associated with each method.
- **SQL operations:** Using COUNT(DISTINCT order_id) to count the number of unique orders, SUM(total_amount), and SUM(total_profit) grouped (GROUP BY) by payment_method.
- **Data Analysis:** Provides details on how the transaction was completed.



Insights

- **Consumer Preference for Security:** The dominance of the COD payment method (45.1%) shows that a large portion of consumers prioritize a sense of security and confidence when shopping online, as they can inspect the goods before paying.
- **Operational and Cost Challenges:** The high usage of COD creates significant operational challenges, particularly related to high logistics costs and the risk of returns that are less efficient than digital payment methods.
- **Opportunity for Digital Payment Migration:** Although COD dominates, the total percentage of digital payments (UPI, Debit Card, Credit Card) is also very large (46.7%). This indicates a ready consumer base that can be incentivized to switch.

Top 10 Best Profit by Category & State

```sql
WITH details_base AS (
  SELECT
    CAST(`Order_ID` AS STRING) AS order_id,
    Amount AS total_amount,
    Profit AS total_profit,
    Quantity AS product_quantity,
    Category AS product_category,
    `Sub_Category` AS product_sub_category,
    PaymentMode AS payment_method
  FROM
    `dummy_project.details`
),
orders_base AS (
  SELECT
    CAST(`Order_ID` AS STRING) AS order_id,
    CAST(`Order_Date` AS DATE) AS order_date,
    CustomerName AS customer_name,
    State AS order_state,
    City AS order_city
  FROM
    `dummy_project.orders`
),
final_analysis_data AS (
  SELECT
    d.order_id,
    d.total_amount,
    d.total_profit,
    d.product_quantity,
    d.product_category,
    d.product_sub_category,
    d.payment_method,
    o.order_date,
    o.customer_name,
    o.order_state,
    o.order_city,
    CASE WHEN d.product_quantity > 0 THEN d.total_amount / d.product_quantity ELSE 0 END AS average_cost_per_product,
    CASE WHEN d.total_amount > 0 THEN ROUND(d.total_profit / d.total_amount, 4) ELSE 0 END AS profit_margin,
    CASE WHEN d.product_quantity > 0 THEN d.total_profit / d.product_quantity ELSE 0 END AS profit_per_product,
    CASE WHEN d.total_amount > 0 AND (d.total_profit / d.total_amount) >= 0.25 THEN 'High Profit' WHEN d.total_amount > 0 AND (d.total_profit / d.total_amount) >= 0.10 THEN 'Medium Profit' WHEN d.total_amount > 0 AND (d.total_profit / d.total_amount) >= 0 THEN 'Low Profit' ELSE 'Loss' END AS profit_status
  FROM
    details_base AS d
  JOIN
    orders_base AS o
  ON
    d.order_id = o.order_id
),
best_profit_by_category_state AS (
  SELECT
    product_category,
    order_state,
    SUM(total_profit) AS total_profit_category_state,
    AVG(profit_per_product) AS avg_profit_per_product,
    AVG(profit_margin) AS avg_profit_margin_category_state
  FROM
    final_analysis_data
  GROUP BY
    product_category,
    order_state
  ORDER BY
    total_profit_category_state DESC
  LIMIT 10
)
SELECT 'Top 10 Best Profit by Category and State' AS Query_Description, t5.* FROM best_profit_by_category_state AS t5;
```

Results

Row	Query_Description	product_category	order_state	total_profit_categ...	avg_profit_per_pr...	avg_profit_margi...
1	Top 10 Best Profit by Category ...	Electronics	Madhya Pradesh	4660	24.54681013431...	0.068790384615...
2	Top 10 Best Profit by Category ...	Clothing	Maharashtra	3379	4.289268271411...	0.026830769230...
3	Top 10 Best Profit by Category ...	Furniture	Maharashtra	2416	19.63344547964...	0.04075
4	Top 10 Best Profit by Category ...	Furniture	Gujarat	2241	29.07397959183...	0.055921428571...
5	Top 10 Best Profit by Category ...	Furniture	Tamil Nadu	2025	77.97333333333...	0.302600000000...
6	Top 10 Best Profit by Category ...	Electronics	Uttar Pradesh	1763	9.264957264957...	-0.01123529411...
7	Top 10 Best Profit by Category ...	Clothing	Kerala	1542	17.18168498168...	0.055580769230...
8	Top 10 Best Profit by Category ...	Clothing	West Bengal	1522	10.63274754346...	0.156597619047...
9	Top 10 Best Profit by Category ...	Electronics	Himachal Pradesh	1479	61.68452380952...	0.3038
10	Top 10 Best Profit by Category ...	Clothing	Punjab	1452	10.43906746031...	0.115794999999...

- **Query Objective:** Identify the 10 product category and state combinations that generate the highest profits, and see the average profit per product and average profit margin for these combinations.
- **SQL operations:** Aggregation of SUM(total_profit), AVG(profit_per_product), and AVG(profit_margin) grouped (GROUP BY) by product_category and order_state. The results are sorted (ORDER BY) by total profit and limited (LIMIT) to the top 10.
- **Data Analysis:** This provides a more granular geographical and categorical insight into profitability.

Top 10 Best Profit by Category

	Category	State	Profit	Profit per Product	Profit Margin
1.	Electronics	Madhya Pradesh	$4,660	$1,276.43	357%
2.	Clothing	Maharashtra	$3,379	$780.65	484%
3.	Furniture	Maharashtra	$2,416	$903.14	187%
4.	Furniture	Gujarat	$2,241	$407.04	78%
5.	Furniture	Tamil Nadu	$2,025	$389.87	152%
6.	Electronics	Uttar Pradesh	$1,763	$157.5	-19%
7.	Clothing	Kerala	$1,542	$446.72	145%
8.	Clothing	West Bengal	$1,522	$446.58	660%
9.	Electronics	Himachal Pradesh	$1,479	$493.48	244%
10.	Clothing	Punjab	$1,452	$417.56	463%

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Insights

- **Localized Profitability Crisis:** The electronics product category in Uttar Pradesh is suffering a significant loss with a negative profit margin of -19%. This is a critical condition as the company is losing money on every sale in that region, driven by a decrease in the Average Selling Price (ASP).
- **Isolated Geographical Issue:** This profitability problem is not systemic to the entire electronics category but is isolated to the Uttar Pradesh region. This is evident when compared to other electronics sales in the table which have very high, positive profit margins in other states.
- **Ineffective Discounting:** The decline in ASP suggests that the discounting or pricing strategy in this region is ineffective and is eroding profits to below the cost of the product.

Amount, Average Cost, & Profit by Sub-Category

```sql
WITH details_base AS (
  SELECT
    CAST(`Order_ID` AS STRING) AS order_id,
    Amount AS total_amount,
    Profit AS total_profit,
    Quantity AS product_quantity,
    Category AS product_category,
    `Sub_Category` AS product_sub_category,
    PaymentMode AS payment_method
  FROM
    `dummy_project.details`
),
orders_base AS (
  SELECT
    CAST(`Order_ID` AS STRING) AS order_id,
    CAST(`Order_Date` AS DATE) AS order_date,
    CustomerName AS customer_name,
    State AS order_state,
    City AS order_city
  FROM
    `dummy_project.orders`
),
final_analysis_data AS (
  SELECT
    d.order_id,
    d.total_amount,
    d.total_profit,
    d.product_quantity,
    d.product_category,
    d.product_sub_category,
    d.payment_method,
    o.order_date,
    o.customer_name,
    o.order_state,
    o.order_city,
    CASE WHEN d.product_quantity > 0 THEN d.total_amount / d.product_quantity ELSE 0 END AS average_cost_per_product,
    CASE WHEN d.total_amount > 0 THEN ROUND(d.total_profit / d.total_amount, 4) ELSE 0 END AS profit_margin,
    CASE WHEN d.product_quantity > 0 THEN d.total_profit / d.product_quantity ELSE 0 END AS profit_per_product,
    CASE WHEN d.total_amount > 0 AND (d.total_profit / d.total_amount) >= 0.25 THEN 'High Profit' WHEN d.total_amount > 0 AND (d.total_profit / d.total_amount) >= 0.10 THEN 'Medium Profit' WHEN d.total_amount > 0 AND (d.total_profit / d.total_amount) >= 0 THEN 'Low Profit' ELSE 'Loss' END AS profit_status
  FROM
    details_base AS d
  JOIN
    orders_base AS o
  ON
    d.order_id = o.order_id
),
amount_avg_cost_profit_by_sub_category_state AS (
  SELECT
    product_sub_category,
    order_state,
    SUM(product_quantity) AS total_quantity_sold,
    SUM(total_amount) AS total_amount_sales,
    AVG(average_cost_per_product) AS overall_average_cost_per_product,
    SUM(total_profit) AS total_profit_sub_category_state
  FROM
    final_analysis_data
  GROUP BY
    product_sub_category,
    order_state
  ORDER BY
    total_amount_sales DESC, total_profit_sub_category_state DESC
)
SELECT 'Amount, Average Cost, & Profit by Sub-category and State' AS Query_Description, t6.* FROM amount_avg_cost_profit_by_sub_category_state AS t6;
```

Results

Row	Query_Description	product_sub_category	order_state	total_quantity_sold	total_amount_sal...	overall_average_c...	total_profit_sub_...
1	Amount, Average Cost, & Profit ...	Printers	Maharashtra	70	14819	206.6864197530...	1769
2	Amount, Average Cost, & Profit ...	Saree	Maharashtra	173	14586	88.61457771787...	1280
3	Amount, Average Cost, & Profit ...	Phones	Maharashtra	68	13715	194.0057017543...	-705
4	Amount, Average Cost, & Profit ...	Bookcases	Maharashtra	63	12581	199.2783482142...	495
5	Amount, Average Cost, & Profit ...	Electronic Games	Maharashtra	69	12550	180.0616582491...	-139
6	Amount, Average Cost, & Profit ...	Saree	Madhya Pradesh	170	12193	72.45212102712...	241
7	Amount, Average Cost, & Profit ...	Printers	Madhya Pradesh	49	12186	253.8841836734...	2019
8	Amount, Average Cost, & Profit ...	Phones	Madhya Pradesh	57	10713	212.1598958333...	115
9	Amount, Average Cost, & Profit ...	Electronic Games	Madhya Pradesh	69	9220	143.5781746031...	1966
10	Amount, Average Cost, & Profit ...	Chairs	Uttar Pradesh	23	8745	320.6785714285...	63

- **Query Objective:** Analyze the total quantity sold, total sales value, average cost per product, and total profit at the sub-category and state levels.
- **SQL operations:** Used SUM() for product_quantity, total_amount, and total_profit, and AVG() for average_cost_per_product, all of which were grouped (GROUP BY) by product_sub_category and order_state.
- **Data Analysis:** Provides a highly detailed view of product performance across multiple locations.

Amount, Average Cost & Profit by Sub-Category

	Sub-Category	State	Quantity	Amount	Average Cost	Profit
1.	Hankerchief	Madhya Pradesh	206	$3,047	$775.53	$-29
2.	Saree	Maharashtra	173	$14,586	$4,696.57	$1,280
3.	Saree	Madhya Pradesh	170	$12,193	$2,825.63	$241
4.	Stole	Madhya Pradesh	135	$3,643	$927.37	$628
5.	Stole	Maharashtra	123	$3,217	$947.53	$320
6.	Hankerchief	Maharashtra	121	$2,621	$721.07	$646
7.	Furnishings	Madhya Pradesh	77	$3,817	$1,019.85	$-311
8.	Chairs	Madhya Pradesh	76	$6,863	$2,260.03	$-293
9.	Furnishings	Maharashtra	75	$3,755	$723.4	$-200
10.	Printers	Maharashtra	70	$14,819	$3,720.36	$1,769

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Insights

- **Regional Profitability Disparity:** There is a stark difference in profit for the same product, handkerchief, between two regions. A negative profit of $-29 in Madhya Pradesh indicates the company is losing money on sales there, while the same product in Maharashtra is significantly profitable, generating $646.
- **Cost or Pricing Issues in Madhya Pradesh:** The negative profit in Madhya Pradesh suggests that the selling price of the product may not be sufficient to cover costs (COGS, logistics, etc.). This points to a deeper issue with pricing strategy or an elevated cost structure in that specific region.
- **Systemic Issue at the Regional Level:** The profitability problem in Madhya Pradesh appears to be more than a single-product issue. The table also shows losses in other categories like furnishings and chairs in the same state.

Summary

Top 5 Best Sub-Category Product by Amount

Insight

- High sales of printers demonstrate the platform's strength in serving specific market segments.
- This success is driven by a deep understanding of the needs and price sensitivity of segmented consumers.
- There are significant differences in feature and price preferences among different consumer segments.

Recommendations

- Develop pricing strategies specific to each consumer segment.
- Add complementary products (such as ink and paper) to meet the needs of existing market segments.
- Create targeted marketing campaigns tailored to the preferences of each segment.

Category Product by Amount

Insight

- Electronics is the top-selling product category with sales of $166,267, indicating consumers' strong preference for technology products.
- There is great potential to increase sales of the Apparel and Furniture categories, which are still underperforming the electronics category.
- The dominance of electronics creates a great opportunity for cross-selling or bundling strategies of products from other categories.

Recommendations

- Strengthen the strategy for the electronics category by increasing product variety and exclusive promotions.
- Conduct an in-depth analysis to improve sales bottlenecks in the Apparel and Furniture categories.
- Implement cross-selling strategy of electronic products to drive sales of other categories.

Amount and Profit by Category

Insight

- Electronics had the highest sales but the lowest profitability (7.92%), indicating a gap between volume and profit.
- All categories have profit margins below the industry average (10-20%), indicating a large room for efficiency improvement.
- Low margins indicate potential problems with cost structures or overly competitive pricing strategies.

Recommendations

- Prioritize profitability optimization, especially for the electronics category.
- Conduct a comprehensive cost analysis to identify areas for savings.
- Revise pricing strategies, such as using dynamic pricing or bundling.

Payment Method

Insight

- The dominance of COD payments (45.1%) indicates consumers' preference for a sense of security when shopping online.
- The high usage of COD poses significant operational challenges and logistics costs.
- Digital payments account for a large percentage (46.7%), indicating a migration opportunity.

Recommendations

- Promote digital payments with incentives to encourage migration from COD.
- Increase consumer confidence in digital payment systems through education and security assurance.
- Optimize the COD logistics process to minimize costs and risks.

Top 10 Best Profit by Category & State

Insight

- Electronics in Uttar Pradesh is losing money with a negative profit margin of -19%.
- This problem is isolated to Uttar Pradesh, in contrast to high profit margins in other regions.
- The decline in Average Selling Price (ASP) indicates an ineffective discounting strategy that is eroding profits.

Recommendations

- Stop non-strategic discounting on electronic products in Uttar Pradesh to stop losses.
- Shift focus to high profit margin markets (such as Madhya Pradesh) to maximize profits.
- Implement a smart and planned discounting strategy, not just to attract customers.

Amount, Average Cost, & Profit by Sub-Category

Insight

- There is an extreme profit difference for handkerchiefs between Madhya Pradesh ($-29) and Maharashtra ($646).
- Negative profits in Madhya Pradesh indicate a cost issue or selling prices that are not sufficient to cover costs.
- This profitability issue could be a systemic issue in Madhya Pradesh as other products are also losing money.

Recommendation

- Conduct an in-depth cost audit in Madhya Pradesh for handkerchiefs and other loss-making products.
- Replicate successful strategies from Maharashtra to Madhya Pradesh to increase profits.
- Thorough evaluation of all operations in Madhya Pradesh to address systemic issues.

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