IIT Madras

Optimizing Sales & Marketing Strategies for Sustainable Growth at Ajay Prasad Jewellers

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BUSINESS DATA MANAGEMENT- CAPSTONE PROJECT
PROJECT-MIDTERM REPORT

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Executive Summary

Ajay Prasad Jewellers, a small jewellery shop in Jehanabad, Bihar, operates on a B2C model, offering affordable jewellery with personalized service. Despite having a loyal customer base, the shop faces multiple challenges, including stagnant profits, inefficient inventory management, fluctuating gold prices, and rising operational costs. Strong competition from well-established brands and local jewellers further limits market expansion and customer retention.

During the analysis of financial performance from October to December 2024, the highest monthly revenue was recorded in October at ₹2,217,076. However, November saw a sharp decline to ₹701,897, followed by a partial recovery in December, reaching ₹1,324,985. Gross profit averaged ₹424,395.83 over the period, peaking at ₹665,122.73 in October, while the average net profit stood at ₹282,930.55. The sales data indicated significant fluctuations, emphasizing the need for a strategic approach to revenue stabilization.

Inventory management issues were identified, with certain high-demand items, such as gold pendants, gold rings, silver bangles, and gold bracelets, being understocked below the threshold of five units. Meanwhile, gold prices fluctuated considerably, dropping from ₹5,932.50 per gram in October to ₹2,541.67 in December. Silver prices also experienced volatility, declining from ₹3,593.18 in October to ₹1,753.57 in November before rebounding.

To address these challenges, the shop should implement targeted marketing strategies to ensure consistent sales growth. Improving inventory forecasting will help prevent understocking and ensure product availability. Additionally, close monitoring of metal price trends will allow for better procurement planning and pricing strategies. By adopting these measures, Ajay Prasad Jewellers can enhance financial stability, optimize inventory, and navigate market uncertainties effectively.

Proof of Originality

Interaction video:

https://drive.google.com/file/d/1VIYD64klmmivvfbBf8bsKyiBZxJruXuf/view?usp=drive_link

Raw data:

https://drive.google.com/file/d/1VTzE8yBFeaDIieHECagQJpshYEWpW24A/view?usp=drive_link

https://drive.google.com/file/d/1VRB5eVQ9P2cpM7cCs1X_-8pL_7a6SzXu/view?usp=drive_link

Letter of Authorization:
https://drive.google.com/file/d/1VJsbO1no37fcGRxHCd0McBDisF8eWPvU/view?usp=drive_link
Site of shop: https://g.co/kgs/JKpM7Wg

Metadata

The collected data includes Stock Data and Stock-Sales Summary Data for Ajay Prasad Jewellers. Metadata refers to descriptive details about this dataset, which provides valuable insights into the store's inventory, purchasing trends, and sales performance. The product data consists of three key columns:

1. **Purchase Data**: Records the buying price of each Stock Keeping Unit (SKU), tracking procurement costs and supplier pricing trends. This helps in analyzing cost variations and optimizing purchasing decisions.
2. **Sales Data**: Captures the selling price of jewellery items, offering insights into revenue generation, profit margins, and demand trends across different products.
3. **Inventory Data**: Lists all SKUs, representing various jewellery products, including gold, silver, and gemstone ornaments, aiding in stock management and demand forecasting.

1. Sales data worksheet

SALES DATA OF AJAY PRASAD JEWELLERS						
Date	Item Name	Category	Weight (grams)	Price per Gram (INR)	Quantity Sold	Total Sale Value (INR)
01-Oct-24	Gold Pendant	Gold	3.25	6600	2	42900
02-Oct-24	Silver Bangle	Silver	3.66	6600	3	72468
03-Oct-24	Silver Necklace	Gold	2.31	6600	4	60984
04-Oct-24	Silver Bangle	Silver	2.81	75	2	421.5
05-Oct-24	Gold Bracelet	Gold	1.57	75	1	117.75
06-Oct-24	Gold Ring	Silver	2.07	6600	2	27324
07-Oct-24	Gold Ring	Silver	3.18	75	3	715.5
08-Oct-24	Gold Ring	Gold	5.79	75	2	868.5
09-Oct-24	Gold Ring	Silver	13.86	6600	4	365904
10-Oct-24	Silver Bangle	Silver	23.03	75	4	6909
11-Oct-24	Gold Pendant	Silver	22.13	75	1	1659.75
12-Oct-24	Gold Bracelet	Silver	11.78	6600	3	233244
13-Oct-24	Gold Bracelet	Silver	4.39	6600	1	28974
14-Oct-24	Silver Earrings	Silver	40.5	6600	3	801900
15-Oct-24	Silver Bangle	Gold	12.84	6600	1	84744
16-Oct-24	Silver Bangle	Gold	27.06	75	3	6088.5
17-Oct-24	Gold Ring	Silver	22.02	75	4	6606
18-Oct-24	Gold Bracelet	Silver	47.51	75	2	7126.5
19-Oct-24	Silver Bangle	Silver	46.13	75	1	3459.75
20-Oct-24	Gold Bracelet	Gold	7.4	6600	3	146520
21-Oct-24	Gold Ring	Gold	6.34	6600	2	83688
22-Oct-24	Silver Bangle	Silver	12.2	6600	4	322080
23-Oct-24	Gold Pendant	Silver	47.33	75	2	7099.5
24-Oct-24	Silver Earrings	Gold	2.02	75	1	151.5

The metadata of the above mentioned column headers are explained as follows:

1. **Date** – Represents the transaction date for the sale.
2. **Item Name** – The name of the jewellery item sold (e.g., Gold Pendant, Silver Bangle).
3. **Category** – Indicates whether the item is made of Gold or Silver.
4. **Weight (grams)** – The weight of the item in grams.
5. **Price per Gram (INR)** – The price of the metal per gram in Indian Rupees.
6. **Quantity Sold** – The number of units sold on that particular date.
7. **Total Sale Value (INR)** – The total revenue generated from the sale, calculated as:

   Total Sale Value=Weight (grams)×Price per Gram (INR)×Quantity Sold

2. Purchase data worksheet

Purchase Data of Ajay Prasad Jewellers			
Metal Type	Weight (grams)	Price per Gram (INR)	Total Cost (INR)
Gold	19.67	5900	116053
Gold	22.06	6000	132360
Gold	4.24	6000	25440
Gold	31.09	6000	186540
Gold	9.05	6000	54300
Gold	15.75	6000	94500
Gold	2.89	6000	17340
Gold	3.3	6000	19800
Gold	27.79	6000	166740
Gold	2.72	6000	16320
Gold	50.7	5800	294060
Gold	36.3	5950	215985
Gold	8.32	5800	48256
Gold	2.73	5900	16107
Gold	5.61	5900	33099
Gold	34.99	5900	206441
Gold	7.51	5900	44309
Gold	21.14	5900	124726
Gold	46.68	5900	275412
Gold	29.89	5900	176351
Gold	20.22	5900	119298
Gold	35.79	5900	211161
Gold	48.75	5900	287625
Gold	49.2	5900	290280

The metadata of the above mentioned column headers are explained as follows:

Metal Type – The type of metal purchased (e.g., Gold, Silver).

Weight (grams) – The total weight of the metal purchased in grams.

Price per Gram (INR) – The cost per gram of the metal in Indian Rupees.

Total Cost (INR) – The total expenditure for the purchase, calculated as:

$$\text{Total Cost} = \text{Weight (grams)} \times \text{Price per Gram (INR)}$$

3. Inventory data worksheet

Inventory Data of Ajay Prasad Jewellers					
Item Name	Category	Weight (grams)	Price per Gram (INR)	Stock Quantity	Total Value (INR)
Silver Necklace	Gold	38.2	75	8	22920
Gold Pendant	Gold	22.27	6600	1	146982
Silver Bangle	Silver	23.38	6600	5	771540
Silver Earrings	Silver	28.41	6300	7	1252881
Gold Bracelet	Silver	31.35	75	4	9405
Gold Pendant	Gold	2.91	6200	17	306714
Gold Bracelet	Gold	14.53	75	15	16346.25
Gold Ring	Silver	50.31	75	10	37732.5
Silver Earrings	Gold	3.11	6350	12	236982
Silver Earrings	Gold	46.69	6350	13	3854259.5
Silver Bangle	Silver	21.27	6350	8	1080516
Silver Necklace	Silver	1.17	75	12	1053
Gold Bracelet	Gold	29.67	6600	11	2154042
Silver Earrings	Gold	34.06	75	9	22990.5
Gold Ring	Silver	1.92	75	6	864
Gold Bracelet	Silver	4.48	6300	3	84672
Gold Pendant	Gold	49.3	6600	10	3253800
Gold Bracelet	Silver	16.31	75	18	22018.5
Gold Pendant	Silver	37.65	75	3	8471.25
Gold Bracelet	Gold	19.7	5900	7	813610
Gold Ring	Silver	23.24	75	13	22659

The metadata of the above mentioned column headers are explained as follows:

Item Name – The name of the jewellery item (e.g., Silver Necklace, Gold Pendant).

Category – Specifies whether the item is made of Gold or Silver.

Weight (grams) – The weight of the item in grams.

Price per Gram (INR) – The cost per gram of the metal in Indian Rupees.

Stock Quantity – The number of units of the item currently available in inventory.
Total Value (INR) – The total inventory value of the item, calculated as:
Total Value=Weight (grams)×Price per Gram (INR)×Stock Quantity

MONTH WISE SALES

Month	Revenue (INR)	Gross Profit (INR)	Net Profit (INR)
October 2024	2217075.75	665122.725	443415.15
November 2024	701897.25	210569.175	140379.45
December 2024	1324985.25	397495.575	264997.05

* Link to the Project Data : inventory.xlsx, Sales Data (1).xlsx, purchase.xlsx

Descriptive Statistics

Once the DataFrame is created in Python, the `df.describe()` function is used to obtain the relevant statistics for the dataset.

Descriptive Statistics for the sales data

```
import pandas as pd
import numpy as np
```

```
df=pd.read_excel('/content/Sales Data (1).xlsx')
df.describe()
```

	Date	Weight (grams)	Price per Gram (INR)	Quantity Sold	Total Sale Value (INR)
count	90	90.000000	90.000000	90.000000	90.000000
mean	2024-11-14 12:00:00	13.044333	3555.000000	2.500000	47155.091667
min	2024-10-01 00:00:00	1.130000	75.000000	1.000000	151.500000
25%	2024-10-23 06:00:00	3.197500	75.000000	2.000000	4050.000000
50%	2024-11-14 12:00:00	7.440000	6600.000000	2.000000	14451.000000
75%	2024-12-06 18:00:00	18.130000	6600.000000	3.000000	60258.000000
max	2024-12-29 00:00:00	49.480000	6600.000000	4.000000	801900.000000
std	NaN	13.444137	3273.478719	1.052018	94598.605869

The sales data contains 90 entries with a mean total sale value of ₹45,294.81, indicating a moderate average transaction value. The standard deviation of ₹90,446.73 suggests significant variability in sales performance. A rightward skew is evident, with the 25th percentile at ₹4,050, the median at ₹14,346, the 75th percentile at ₹59,928, and a maximum sale of ₹765,450.

Descriptive statistics for inventory data

```
df=pd.read_excel('/content/inventory.xlsx')
df.describe()
```

	Weight (grams)	Price per Gram (INR)	Stock Quantity	Total Value (INR)	Unnamed: 6
count	50.000000	50.000000	50.000000	5.000000e+01	0.0
mean	24.021800	3131.500000	8.580000	5.440424e+05	NaN
std	15.195495	3216.236749	5.091369	9.402381e+05	NaN
min	1.170000	75.000000	1.000000	8.437500e+02	NaN
25%	12.970000	75.000000	5.000000	1.451700e+04	NaN
50%	22.755000	75.000000	8.500000	4.300612e+04	NaN
75%	34.262500	6487.500000	12.000000	7.432350e+05	NaN
max	50.870000	6600.000000	18.000000	3.854260e+06	NaN

The inventory data consists of 50 entries, with an average total value of ₹544,042.40, indicating a substantial stock value. The standard deviation of ₹94,023.81 suggests considerable variation in inventory worth. The data exhibits a rightward skew, with the 25th percentile at ₹14,517, the median at ₹430,061, the 75th percentile at ₹743,235, and a maximum inventory value of ₹3,854,260.

Descriptive statistics for purchase data

```
df=pd.read_excel('/content/Book5.xlsx')
df.describe()
```

	Weight (grams)	Price per Gram (INR)	Total Cost (INR)
count	50.000000	50.000000	50.000000
mean	25.866800	3002.500000	67484.005000
std	16.784551	2957.532109	93762.618304
min	2.080000	75.000000	156.000000
25%	10.747500	75.000000	2021.625000
50%	23.435000	2937.500000	9957.375000
75%	44.207500	5900.000000	123369.000000
max	50.770000	6000.000000	294060.000000

The dataset contains 50 inventory entries, with an average total cost of ₹67,484.01, indicating a moderate stock valuation. The standard deviation of ₹93,762.62 suggests significant variability in total costs. A rightward skew is observed, with the 25th percentile at ₹2,021.63,

the median at ₹9,957.38, the 75th percentile at ₹123,369, and a maximum total cost of ₹294,060.

Descriptive statistics for month wise sales data

>Descriptive Statistics of Sales by Amount of three month (October, November, December):

```
df=pd.read_excel('/content/Book6.xlsx')
df.describe()
```

	Revenue (INR)	Gross Profit (INR)	Net Profit (INR)
count	3.000000e+00	3.000000	3.000000
mean	1.414653e+06	424395.825000	282930.550000
std	7.615587e+05	228467.612676	152311.741784
min	7.018972e+05	210569.175000	140379.450000
25%	1.013441e+06	304032.375000	202688.250000
50%	1.324985e+06	397495.575000	264997.050000
75%	1.771030e+06	531309.150000	354206.100000
max	2.217076e+06	665122.725000	443415.150000

Upon analysis, it was discovered that the average revenue across three months amounted to ₹1,414,653. Notably, the highest revenue, reaching ₹2,217,076, was recorded in October. The gross profit averaged ₹424,395.83, with a peak of ₹665,122.73, while the net profit had a mean of ₹282,930.55, reaching a maximum of ₹443,415.15.

Detailed Explanation of Analysis Process/Method

The analysis provides a comprehensive overview of the financial and operational performance of **Ajay Prasad Jewellers** over the period from [October-December]. The dataset includes sales, purchases, and inventory records, enabling an in-depth examination of revenue, expenditure, profitability, and inventory management. The dataset consists of time-series data covering three months, offering insights into business trends.

Analysis Process

1. **Revenue, Expenditure, and Profit Calculation:**
   - The total sales and expenses were calculated for each month by summing up all transaction values.
   - This provided an assessment of the company's overall financial standing and cash flow.
2. **Descriptive Statistics Analysis:**

- Descriptive statistics were computed for all datasets to gain insights into sales, profit, and cost variations.
- Python libraries such as **Pandas and NumPy** were used to calculate mean, median, standard deviation, and percentiles.

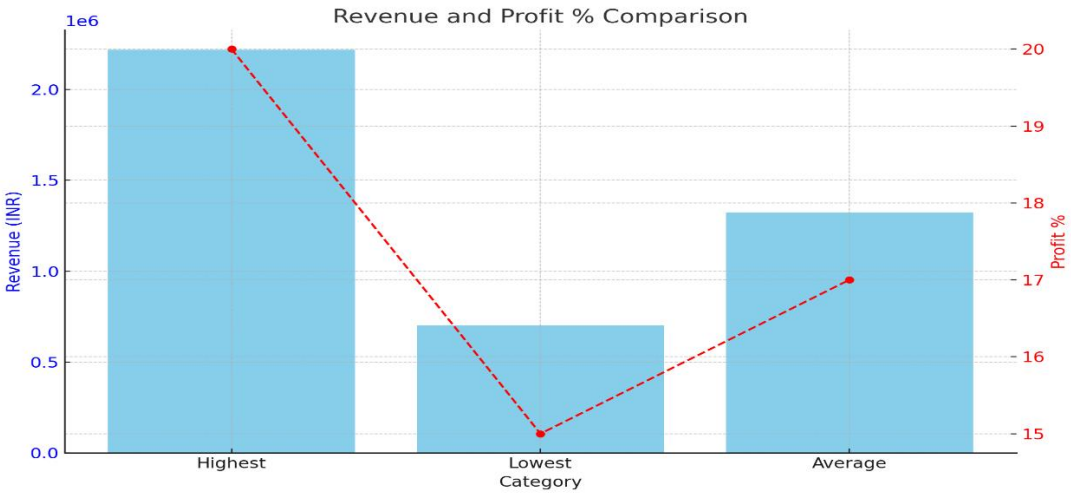
3. **Profit/Loss Computation:**
   - Data from multiple sheets (sales, purchases, inventory**)** were aggregated to determine overall profit or loss.
   - This helped identify low-sales months and potential loss-making periods, assisting in business strategy formulation.
4. **Average Monthly Revenue and Expense Calculation:**
   - Monthly average sales, expenses, and profits were computed using the formula:
   - Avg= (Total Sales or Total Expenses in a Mon)/ (Number of Transactions in that Mon)
   - This provided insights into monthly financial trends and assisted in forecasting future performance.
5. **Inventory Analysis:**
   - Stock movement trends were analyzed by comparing purchase quantities with sales and usage data.
   - This helped in making informed decisions regarding reordering, stock management, and demand forecasting.
6. **Price & Cost Trend Analysis:**
   - Price fluctuations of key materials (gold, silver, gemstones) were tracked across different months.
   - Logistics and operational cost variations were analyzed to understand changes in expenses and potential savings.
   - This enabled pricing strategy adjustments and cost optimization measures to enhance profitability.

This structured approach provided valuable insights into sales trends, profit margins, inventory management, and cost optimization, allowing for data-driven decision-making at Ajay Prasad Jewellers

Results and Findings

Monthly revenue and profit generated

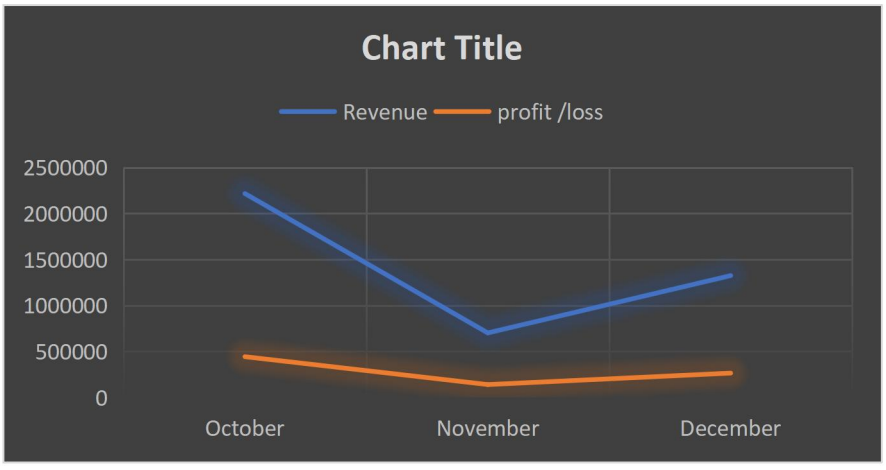
	Revenue (INR)	Profit %
Highest	₹ 22,17,075.75	20%
Lowest	₹ 7,01,897.25	15%
Average	₹ 13,24,985.25	17%



Inconsistent sales:

Months	Revenue	profit /loss
October	2217075.75	₹ 4,43,415.15
November	701897.25	₹ 1,40,379.45
December	1324985.25	₹ 2,64,997.05

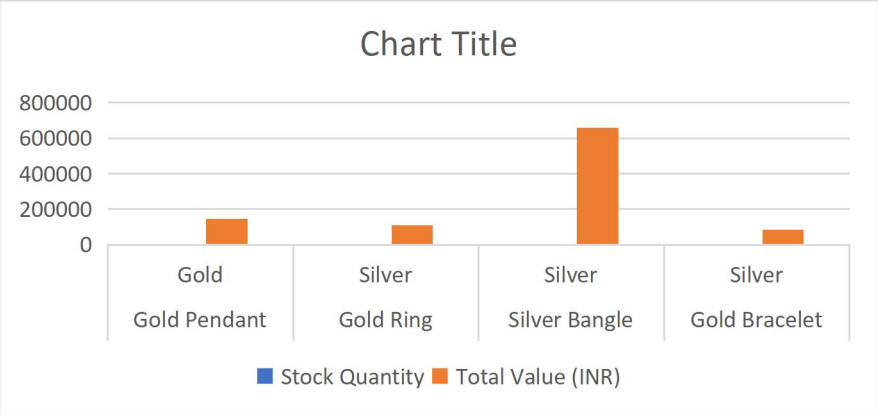
Table-3



The chart visualizes revenue and profit/loss for October, November, and December. Revenue is represented in blue, while profit/loss is shown in orange. The vertical axis indicates monetary values, and the chart highlights a significant revenue drop in November before recovering in December.

Understocking

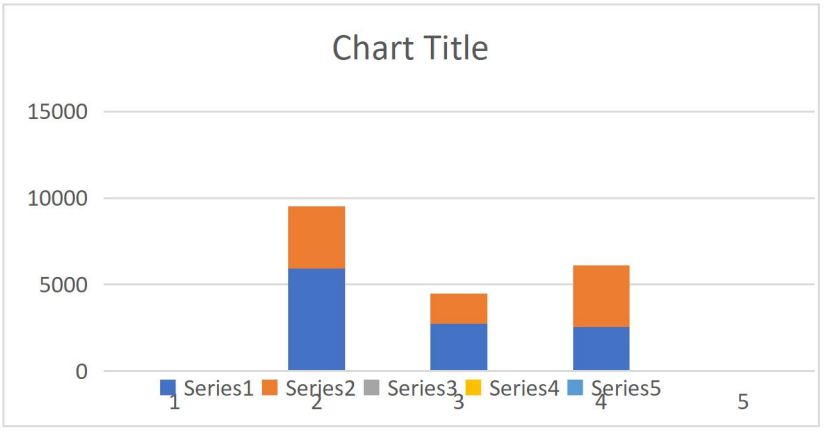
Item Name	Category	Stock Quantity	Total Value (INR)
Gold Pendant	Gold	1	₹ 1,46,982.00
Gold Ring	Silver	1	₹ 1,10,359.50
Silver Bangle	Silver	2	₹ 6,58,320.00
Gold Bracelet	Silver	3	₹ 84,672.00



The bar chart highlights understocked items with stock levels below the threshold of 5 units. Red bars indicate critical shortages, requiring urgent restocking. The dashed gray line represents the minimum stock limit. Regular monitoring and restocking strategies are essential to prevent stockouts and ensure smooth inventory management, avoiding disruptions in sales and operations

Month-wise Gold Price Fluctuating price of gold and silver Analysis

Month	Gold Price per Gram (INR)	Silver Price per Gram (INR)
Oct-24	5932.5	3593.18
Nov-24	2719.44	1753.57
Dec-24	2541.67	3564.29



The table presents month-wise price fluctuations of gold and silver. Gold peaked at ₹5,932.50 in October but dropped to ₹2,541.67 by December. Silver fell from ₹3,593.18 in October to ₹1,753.57 in November before recovering to ₹3,564.29. These variations highlight market volatility, requiring strategic pricing and inventory planning to manage risks effectively.