

Optimizing Revenue Streams and Operational Efficiency: A Data-Driven Approach for a Clothing Manufacturing and Export Company

A Mid-term report for the BDM capstone Project

Submitted by
Name: Navya Tyagi
Roll number: 22f1001270



IITM Online BS Degree Program,
Indian Institute of Technology, Madras, Chennai
Tamil Nadu, India, 600036

Contents

1. Executive Summary and Title
2. Proof of originality of the data
3. Metadata
4. Descriptive Statistics
5. Detailed explanation of analysis process/method
6. Results and findings
7. Expected Outcome

1. Executive Summary and Title

JK Clothing is a prominent garment exporter under JK Handicrafts, boasting a 15 year legacy of delivering high-quality products globally. Renowned for excellence in producing chemical-free garments, the company has maintained an impeccable reputation in sustainability.

However, JK Clothing encounters critical challenges impacting its operational efficiency. The issues primarily revolve around stagnant sales, inefficient inventory management, and a restricted understanding of evolving customer preferences.

These challenges arise from complex market dynamics and rapidly changing consumer trends. Internally, disjointed data systems and limited analytics hinder comprehensive decision-making across the various units of business. Externally, global competition and economic fluctuations further alleviate these challenges.

This report presents an analysis of manufacturing and sales data obtained from JK Clothing of approximately four months i.e. May-August 2023. While the data lacks specific details on categorized sales and quantities, it offers valuable information for addressing some of the identified problems.

The proposed solution involves a data-driven approach. By harnessing purchase data, sales data, customer behavior insights, and inventory trends, the aim is to refine marketing strategies, optimize inventory levels, and align product offerings with evolving customer needs. This data-centric strategy targets enhanced sales performance, reduced return rates and improved operational efficiency by implementing the recommended solutions.

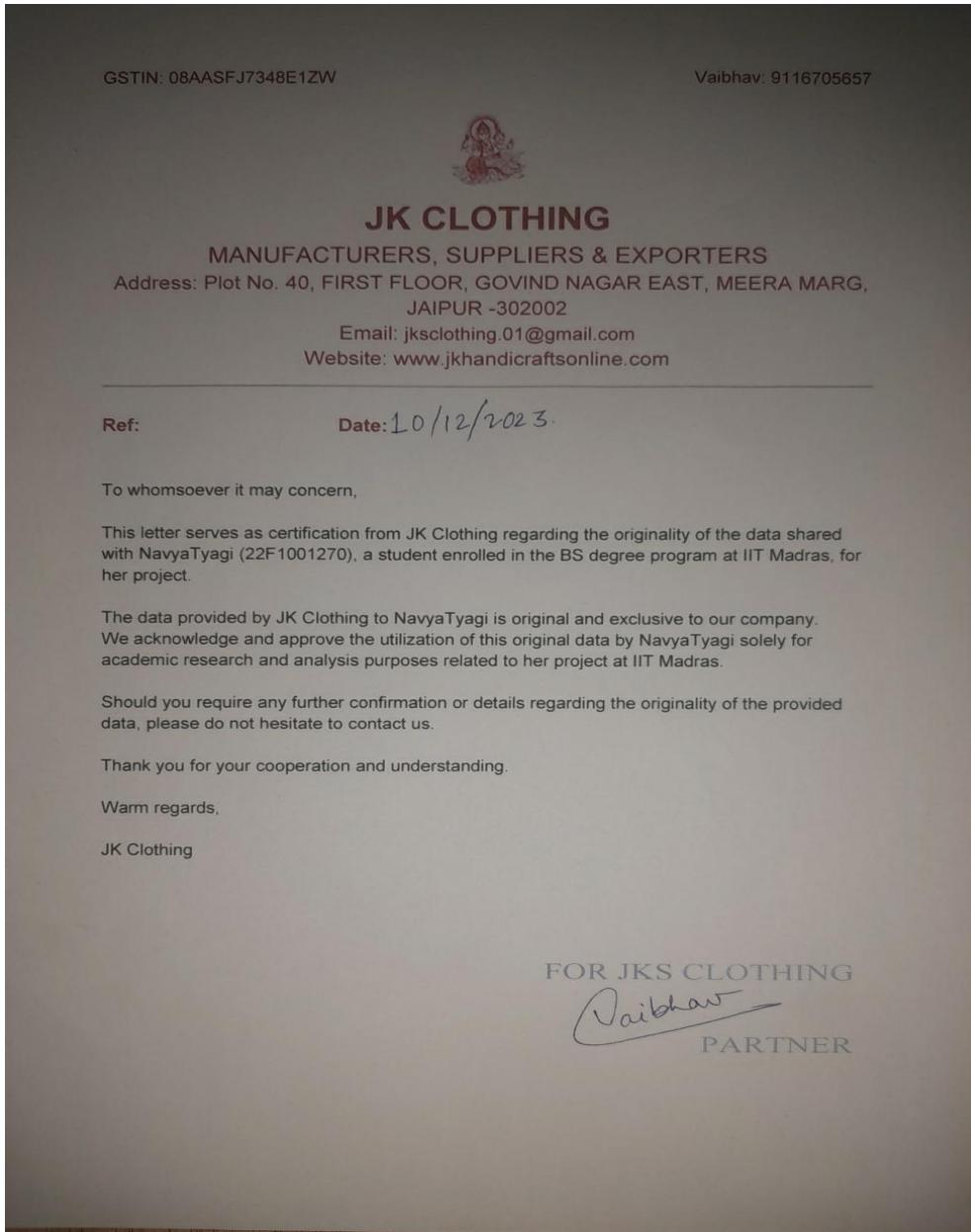
This strategic endeavor aligns with JK Clothing's commitment to maintaining its standing as a distinguished global supplier. The project endeavors to propel JK Clothing towards an adaptive and data-informed business model, fostering growth and sustainability in an increasingly competitive market landscape.

2. Proof of originality of the data

The data is collected in primary form from one of the business owners and converted into a spreadsheet format to give it a proper visual structure. The spreadsheet contains two sheets of data containing purchase/manufacturing data and sales data respectively. The data is quite in a simple format containing basic information from the business's local inventory.

The remaining analysis is done by cleaning the data and importing it to google colaboratory notebook in csv format. Colab helps in extracting insights from the data and in data visualization.

- A survey link was not required in this situation and hence it is not used.
- This is a letter from the business i.e. JK Clothing certifying the originality of the data and their permission to use their data for project purposes.



- Images from the business factory



- Recorded virtual meeting video with one of the business owners
(In this video, one of the business owners, Mr. Vaibhav Maheshwari talks about the company background, B2B nature of their business, data collection that is required for the project, letter of originality/ permission to use data which is supposed to be included in the report.)

Link: https://youtu.be/_Xv0rWzc_kw?si=TmwzXoGvudwoGXYd

3. Metadata

This project involves analysis of data from a clothing manufacture and export company. The data is collected in the form of a spreadsheet which was taken from their local inventory.

The spreadsheet BDM.xlsx contains:

(Link:

https://docs.google.com/spreadsheets/d/1iF_4qRwrC6uPI_KoRS_V1XY_K5u938YrbroOu3RsWhA/edit?usp=sharing)

Sheet 1: Purchase & Manufacturing Data

- DATE: Date of the purchase/manufacture.
- PRODUCT: Name of the product.
- GENDER: Gender specification related to the product (e.g., M, F).
- SIZE: Size variations of the product (e.g., S, M, L, XL, FREE SIZE).
- PIECES: Quantity of individual pieces purchased or manufactured.
- RATE: Price per piece.
- TOTAL: Total cost calculated based on the quantity and rate.

Sheet 2: Sales Data

- DATE: Date of the sale.
- PRODUCT: Name of the sold product.
- GENDER: Gender specification related to the sold product (e.g., M, F).
- SIZE: Size variations of the sold product (e.g., S, M, L, XL, FREE SIZE).
- PIECES: Quantity of individual pieces sold.
- RATE: Selling price per piece.
- TOTAL: Total Revenue generated from the sale.

Next, we used google colaboratory notebooks for the data analysis.

Colab Notebook 1: Purchase_data.ipynb

(Link:

https://colab.research.google.com/drive/1HLwhxz25q_QUX0qCuDmFUFyanVCyhoYH?usp=sharing

- Comprehensively analyzes purchase and manufacturing data from JK Clothing.
- It explores diverse aspects, including purchase trends over time, product performance, gender and size preferences, etc.

Colab Notebook 2: Sales _data.ipynb

(Link:

https://colab.research.google.com/drive/1XOZ7g-loYnwaIALZesK5_XWzQDWsOCR?usp=sharing)

- Comprehensively analyzes sales data from JK Clothing.
- It explores diverse aspects, including purchase trends over time, product performance, gender and size preferences, etc.

The report aims to analyze the purchase and sales data to gain insights beneficial for enhancing sales strategies, inventory management, and understanding customer behavior. The metadata provides a precise overview of the data structure and the specific sheets and notebooks used for the analysis.

4. Descriptive statistics

Descriptive statistics are used to describe the dataset using statistical measures like mean, median, mode, minimum and maximum. They provide insights into the distribution and variability of the dataset.

Table 1: Purchase & Manufacturing data

	PIECES	RATE	TOTAL
count	123.000000	123.000000	123.000000
mean	48.089431	1000.820325	30376.747967
std	178.207744	438.892689	21192.129289
min	10.000000	100.000000	10000.000000
25%	17.500000	830.000000	15450.000000
50%	30.000000	1000.000000	26100.000000
75%	50.000000	1100.000000	40037.500000
max	2000.000000	2500.000000	200000.000000

The table presents descriptive statistics of purchase & manufacturing data from May 2023 to August 2023 of JK Clothing. These statistics summarize the distribution of variables 'PIECES', 'RATE', and 'TOTAL'.

Mean represents the average value for each variable. The mean 'PIECES' is approximately 48.09, 'RATE' is around 1000.82, and 'TOTAL' is roughly 30376.75.

Min refers to the minimum value observed in each variable. The minimum 'PIECES' value is 10, 'RATE' is 100, and 'TOTAL' is 10000. Similarly, *Max* refers to the maximum observed value. The maximum 'PIECES' value is 2000, 'RATE' is 2500, and 'TOTAL' is 200000.

25%, 50%, 75% (percentiles) values represent the data distribution. For example, 25% of the 'PIECES' values fall below 17.5, 50% fall below 30, and 75% fall below 50. These percentiles help understand the data's distribution in quartiles. *std (standard deviation)* refers to the dispersion or spread of the data around the mean.

Table 2: Sales Data

	PIECES	RATE	TOTAL
count	123.000000	123.000000	123.000000
mean	48.089431	1601.312520	48602.796748
std	178.207744	702.228302	33907.406863
min	10.000000	160.000000	16000.000000
25%	17.500000	1328.000000	24720.000000
50%	30.000000	1600.000000	41760.000000
75%	50.000000	1760.000000	64060.000000
max	2000.000000	4000.000000	320000.000000

This table presents descriptive statistics of sales data from May 2023 to August 2023 of JK Clothing and can be interpreted in the same manner as Table 1(see above).

5. Detailed explanation of analysis process

The analysis involved the following steps:

1. Data cleaning and preprocessing: The data was available in spreadsheets which were imported to google colaboratory notebook for further analysis. The data was checked for missing values, data types and data integrity.
2. Descriptive Statistics: The statistics of the dataset were summarized using measures like mean, standard deviation, min and max for better understanding of distribution of the variables in the dataset.

3. Purchase and sales analysis: The monthly purchase and sales data was used to determine the most purchased and sold product. Pareto charts were plotted to represent the monthly purchase and sales distribution of the products.
4. Gender and size analysis: The gender and size variables were explored to understand customer preferences based on gender and size criteria. Bar plots were used to visualize this distribution. A pivot table was also created to analyze quantities bought/sold for different sizes based on gender and a heatmap was utilized to visualize this.
5. Price distribution analysis: This was done to explore the distribution of prices ('RATE') for products, analyze price ranges, and identify any outliers or common price points. A histogram was created to visualize the same.
6. Time Series analysis: The time series analysis was performed to understand the trend of total purchase/sale amounts over time.

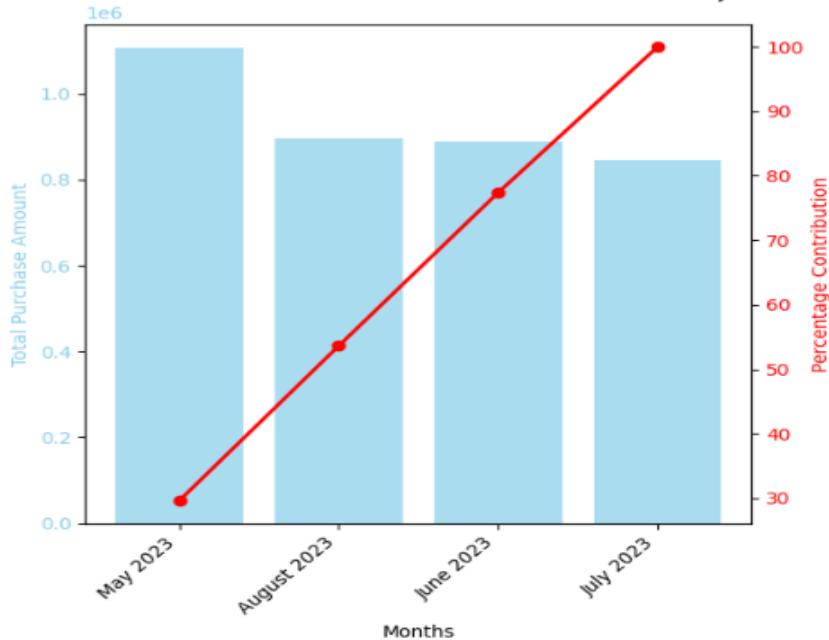
By following this analysis process, meaningful insights were derived from the available data. The sales and purchase analysis provides an overview of the monthly trends, descriptive statistics offer quantitative measures of the data, and the rest analysis methods highlight any patterns or trends associated with the data.

6. Results and Findings

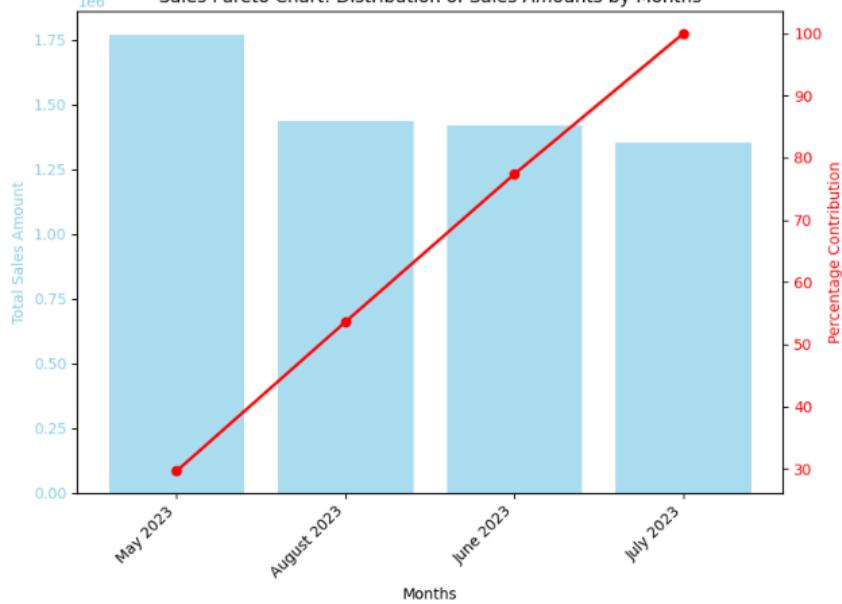
The detailed analysis of the purchase and sales data of JK Clothing gave critical insights to the data and shed light on various patterns and trends.

Pareto Analysis: By using Pareto charts, we identified the most influential products and months contributing significantly to overall purchases and sales, aiding in strategic inventory management. Knowing top contributing products helps in decision making regarding pricing strategies or promotions to maximize revenue.

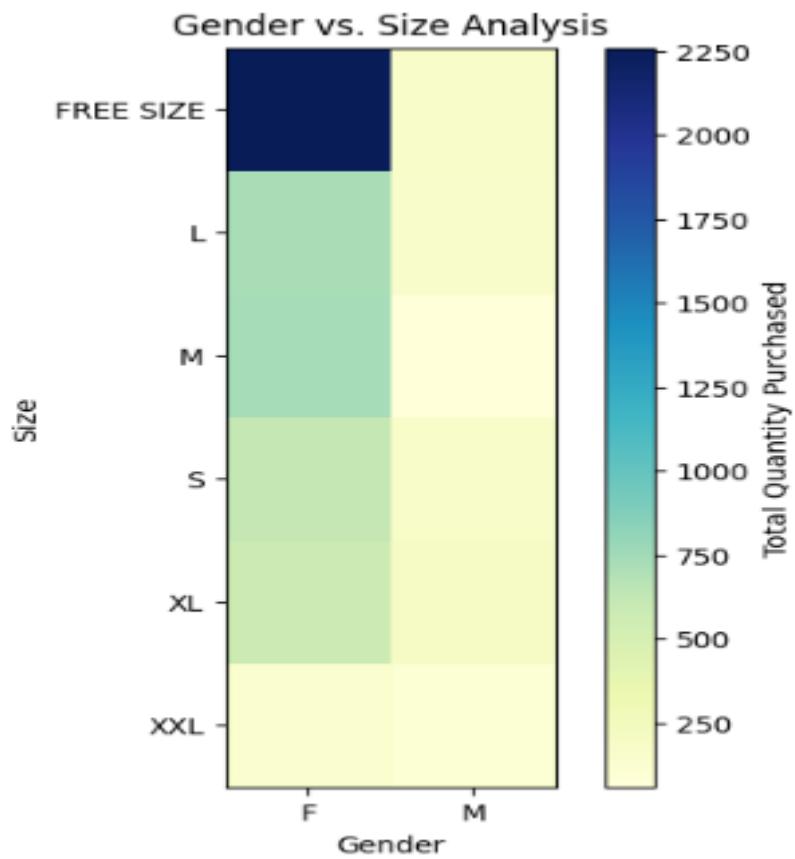
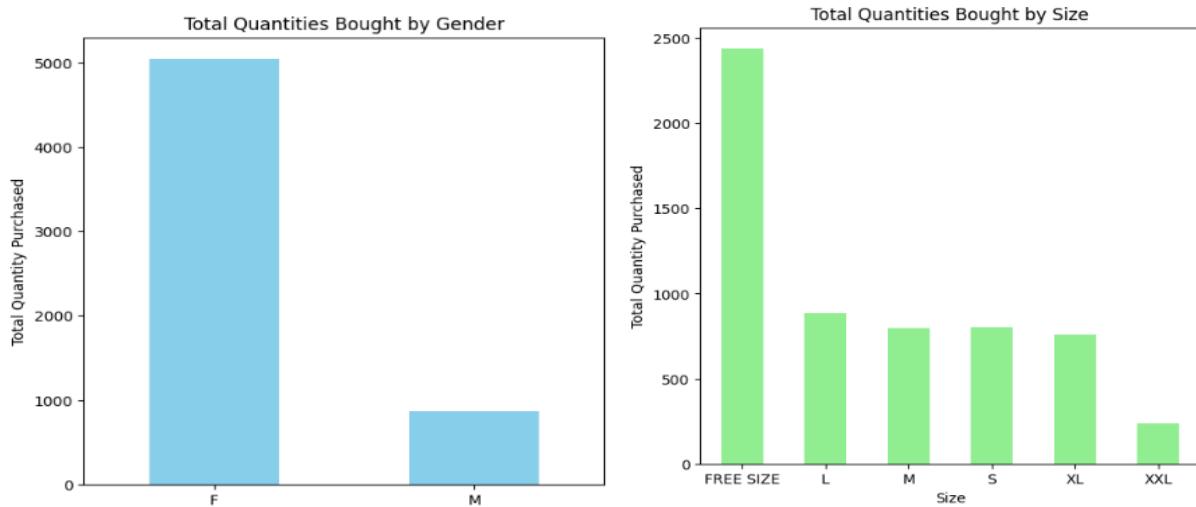
Purchase Pareto Chart: Distribution of Purchase Amounts by Months



Sales Pareto Chart: Distribution of Sales Amounts by Months

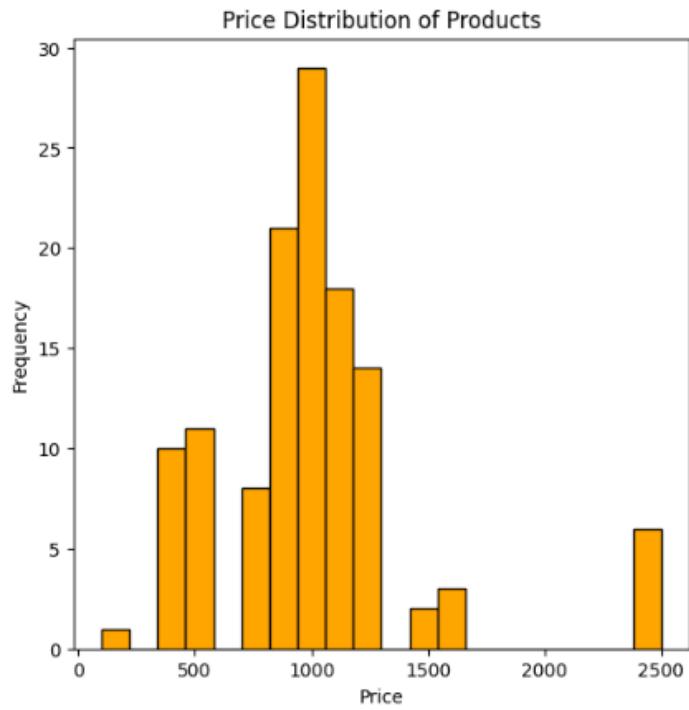


Gender & size analysis: This analysis gave more insight into the customer preferences for optimum inventory management, product development and targeting marketing strategies.



Price distribution of products: Price distribution helps to identify the range of costs incurred or procured. This can help in understanding the variability of price and negotiation for better pricing. This can be also utilized to reveal profit margins and identify price bands.

Purchase products



Sold products:

