

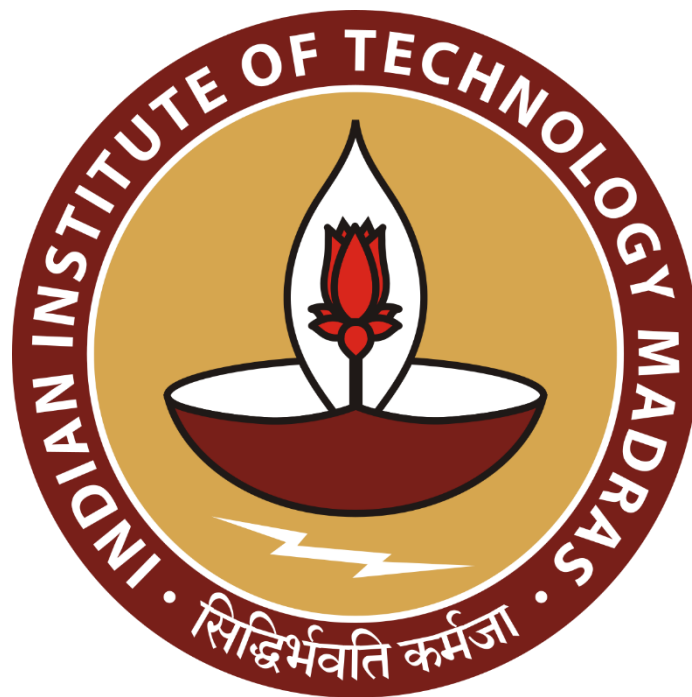
ENHANCING PROFITABILITY AND CUSTOMER SATISFACTION AT
MADRAS METTALURGICAL SERVICES PRIVATE LIMITED : A
FOCUS ON REVAMPING PROCUREMENT APPROACHES AND
SALES EFFICIENCY

A Final Submission report for the BDM capstone Project

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EXECUTIVE SUMMARY

This report provides an analysis of various aspects of a private business which specializes on selling products and equipment's based on metallurgy, focusing on issues related to equipment retention and storage, sales of equipment's, and equipment procurement i.e basically identifying the seller for a specific equipment. The **data was collected** through meetings with the owner and employees which turned out to be hugely pivotal to this entire process. The findings aim to identify key problems and suggest potential solutions for the business to introspect their current approach and work efficiently as an unit. Using the findings and result various interpretations and solutions can be created for solving the business problem's related to the business. It Falls under the type of B2B(business-to-business) Model.

Regarding **equipment retention and return issue**, the analysis reveals that the return percentage can be considered to be less compared to accepted equipment's .One can further see that most of the returned products/equipment's are those which aren't big or huge in terms of volume or size. Hence to address this issue there is no need to buy a separate storage space for storing these equipment's but rather a small room can be provided for storing this. On further analysis one can see that of the products returned most of the products turned out to be those products manufactured and supplied by the firm itself. This further substantiates the case for no need for extra storage.

The sales data for equipment's indicates that Portable rebound Hardness tester, SCRM ductile (nodular) and spectrographic reference are the top revenue-generating items, while Sic Paper 8 has the highest average quantity sold. ATB-1 rechargeable battery pack , on the other hand, has a lower average quantity sold, suggesting lower popularity. Exploring alternative options like providing complementary offers etc and by following new approaches in this industry like by developing an android application and providing it to customer's can reduce workload and increase sales.

In terms of equipment procurement, the analysis shows that some new supplier's tend to provide the same equipment at lower cost and nearly 5 supplier's tend to provide almost 75 percent of the profit . Exploring new suppliers hence ,while ensuring quality could be a potential solution to address the issue of high supplier rates

Tools used are all in Excel and Google Sheets with Charts and Formulas, along with this Python was also used for creating charts and visualization and analysis purposes.

Time period is 5 months for all sort of data that is collected for this purpose.

The report concludes with recommendations, including cost-saving measures for storing returned product, following new methods for selling products. Additionally, it suggests considering the procurement of equipment from alternative sources to reduce costs.

DETAILED EXPLANATION OF ANALYSIS PROCESS -

MEETING WITH OWNER

- To get an in-depth knowledge about the business problems in general.
- Retention of “Equipment’s” is a significant problem along with the equipment suppliers and the number of equipment sales.
- With many sellers now preferring to directly sell the Equipment instead of using a mediator in between the buyer and the seller as resulted in a reduced amount of sales.
- Moreover with many competitive business’s opening shop in recent times and them following new approaches also can be a huge factor.
- An increase in the prices of raw materials required for the equipment design and build can be considered to be a major factor leading to this problem.
- The owner further stated that competitive business’s use some advanced strategies like Data analysis ,understanding about their sales data and further selecting best supplier based on these analysis .
- Even though he feels its high time his company too follows suit to follow these measures he feels there is a dearth for talent pertaining to that and he also feels it will cost a lot more to employ someone like that which will basically increase their expenditure.
- Other things that were discussed were –
 - What about the idea and notion of giving freebies to new customer’s and gain their support and trust for future dealings.
 - Expanding the business by making foreign Export’s as they have Import and export license which many competitors don’t have .
 - Introducing new methods like developing mobile app’s per say.

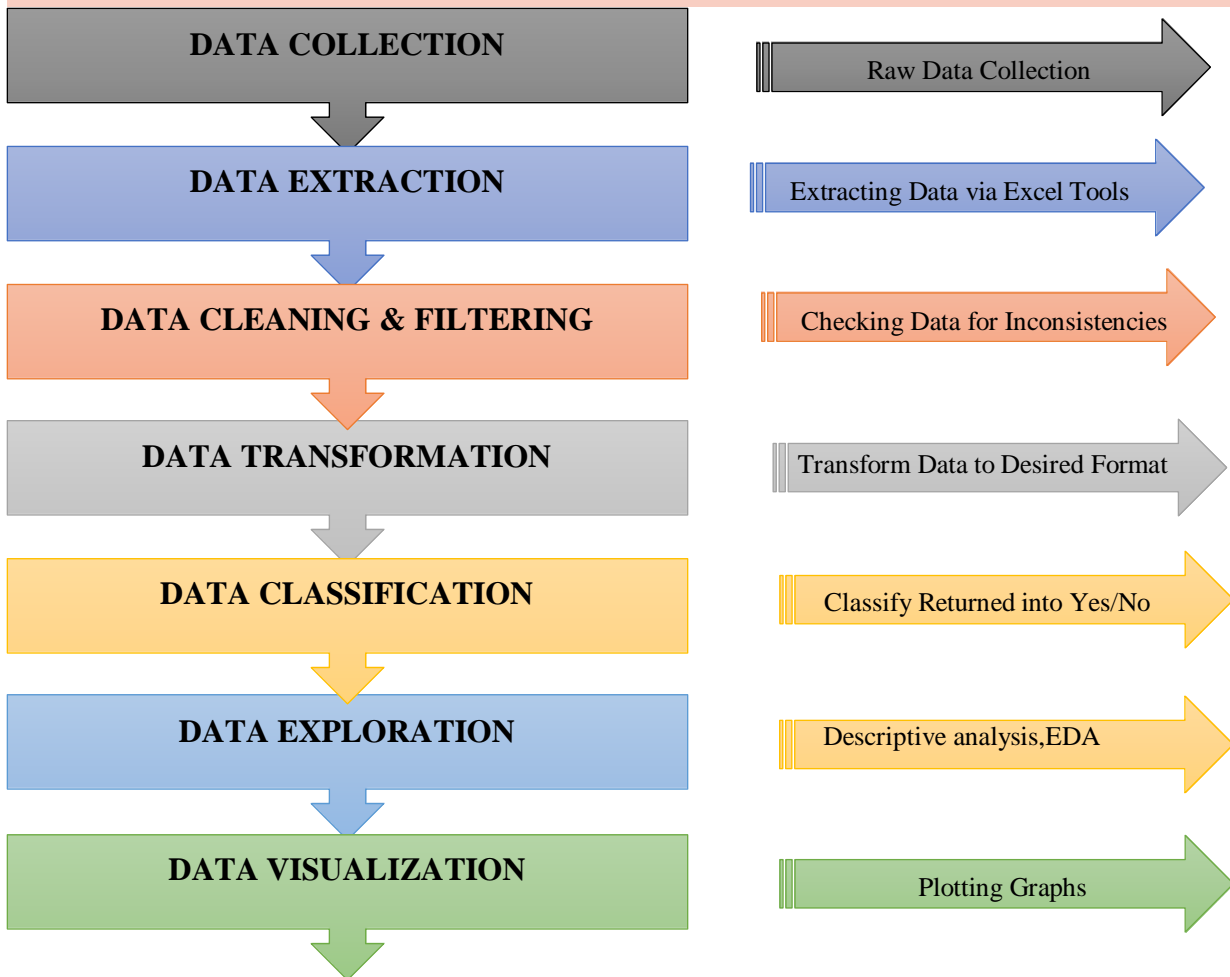
MEETING WITH EMPLOYEES OF THE FIRM

- Most of the employees live near the firm and according to them the business market as a whole as gone down over the years mainly due to the fact that over-competition of entities,many buyers prefer to use the product they bought before for some more time.
- Employees feel most of the tools and system’s in place are age old and some new changes must be made to improve the one’s in place.
- The machines used for manufacturing item’s are old and new tools must be bought to replace them.
- Problems they mentioned –
 - They feel their main customer’s being colleges prefer to buy

equipment's that come in tango with supplementary tools and kits.

- Some employees say that people learn business tricks and start a company elsewhere providing products at low cost resulting in buyers preferring them.
- With tools being old in nature products produced by the firm are rather inconsistent. This has resulted in return of self-produced products.

METHODOLOGY:



DATA COLLECTION

To find the above-stated problem objectives, there was a need to get data pertaining to purchase and sales. This included need for various other details like sales date supplier name quantity supplier price and invoice price. Given some products got returned hence there was a need for collect that data too.

[Link for the collected data:](#)

The data in the aforementioned link contains all the data collected for this purpose-

Date	Customer Details	Item	Qty	Selling Price
05.06.2020	Jindal Saw Ltd	Charts	11	Rs.14000
05.06.2020	Nelcast Ltd	Poldi test bar	5	Rs.3250
05.06.2020	Nelcast Ltd	Poldi test bar	13	Rs.8450
05.06.2020	Safew tech	Specimens	1 set	Rs.12500
08.06.2020	Aerospace processing	Sic paper	200	Rs.6200
Total	-	-	230	Rs.44400

Table 1: A sample of the population of data(Sales)

Supplier details	Supplier Price	Profit	Profit Margin
MMS	Rs 7000	Rs 7000	50% approx.
BLUE STEEL	Rs 2500	Rs 750	23% approx.
BLUE STEEL	Rs 6500	Rs 1950	23% approx.
MODERN MET	Rs 9000	Rs 3500	28% approx.
AUM VIJAYA	Rs 5000	Rs 1200	19% approx
Total:	Rs 30000	Rs 14400	—

Table 2: A sample of the population of data (Buy)

The first problem is of finding a possible approach to curb the problem of returned products. Address the issue of storage space and the cost associated with it.

1. **Product is returned or not-** So if a buyer makes any product purchase then if the buyer deems the product to be not upto the mark then he might return the product back to the company.
2. **If returned, what's the procedure:** So if a product is returned then in most case it stays back with the company and not sent to the seller, the company's engineer's work on it to find the issues etc.

RETURNED	Numbers
YES	13
NO	93
Total	15

Table 3: Return Data .

Reason for return:

The seller shipped a faulty product.

Buyer might have got a better deal somewhere.

Late delivery.

Didn't match the benchmarks set by buyer.

Picture 1: Rough data provided by the owner of the firm as the reason for product return

MAKING PIVOT TABLES:

A pivot table is a data summarization technique used in spreadsheet programs and data analysis tools. It allows you to reorganize and summarize large amounts of data into a concise, tabular format. Pivot tables provide an efficient way to analyze, aggregate, and extract insights from complex datasets.

PLOTTING CHARTS:

There are several reasons why plotting graphs and charts is valuable in data analysis and communication:

- Data Visualization
- Data Validation and Quality Assurance
- Summarization and Comparison
- Storytelling and Persuasion
- Summarization and Comparison

TOOLS AND TECHNIQUES USED FOR ANALYSIS:

The data was collected using Microsoft excel and basic understanding and analysis was done on the data using the same. Sheets was also used as there was a need to share the data collected with the Company as some changes were made here and there. Further using python charts and complex analysis was performed on the data. This includes :

- Finding which customer's tend to return more.
- Among those returned products which products are returned more.
- Which supplier's tend to supply products which gets rejected often.

- Which product sold more number of quantities.
- Which product created more revenue/profit for the firm.
- Which supplier generated more revenue/profit for the firm.
- Which month's tend to create more sales.
- Which products have more than 1 supplier.
- Comparison between cost of various suppliers for a single product.
- Which customer's tend to buy more.

So as mentioned above the data was provided in excel workbook but it required a lot of cleaning which resulted in a lot of effort for doing that. Python was useful for completing this part of my analysis.

Solution for problem's posted by employees and owner:

We can see from the data collected that total return's as a proportion of total products bought is almost 13%. Even though there is a scope for reducing this even further this is a very good number for a business entity. One can take measures like :

- **Carefully choosing suppliers** this means basically choose suppliers who tend to provide better quality products as compared to supplier's who tend to provide low quality products at lower cost's as in the longer run this cost difference will become negligible compared to other expenses on the product.
- On further analysis one can see that some customer's tend to return product's more often. A word of caution can be to be extra careful while dealing with them.
- Moreover as mentioned by the employees one can on close observation see that of the products that are returned ,self-produced products by the company were returned the most with a number of "6" which is almost half of the return's made by the buyers back to the firm .
- To curb this issue one can suggest that some new manufacturing tools can be bought to replace the existing one's . Based on the employees info these equipment's were bought nearly **50 years** ago that's when the company was founded. Even though the immediate expenditure for the company will increase this will prove to be hugely beneficial for the company in the longer run as it will not just reduce the cost's of manufacturing but rather it also reduces the return rate for self-produced products.

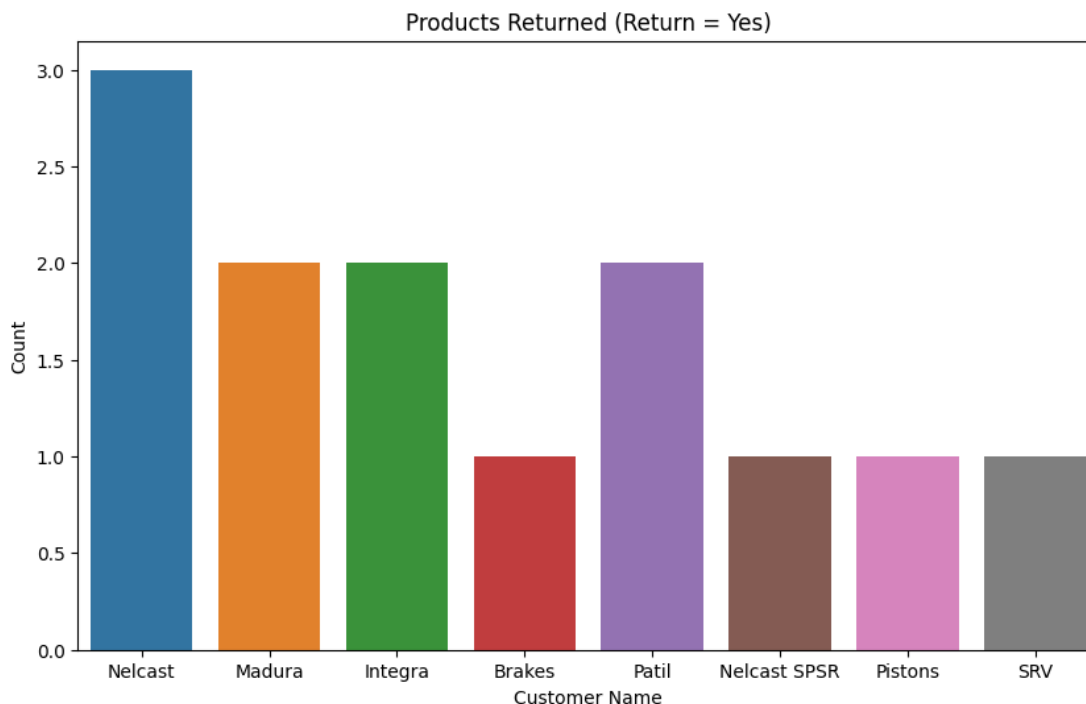
RESULTS AND FINDINGS

❖ Customer name vs Returned Count:

Table:

Customer Name	Count Of returned Products
Nelcast	3
Madura	2
Integra	2
Brakes	1
Patil	2
Nelcast SPSR	1
Pistons	1
SRV	1

Chart /Plot:



Observation:

We can observe that Buyer **Nelcast** made most Returns at **3** while 3 Buyers returned their purchase twice while 4 buyers made 1 return each. Total return's turned out to be 13 in number.

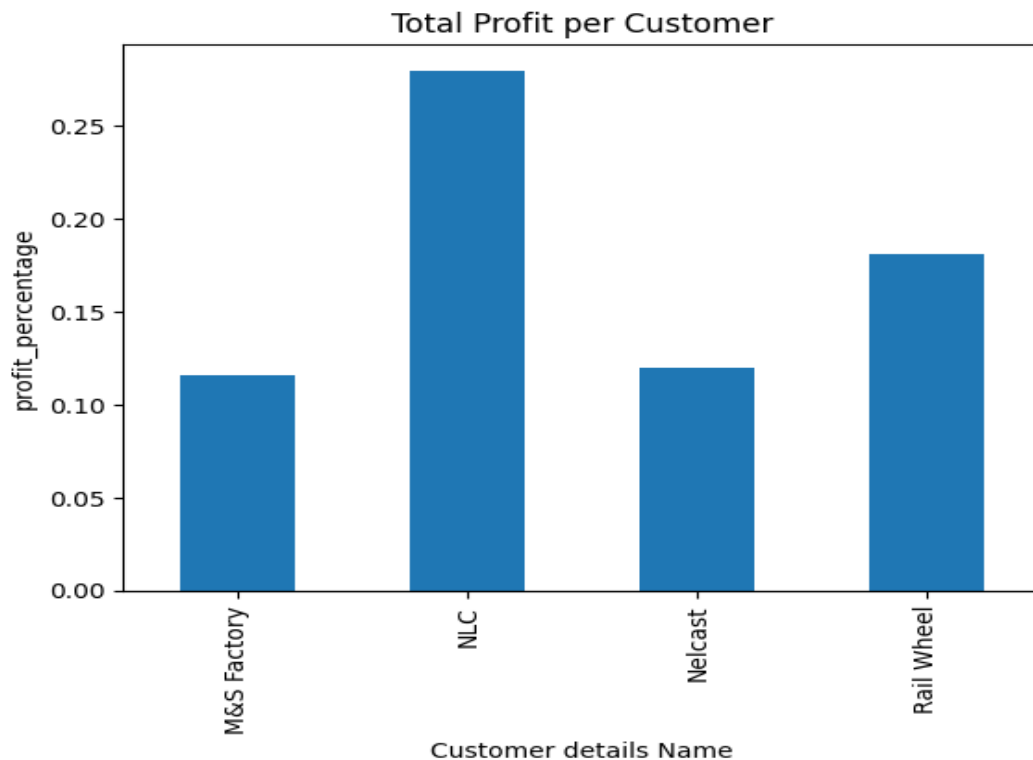
❖ Customer name vs Profit Percentage:

Table:

Customer Name	Count Of returned Products
M&S Factory	0.115809
NLC	0.279873
Nelcast	0.120032
Rail Wheel	0.180952

Total Profit : Rs . 4,14,474

Chart /Plot:



Observation:

We can observe that Buyer **NLC** created more profit for the firm by making corresponding purchases .This plot shows data for customer's who's total profit percentage turned out to be greater than 0.1 times total profit.This shows the importance of these customer's to the firm.

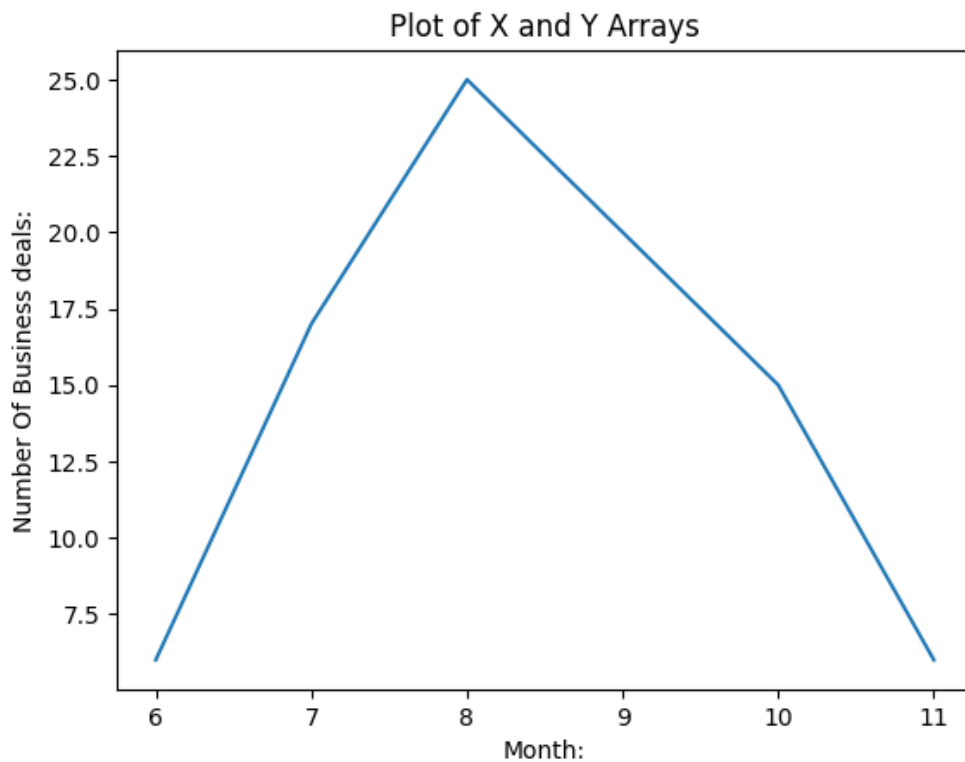
❖ Sales Trend over month's:

Table:

Month	Count Of Sales
6(June)	6
7(July)	17
8(August)	25
9(September)	20
10(October)	15
11(November)	6

Total Sales : 89

Chart /Plot:



Observation:

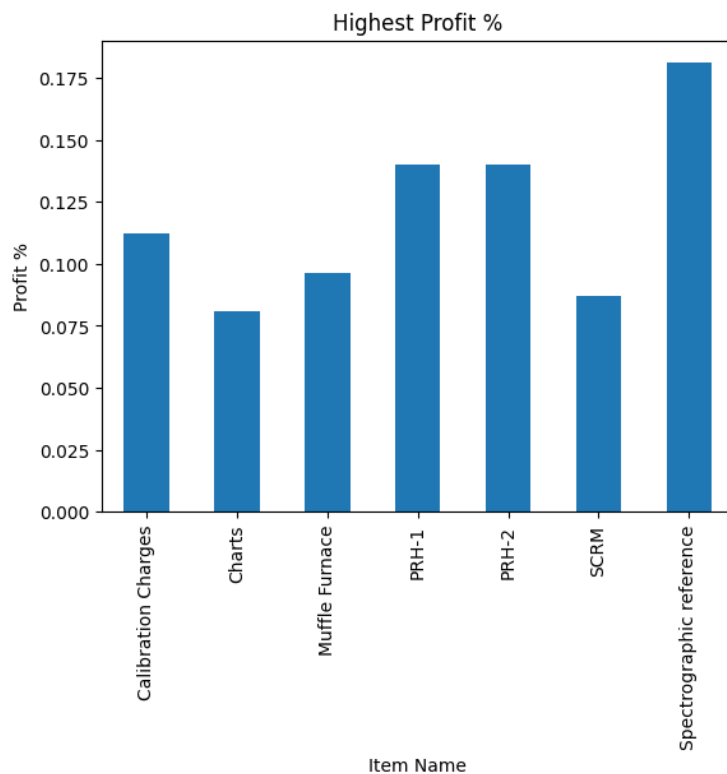
We can observe that the sales is maximum during the month of August and September while its very low during the month of June and November. It follows a rise hits max and the falls ,quite an interesting plot that can be said.

❖ Product vs Profit %:

Table:

Product Name	Profit %
Calibration Charges	0.112190
Charts	0.080825
Muffle Furnace	0.096508
PRH-1	0.139936
PRH-2	0.139936
SCRM	0.086857
Spectrographic Reference	0.180952

Chart /Plot:



Observation:

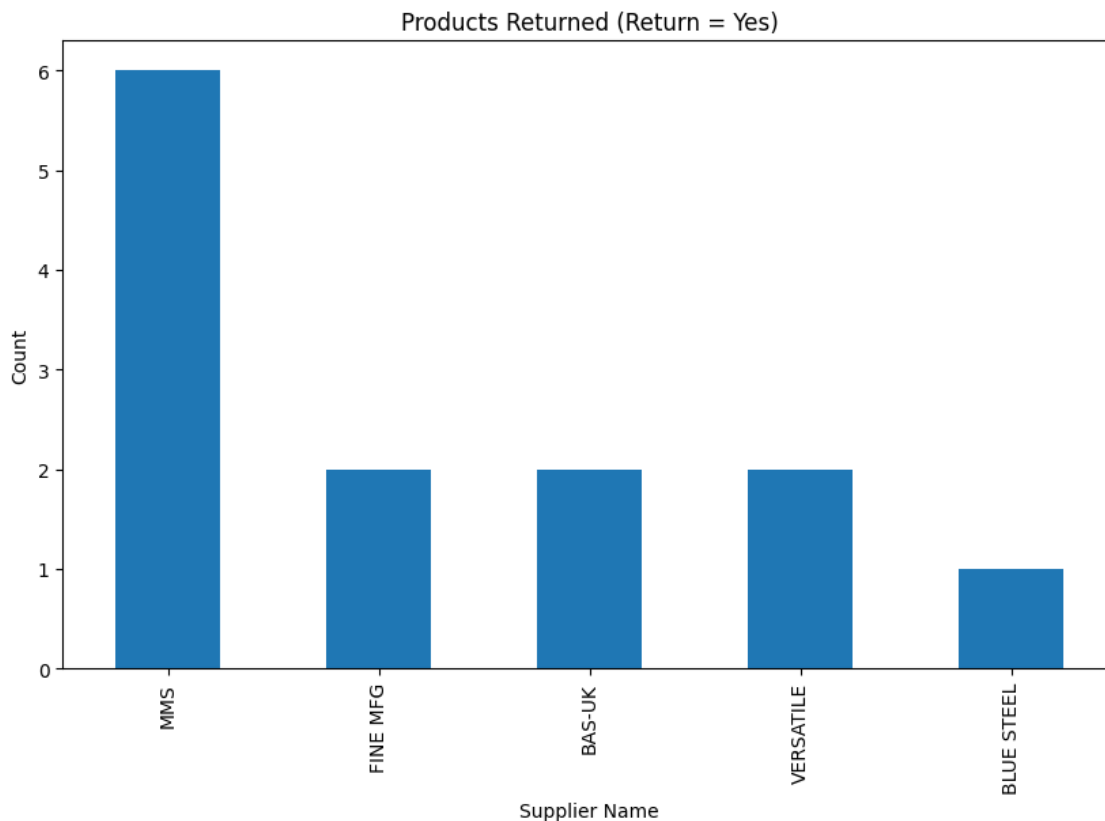
We can observe that the item/product Spectrographic reference has generated highest profit % at 0.18 or 18% one can further notice that PRH-1 and PRH-2 both different kinds of a same equipment have interestingly generated equal profit percentage at 0.13 or 13%. There isn't a huge deviation between high profit generating products they are somewhat close to each other.

❖ Supplier's vs Return:

Table:

Supplier Name	Count Of Return's
MMS	6
FINE MFG	2
BAS-UK	2
VERSATILE	2
BLUE STEEL	1

Chart /Plot:



Observation:

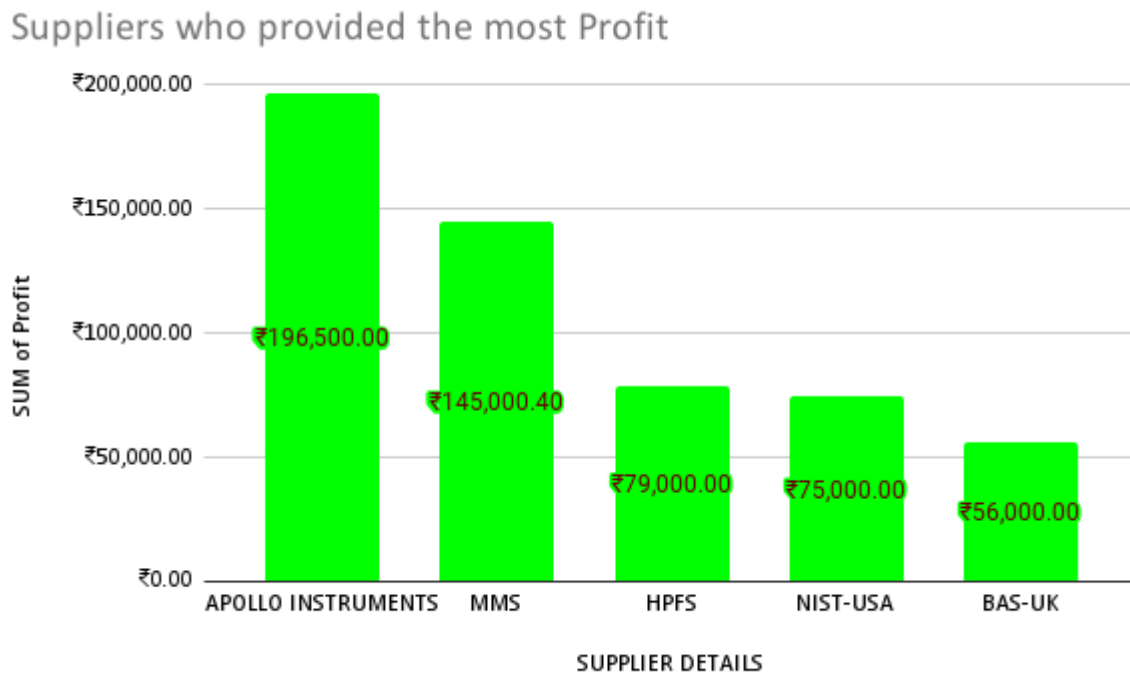
We can observe that the supplier **MMS** products were returned the most. This can also be seen that these products were manufactured, marketed, and sold by the firm themselves; this is something which was discussed above in general. Further, one can notice that 3 supplier's products were returned twice each, and Blue Steel had one of their products returned back. This observation can aid in the overall process of choosing suppliers for an item/product/equipment.

❖ Supplier's vs Profit:

Table:

Supplier Name	Amount of Profit
APOLLO INSTRUMENTS	196500
MMS	145000
HPFS	79000
NIST-USA	75000
BAS-UK	56000

Chart /Plot:



Observation:

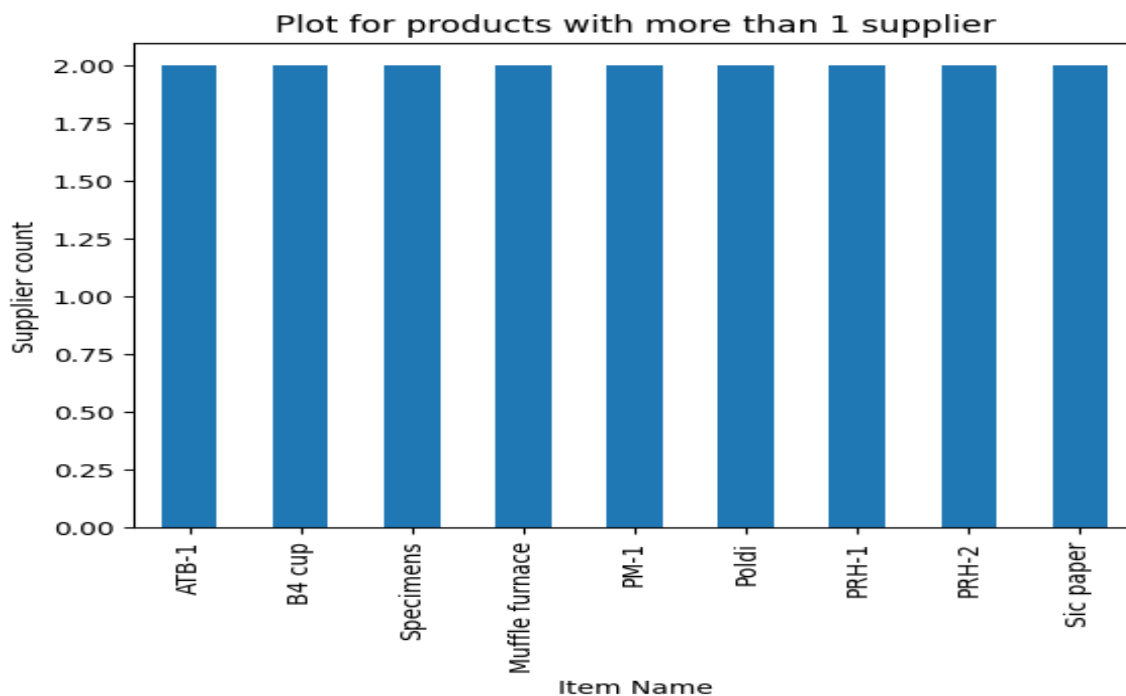
We can observe that the supplier **Apollo Instruments** provided the most profit for the firm at 1,96,500 Rs. Another interesting observation is that **MMS** product's generated second highest profit at 1,45,000 pointing out their self – reliant capability. HPFS provided 79000 rs and NIST-USA provided 75000 rs here NIST-USA is a foreign company from which product was imported and sold by MMS. Similarly BAS-UK is another foreign company from which product was imported and sold to the corresponding customer. These 5 firms combined to generated almost 70 to 75 percent of the total profit.

❖ **Products with more than 1 supplier:**

Table:

Product Name	Number of Suppliers
ATB-1	2
B4 CUP	2
SPECIMENS	2
MUFFLE FURNACE	2
PM-1	2
POLDI	2
PRH-1	2
PRH-2	2
SIC PAPER	2

Chart /Plot:



Observation:

We can observe that **9 Item's** have **2** suppliers each. Now this is very important as one supplier might provide the same item at lower cost compared to another supplier. This also allows for variability which is very important in a business like this which can help them to sustain.

❖ Cost vs supplier for a single Item:

Table:

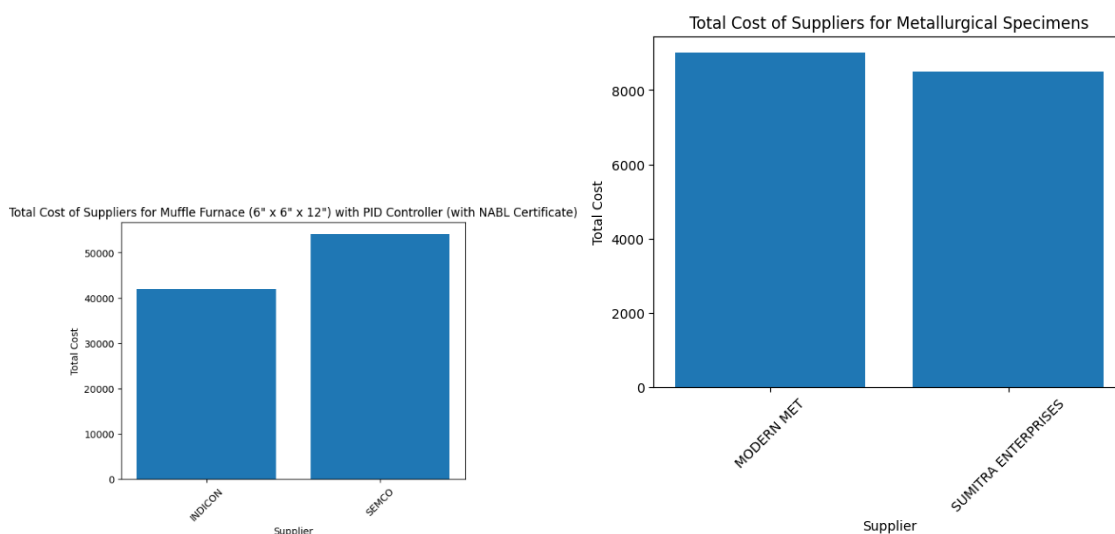
Item: Muffle Furnace

Supplier Name	Cost
INDICON	42500
SEMCO	55000

Item: Metallurgical Specimens

Supplier Name	Cost
MODERN MET	8700
SUMITRA	8200

Chart /Plot:



Observation:

We can observe that for Item **Muffle Furnace** there are two supplier's i.e Indicon and semco we can note that indicon provided the item at a lower cost than semco which is very suitable for their business increasing profit's. Similarly we can also note that for the item **Metallurgical Specimen's** we have two suppliers namely: MODERN MET AND SUMITRA ENTERPRISES just like the above scenario one supplier provides the same item at a lower cost than another supplier resulting in a favorable scenario for the company.

❖ Cost vs supplier for a single Item(Contd):

Table:

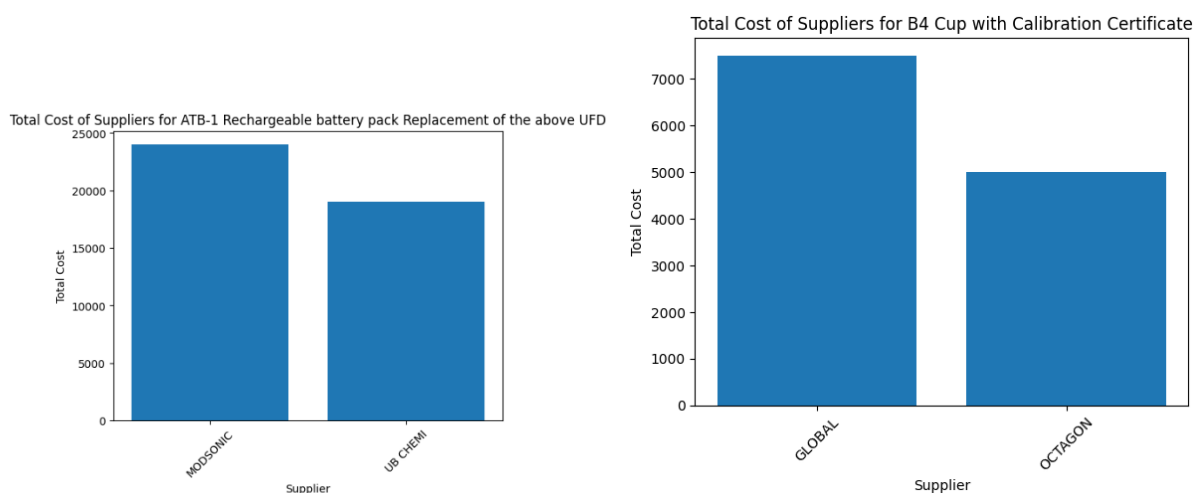
Item: ATB-1 Battery

Supplier Name	Cost
MODSONIC	24500
UB CHEMI	18500

Item: B4 cup with Calibration Certificate

Supplier Name	Cost
GLOBAL	7500
OCTAGON	5000

Chart /Plot:



Observation:

We can observe that for Item **ATB-1 Battery** there are two supplier's i.e MODSONIC and UB CHEMI we can note that UB CHEMI provided the item at a lower cost than MODSONIC which is very suitable for their business increasing profit's. Similarly we can also note that for the item **B4 Cup with calibration certificate** we have two suppliers namely: GLOBAL AND OCTAGON just like the above scenario one supplier(OCTAGON) provides the same item at a lower cost than another supplier(GLOBAL) resulting in a favorable scenario for the company.

INTERPRETATION OF RESULTS AND RECOMMENDATION -

- ❖ One can note that based on above observations and results, some Item's have more than one supplier, and on comparison one supplier provides the same product at a lesser price. Hence choosing this supplier would be wise for the business and the company. This approach can be followed for other item's too which will increase the profit and profit percentage of the company.
- ❖ Similarly we can note that nearly 5 supplier's provide almost 65 to 70 percent of the total profit for the company. Relationship should be made sure to be healthy between these supplier's and the company in general.
- ❖ One important observance is of the supplier's who generated more profit for the firm the firm itself is at second in the list. This means the firm can further try to produce more item's/equipment's on its own rather than acting as a mediator between supplier and buyer. This in general is a very good observance which can improve the business in general.
- ❖ Moreover, of the supplier's who generated more profit there are two companies from abroad in the list. As mentioned before the company has an export/import license which can prove to be a gamechanger given many competitors don't have that, this is further substantiated by the above observances.
- ❖ One notable observance is that of the products returned most of them is of the origin MMS i.e. the firm about which we are discussing about, this means there is no need for an extra storage as such to store returned products. Further based on employee's opinion most of the machines used for manufacturing are rather old which results in defective products produced more often. One advice/recommendation can be to change these old machine's wherever necessary and replace them with new and advanced state of art machines. This can reduce the return rate as well as increase the throughput of production.
- ❖ The product sales over month seems somewhat similar to **Normal Distribution** the products sales reached a peak at August and went down. This can mean a few things that many buyers prefer to buy during the summer months and rather not during the monsoon period this can be due

to weather factor's etc.

- ❖ The product spectrographic reference provided the most profit in terms of percentage at 0.18 or **18 %** .Similarly two Item's of very similar origin PRH-1 and PRH-2 provided almost equal amount of profit percentage at **13.99 %** which is quite interesting as these are products/item's which in most cases are bought alone as per the owner.
- ❖ Of the customer's who have returned the item's they purchased the most number of times Nelcast limited tops the list at 3 customer's have returned their purchased product's twice while 4 customer's have returned their purchased products once. One small word of caution over here can be while dealing with these buyer's in here the firm can be extra bit cautious about the products they sell and make sure they are of highest quality.
- ❖ Of the buyer's/ customer's who have the highest profit percentage NLC Limited tops the list at 0.279 or **27.9 %** which is a very good number for a buyer. The firm can make sure to further improve the relationship with them by providing offer's price reductions etc while dealing with them. Similarly some more firms have a profit percentage of more than 10 they include M&S factory at 11% Rail factory at 18% . These firms can be provided some complementary offer's which might increase their buying rate and further increase the profit.
- ❖ As far as the problem of analysing the data and providing insightful analysis of the firm is taken into account one recommendation can be using freelancers for this purpose as they can be a cheap alternative than actually employing someone specifically for this purpose.

From the above insights, results, tables recordings the firm can take these steps to address their prime issues which include : (1) Retention of returned products. (2) Reduce in sales and profits . (3) Supplier issues .

Along with that various other uses were also taken into account and consequently they were analysed and some useful insights were provided by the plots and graphs and charts plotted for this purpose. In terms of suppliers, the analysis highlighted the importance of maintaining strong relationships with reliable and cost-effective suppliers. The business demonstrated a well-managed supply chain, ensuring a steady flow of inventory and minimizing disruptions. This effective supplier management positively impacted the business's overall operational efficiency. Furthermore, the study examined the buyer base and identified key customer segments that significantly contributed to the business's

revenue. Understanding customer preferences and behaviors allowed the business to tailor its offerings to meet their needs, resulting in increased customer satisfaction and loyalty.

By leveraging these insights, the business can continue to build upon its strengths, address potential weaknesses, and make informed decisions to further improve its overall performance and long-term sustainability.

USEFUL LINKS FOR THE PROJECT

Link to data:

<https://docs.google.com/spreadsheets/d/1esJIFjvNBq3KsJFae75PdXEYiwOsLK0LYYVNCiuwi9I/edit?usp=sharing>

Link to Colab File where analysis was done:

https://colab.research.google.com/drive/18Vi530NMkoI_Vxa6TDHnMBvPk5Y663YN?usp=sharing