Optimizing Inventory Management and Sales Strategies Amid Market Volatility

A Mid-Term report for the BDM capstone Project

Submitted by

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1. Incorrect
2. plus, first page is not to be numbered.

Contents

1 Executive Summary and Title

Ananya Marketing, a wholesale food oil business founded in 2021 by Harsh Choudhary, is based in Varanasi, Uttar Pradesh. The firm specializes in selling mustard, soybean, vegetable, and palm oils under the brands H&T, HBC, and Kesar. Operating in a volatile market, Ananya Marketing faces challenges due to frequent fluctuations in oil prices, leading to supply chain disruptions. These issues are often caused by monopolistic suppliers who halt sales during price increases, resulting in inventory shortages and lost profit opportunities. The goal of this project is to optimize inventory management and sales strategies to help the firm navigate these market challenges effectively.

The analysis was based on sales and purchasing data from April to August 2024. This dataset contained critical metrics such as daily sales volumes, purchase quantities, revenue, closing stock, and invoice data for customer purchases . Detailed data on revenue, overall profit, expenditure, and sales volumes were analyzed to evaluate the firm's performance and identify areas for development.

The analytical procedure began with data cleaning and organizing in Excel, which ensured accuracy by removing duplicates and correcting missing numbers. Descriptive statistics such as mean and standard deviation were used to identify trends in product performance, sales volatility, and price. Results and finding were highlighted using visualization methods including bar chart and column chart.

Key finding suggested that products such as "HBC RPO 850 G POUCH" were highly profitable with effective pricing strategies. Despite increasing sales, "HBC PALM 15 KG TIN" had limited margins that necessitated cost restraint. "H & T SBO 900 GM" had the largest profit margin (6.54%), while "DOUBLE HIRAN MUSTARD 1LTR POUCH" had negative margins and required strategic changes. Inventory inefficiencies, particularly with the "HBC PALM 15 KG TIN", suggested overstocking, whereas the "HBC RPO 850 G POUCH" demonstrated effective inventory control.

2 Proof Of Originality of Data

2.1 Primary Data- Survey Link :

To access the data used for the project use below link

https://docs.google.com/spreadsheets/d/1O2MVBnMuRK-NiXCfKQaVdzU9gvrfoJ18/edit?usp=drive_link&ouid=111937987129148883034&rtpof=true&sd=true

2.2 Letter Of Authentication :

ANANYA MARKETING
FOOD OIL WHOLESALER
MACHODARI PARK VARANASI – 221001

Oct 5, 2024

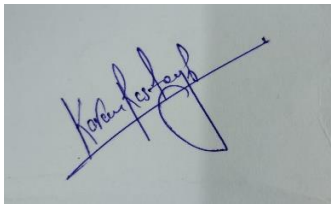
To,
Prof. Vignesh Muthuvijayan
Coordinator, IIT Madras B.S. Degree Program
Chennai, 6000036

Dear Sir,

I hope you're well. I'm writing to certify that Ananya Marketing gave Mr. Aditya Choudhary with the data and information he needed to complete his project successfully. The information provided is original and has been obtained directly from our business.

Mr. Aditya Choudhary has been given full access to the necessary datasets and other relevant information to help him achieve the goals of his project. As the owner of Ananya Marketing, I, Harsh Choudhary, tell you that the information is correct, true, and depicts our business operations honestly. We are delighted to assist Mr.Aditya Choudhary in his academic endeavors, and we are convinced that this data will make a significant contribution to the project's success.

Sincerely,



Harsh Choudhary
Owner, Ananya Marketing
Machodari Kotwali, Varanasi, U.P.

2.3 Photographs of the organization :

2.4 Video interaction with the owner :

* Video showcase of the business place

The video of the interaction with the store owner can be accessed from.

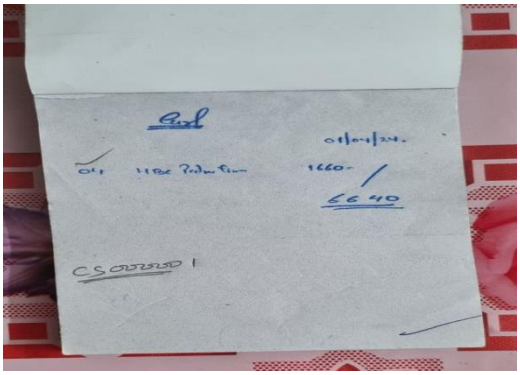
https://drive.google.com/file/d/1eJO-iD0xVXS6lEGZ6f-fhtwf9i60W9V3/view?usp=drive_link

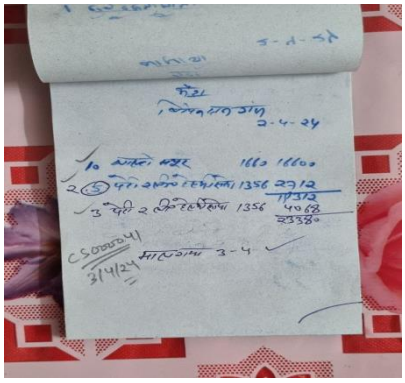
* Authorisation letter and video do not give confidence that the data is from the same business house.

3. Metadata and Descriptive Statistics

3.1 Data Collection for Metadata

- The data I obtained from Ananya Marketing covers five months: April, May, June, July, and August. This dataset contains a variety of parameters required for an entire study.
- The data collecting method involved obtaining sales and purchase information, and then analyzing the structure, variables, and summary statistics. Key columns seen in the data include Revenue, Stock Bought, Stock Sold, and other important indicators.
- Additionally, pictures were collected as raw data, which will be used for in making of metadata





3.2 Metadata

3.2.1 Sales and Purchase Data

It records all transactions from April 2024 to September 2024, which is the most up-to-date data available right now, including product names, ordered quantities, and sale quantities. It also gives closing stock for every day of the five months.

- **Date (Data Type: Date)**

This column reflects the particular date of the sales transaction. It is critical to maintain track of everyday transactions and analyze sales patterns over time.
Format:DD-MM-YYYY

- **Product Name (Data Type: General)**

This column includes the name for sale.The product name helps distinguish between many products in the inventory and can also be used for filtering, grouping, or arranging sales by item in reports.

- **Sale Qty (Data Type: Number)**

This reflects the number of units of a specific product sold on a given date. It shows the volume of sales for a specific product. It's used to calculate various performance measures such as sales per product and average sales volume

- **Sale Revenue (Per Product) (Data Type: Currency)**

This column shows the total money made by selling a certain quantity of a product on that day.It provides information on how much money is earned per product on a given day.

- **Closing Stock (Data Type: Number)**

This column shows the amount of units of a product remaining in stock after the day's sales have been accounted for. It represents the remaining inventory at the conclusion of the day.

- **Selling Price (Data Type: Currency)**

This is the price at which a single unit of goods is sold to the client. This value is significant since it has a direct impact on sales revenue calculation and profitability.

- **Purchase Qty. (Data Type: Number)**

This column shows the quantity of a specific product purchased or restocked on a given day. This is necessary for tracking how much stock has been added to the inventory over time.

- **Purchase Expenditure (Data Type: Currency)**

This column reflects the total cost incurred by purchasing the quantity of products for restocking.

3.2.2 Profit and Loss Data

It allows us to see which products are sold in which months and what profit they made.

- **Product Name (Data Type: General)**

This column includes the name for sale.The product name helps distinguish between many products in the inventory and can also be used for filtering, grouping, or arranging sales by item in reports.

- **Total Profit (Data Type: Currency)**

This column shows the total profit from the sale of all products. It's calculated by deducting the entire expenditure from the total revenue.

- **Total Profit (Per Product) (Data Type: Currency)**

This column represents the profit made from selling a given product. It is computed by subtracting the product's expense from its sales revenue.

- **Total Revenue (Data Type: Currency)**

This column totals the revenue generated from the sale of all products. It is the total of individual revenue from every item sold.

- **Total Expenditure (Data Type: Currency)**

This column totals all expenses related to the purchase of products or other business-related costs.

1. You have to work on Metadata and explain every feature of the sheet.

2. Presently, it is not giving clear picture, what are you trying to convey.

3. Instead of bullets, use Sub-headings like a), b), c) etc.

- **Profit Margin Percentage (Per Product) (Data Type: Percentage)**

This column shows the percentage of revenue that is converted into profit for each product.

3.3 Descriptive Statistics

Descriptive analysis is a fundamental data analysis technique that focuses on summarizing and explaining a dataset's major aspects. It entails organizing, summarizing, and displaying data to reveal patterns, trends, and insights. This study frequently uses measurements such as central tendency (mean, median, mode) to explain the typical value, measures of dispersion (such range, variance, and standard deviation) to highlight the spread of data points, and graphical representations.

- **Sales Descriptive Statistics**

Product Name	Total Sales	Average Sales per Day	Max Sales per Day	Median Sales per Day	Standard Deviation	Total Sales(In Revenue)	Average Sales per Day(In Revenue)	Max Sales per Day(In Revenue)	Standard Deviation(In Revenue)	Median Sales per Day
HBC PALM 15 KG TIN	30908.00	202.01	1618.00	38.00	312.29	₹4,69,30,246.05	₹3,06,733.63	₹24,84,974.75	₹4,73,801.76	₹57,000.00
HBC RPO 850 G POUCH	13522.00	88.38	620.00	37.00	122.97	₹1,37,64,467.36	₹89,963.84	₹6,41,656.00	₹1,24,898.16	₹40,274.14
HBC SBO 850 G Pouch	7327.00	47.89	266.00	36.00	53.83	₹80,55,255.52	₹52,648.73	₹2,91,839.24	₹59,410.68	₹38,674.44
HBC SBO 425 G PET	4279.00	27.97	150.00	14.00	36.51	₹49,84,436.39	₹32,578.02	₹1,74,571.50	₹42,469.65	₹16,000.04
H & T SBO 900 GM	1155.00	7.55	131.00	0.00	17.65	₹13,92,795.84	₹9,103.24	₹1,52,960.27	₹21,065.55	₹0.00
MAYUR VNP BALTY 15 KG	1413.00	9.24	140.00	1.00	16.90	₹22,58,516.66	₹14,761.55	₹2,24,904.40	₹27,059.17	₹1,613.33
DOUBLE HIRAN MUSTARD 1 LTR POUCH	397.00	2.59	45.00	0.00	6.25	₹7,16,792.36	₹4,684.92	₹87,542.90	₹11,466.92	₹0.00
KESAR RB 15 KG	853.00	5.58	102.00	0.00	13.51	₹14,08,962.77	₹9,208.91	₹1,69,524	₹22,058.	₹0.00

Product Name	Total Sales	Average Sales per Day	Max Sales per Day	Median Sales per Day	Standard Deviation	Total Sales(In Revenue)	Average Sales per Day(In Revenue)	Max Sales per Day(In Revenue)	Standard Deviation(In Revenue)	Median Sales per Day
TOTAL SALES PER DAY (across products	59854.00	391.20	1940.00	242.00	441.10	₹7,95,11,472.95	₹5,19,682.83	₹27,70,163.92	₹6,07,839.98	₹3,00,699.77

● Purchase Descriptive Statistics

Product Name	Total Purchase	Average Purchase per Day	Max Purchase per Day	Median Purchase	Standard Deviation	Total Expenditure (In Revenue)	Average Expenditure per Day(In Revenue)	Max Expenditure per Day(In Revenue)	Standard Deviation(In Revenue)	Median Expenditure per Day
HBC PALM 15 KG TIN	33941.00	221.84	2379.00	0.00	492.40	₹5,14,27,710.35	₹3,36,128.83	₹35,56,677.20	₹7,43,085.82	₹0.00
HBC RPO 850 G POUCH	13858.00	90.58	1200.00	0.00	228.85	₹1,40,58,346.97	₹91,884.62	₹12,01,843.07	₹2,32,695.67	₹0.00
HBC SBO 850 G Pouch	7705.00	50.36	860.00	0.00	125.87	₹82,91,367.72	₹54,191.95	₹9,25,772.18	₹1,35,152.14	₹0.00
HBC SBO 425 G PET	4492.00	29.36	450.00	0.00	75.13	₹51,32,779.23	₹33,547.58	₹5,13,819.58	₹85,891.83	₹0.00
H & T SBO 900 GM	1846.00	12.07	749.00	0.00	80.17	₹21,44,607.67	₹14,017.04	₹8,69,008.91	₹93,259.90	₹0.00
MAYUR VNP BALTY 15 KG	1429.00	9.34	180.00	0.00	24.48	₹22,82,690.17	₹14,919.54	₹2,91,800.00	₹39,276.39	₹0.00
DOUBLE HIRAN MUSTARD 1 LTR POUCH	417.00	2.73	69.00	0.00	9.89	₹7,60,837.39	₹4,972.79	₹1,20,379.95	₹17,981.52	₹0.00
KESAR RB 15 KG	963.00	6.29	100.00	0.00	24.05	₹15,84,736.97	₹10,357.76	₹1,71,428.00	₹39,648.23	₹0.00

1. Descriptive Stats. is not about only Sales / purchase.

2. Its about the descriptive statistics of the features of the spreadsheet which you have used for the analysis.

3. Things included by you, will come in the analysis part. (Which items sold the most, mean, median etc).

Product Name	Total Purchase	Average Purchase per Day	Max Purchase per Day	Median Purchase	Standard Deviation	Total Expenditure (In Revenue)	Average Expenditure per Day(In Revenue)	Max Expenditure per Day(In Revenue)	Standard Deviation(In Revenue)	Median Expenditure per Day
TOTAL SALES PER DAY (across products	64651	423	4179	50.00	801.634809	₹8,56,83,076.47	₹5,60,020.11	₹54,11,488.25	₹10,61,957.79	₹74,642.86

4 Detailed Explanation of Analysis Process

The project focused on analyzing Ananya Marketing's sales and invoice data, with particular focus on addressing issues caused by oil price fluctuations and monopolistic supplier behavior.

4.1 Data Collection and Organization (Excel Sheets)

Process:

Excel spreadsheets were used to collect, organize, and clean raw sales and purchase data. This included importing data, deleting duplicates, dealing with missing information, and standardizing entries to assure data consistency.

Justification:

- **Accessible and User-Friendly:** Excel's user-friendly design makes it perfect for firms such as Ananya Marketing. Owner can quickly gain proficiency in fundamental data processing jobs due to the minimal learning curve.
- **Versatile and Efficient for Datasets:** Excel has a variety of functions, including VLOOKUP, IF, and sorting/filtering tools, that are adequate for handling and cleaning datasets. It enables simple data modification and analysis without the need for specialized tools.

Why It Is Appropriate:

Excel is a cost-effective data management tool. It provides key capabilities that are simple to use, making it appropriate for the firm's day-to-day operations without the need for technical skills or expensive tools.

4.2 Descriptive Statistical Analysis (Mean, Median, Standard Deviation)

Process:

Cover

1. Data collection
   - how was it collected
   - cleaned?, feature engineering?
2. Analysis process
   - which features used (relating to the problem statement)
   - Use of visualisation, charts!

After organising, important metrics such as mean, median, standard deviation, and variance were computed. These factors contributed to the mean selling price, average order value, and price variability, all of which are important for understanding the customer purchasing behavior and pricing trends.

Justification:

- **Basis for Insights:** Descriptive statistics offer a strong basis for determining general sales patterns. They help Ananya Marketing to determine how dynamic its pricing strategy is and whether it meets customer demands.

- **Finding Irregularities:** These statistics assist in identifying outliers, such as products sold at extremely high or low prices, which might suggest pricing inefficiencies or inventory mismanagement.

Why It Is Appropriate:
Given Ananya Marketing's issues with fluctuating oil prices, descriptive statistics are a vital tool for gaining fast insights into pricing trends. This strategy allows for data-driven judgments without requiring complex statistical tools.

4.3 Visualization of Data (Graphs, Charts, Pareto Analysis)

Process:

Excel was used to build visualizations such as line graphs to analyze price changes, bar charts to compare product performance, and Pareto charts to emphasize the 20% of products that make up for 80% of total sales.

Justification:

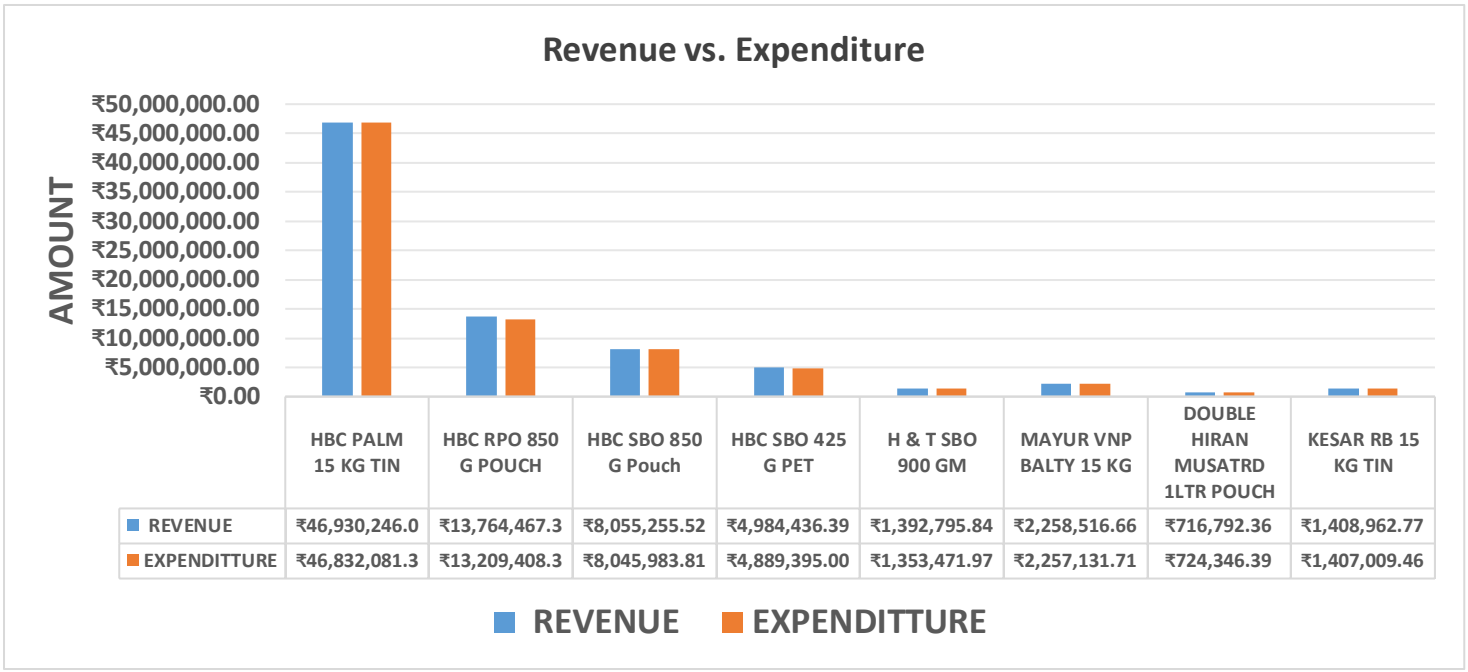
- **Data Clarity:** Visuals simplify complex datasets, immediately revealing patterns, anomalies, and connections.

- **Actionable Insights:** Ananya Marketing uses Pareto Analysis to focus on its most profitable items, guiding tactics to maximize profitability despite market fluctuations.

Why It Is Appropriate:

Visual tools in Excel enable Ananya Marketing to make informed and timely decisions. The Pareto analysis gives actionable insights that are consistent with the firm's aims of managing inventories and increasing sales without requiring complex technical knowledge.

5 Results and Findings (Graphs and other pictorial representations):



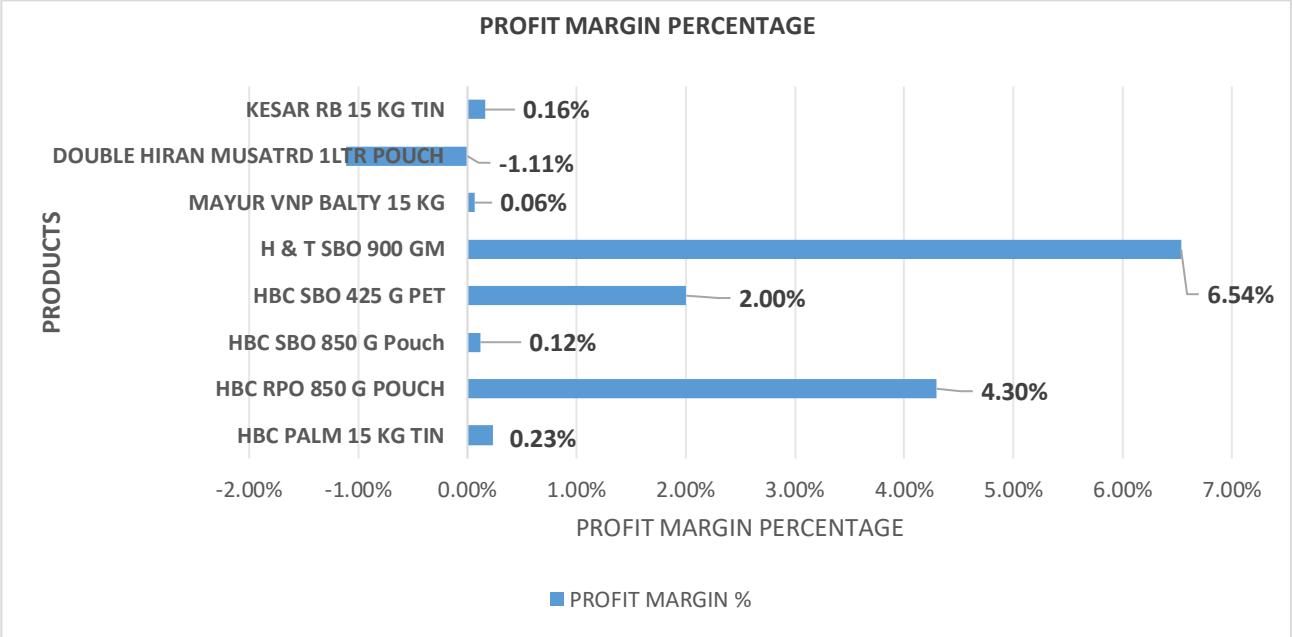
	HBC PALM 15 KG TIN	HBC RPO 850 G POUCH	HBC SBO 850 G Pouch	HBC SBO 425 G PET	H & T SBO 900 GM	MAYUR VNP BALTY 15 KG	DOUBLE HIRAN MUSATRD 1LTR POUCH	KESAR RB 15 KG TIN
REVENUE	₹46,930,246.0	₹13,764,467.3	₹8,055,255.52	₹4,984,436.39	₹1,392,795.84	₹2,258,516.66	₹716,792.36	₹1,408,962.77
EXPENDITTURE	₹46,832,081.3	₹13,209,408.3	₹8,045,983.81	₹4,889,395.00	₹1,353,471.97	₹2,257,131.71	₹724,346.39	₹1,407,009.46

X-axis -Products (e.g., "HBC PALM 15 KG TIN", "HBC RPO 850 G POUCH")
Y-axis – Amount (₹, representing both revenue and expenditure for each product)

Revenue vs. Expenditure (Clustered Bar Chart): This chart compares each product's revenue to its associated costs, emphasizing products that have substantial sales and expenses. It's beneficial for identifying products that make a profit or have tight margins.

Results and Findings

- HBC PALM 15 KG TIN": The close relationship between income and expenditure shows low profitability despite large sales volume. To increase margins, cost-cutting measures may be necessary.
- "HBC RPO 850 G POUCH": The considerable gap between revenue and expenditure indicates healthy profitability, implying that this product has been cost and pricing optimized.
- "DOUBLE HIRAN MUSTARD 1LTR POUCH": Spending exceeds revenue, resulting in a loss, indicating a pricing or cost control issue that requires immediate attention.



X-axis – Products (e.g., "HBC PALM 15 KG TIN", "HBC RPO 850 G POUCH")
Y-axis – Profit Margin Percentage (e.g., -2%, -1%, 0%, up to 7%)

Profit Margin Percentage (Bar Graph): This graph shows the percentage of profit margin per product, which represents the proportion of revenue converted into profit. It is useful for identifying products with low margins that may require price or cost modifications.

Results and Findings

- "HBC RPO 850 G POUCH": The second-highest profit margin (4.30%) indicates effective cost control and pricing power.
- "DOUBLE HIRAN MUSTARD 1LTR POUCH": A negative margin (-1.11%) indicates that the product is a loss-maker and should be addressed immediately.
- "H & T SBO 900 GM" has the highest profit margin at 6.54%, indicating that although generating only a little fraction of the entire revenue, it is highly efficient in converting sales into profit.

More detailed analysis of the data will be done and added to the Final Report of the BDM Capstone Project.

Entire report is to be redone.

1. Meta data.
2. Descriptive Statistics
3. Data collection & Analysis policy
4. findings
5. Recommendation.

And report should be flowing logically.