BDM capstone Project
Mid-Term Submission

Data driven solution for Cost Estimation Accuracy for profit maximization

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9th March 2024

Contents

Executive Summary

The project is focused identifying factors behind reduced sales (not getting enough projects as compared to before) of Pioneer Furnishers despite its presence in the prime commercial location of Central Kolkata.

It is identified that the company is not able to meet required sales as well as profits. To study the following issue from the data analysis grounds, project-wise revenue data of the business (past 8 to 10 months data) are collected.

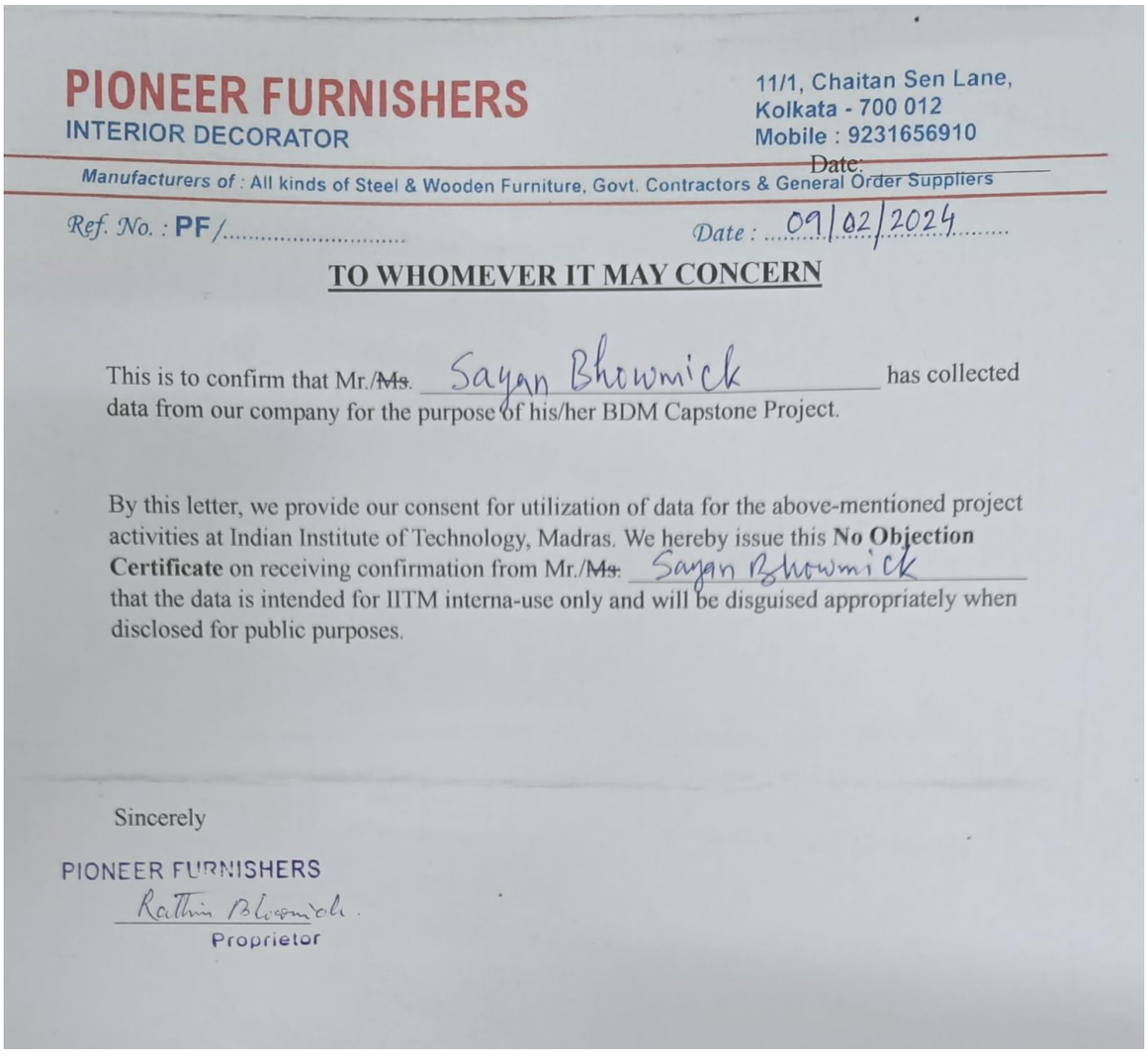
Revenue Data is plotted onto line graph to study trend sales. In addition, sum of cost prices are also plotted onto a different line graph to see the trend of the combined manufacturing cost. Now, combined manufacturing cost trend is important because it will help us understand apart from fixed costs which could be reduced or removed if needed or possible to do so.

After analysis, it was found that there was a significant amount of revenue fall after Q2 of 2023. Also, in the month of September the sales were the highest while during the month of February the sales were the lowest. Also, we found out that there was not a significant hike in Labor cost for Polishing the wooden end products manufactured by the company but there was a significant amount of hike we saw in the Making Charges (Labor charges for Manufacturing a product). Analysis on the other SKUs is under process (as of this document's creation date) and insights pertaining to it are yet to be drawn.

Data Collection

Mr. Rathin Bhowmick, the owner of the company has been very cooperative throughout the course of data collection process. He was very open to discuss the challenges he faces in his business, also he was so eager to know about data analysis and how could this help him as well as his business. Upon explaining the intention of the project in detail and the proposed approach to address the business problem, he gladly agreed to share the requested data and also agreed to provide a No Objection Certificate.

Two visits to the company's workshop, each one week apart, were conducted as a part of this project to gather the required information about the background of the business and problems which are being faced, to explain the objectives of the project, to convince the owner to share the necessary data, to collect the raw project-wise sales data (converted roughly to monthly data and project overlaps were completely ignored since the maximum overlap amount was 4 days).



PIONEER FURNISHERS
INTERIOR DECORATOR

11/1, Chaitan Sen Lane,
Kolkata - 700 012
Mobile : 9231656910

Manufacturers of : All kinds of Steel & Wooden Furniture, Govt. Contractors & General Order Suppliers

Date:

Ref. No. : PF/..... Date : 09/02/2024

TO WHOMEVER IT MAY CONCERN

This is to confirm that Mr./~~Ms.~~ Sayan Bhowmick has collected data from our company for the purpose of his/her BDM Capstone Project.

By this letter, we provide our consent for utilization of data for the above-mentioned project activities at Indian Institute of Technology, Madras. We hereby issue this **No Objection Certificate** on receiving confirmation from Mr./~~Ms.~~ Sayan Bhowmick that the data is intended for IITM interna-use only and will be disguised appropriately when disclosed for public purposes.

Sincerely

PIONEER FURNISHERS
Rathin Bhowmick
Proprietor


PIONEER FURNISHERS,
Chaitan Sen Lane, kolkata
700012

All the gathered data was loaded into MS Excel. The data cleaning involved removal of certain SKUs from the SKU list because values for those were available in lumpsum for certain projects. The data points are plotted onto appropriate visualization figures such as pie chart, bar chart, line chart etc. where ever needed.
The interaction video with the business owner is recorded for evidence & it was recorded with the consent of the owner. The google drive link for the interaction video is given below –

Interaction video with the business owner

Metadata

The data consisting of 12 different sheets is placed in the following location – Raw Data

The analysis of the extracted data is in the following location – Analysis

For Raw Data -

Sheet 1: Sales Data

Under Sales Data, the project-wise revenue details maintained at the company end are collected. The collected data is presented into 3 columns – Project number, Manufacturing Cost and Selling Price of the manufactured product. The data is available approximately from May 2023 to February 2024. The revenue generated in INR is totally from sales and does not include any out flowing expenditures. Data Cleaning was not needed since no anomality were noted.

Sheet 2 to Sheet 11: Project-wise data

The sales data collected in the previous sheet is categorized project-wise for identifying the trends in different projects from time to time. For each project, 8 columns are created – Item Category, Item name (sub category to Item Category), Width (in feet), Height (in feet), Thickness (either in inch or in mm), Quantity, Cost per quantity and Total Cost. The corresponding revenue details are obtained from the sales data sheet.

Sheet 12: SKU listing with Extracted Labor charges

This sheet contains all the items that are used in all the projects (projects for which the data is collected). There are 13 columns – SL. No, SKU Name, Category Name, Style (if applicable), Width (in feet), Height (in feet), Thickness (in inches), Thickness (in mm), Lumpsum Quantity (in feet), Lumpsum Quantity (in pieces/sheets), Quantity (in Kg), Price per item and Total Price.
Just below that table, there is a separate table, with 3 columns – SL. No, Charges and Costs, and Amount.

For Analysis –

Sheet 1: Analysis

Under Analysis sheet, all the preliminary analysis is done, such as calculating all the things for descriptive statistics such as standard deviation, average IQR (inter quartile range) for sales data, charges (Making charges and Polish labor cost) etc.

Sheet 2 to Sheet 13: These sheets are the same sheets from raw dataset

Descriptive Statistics

With 10 data points from May-2023 to Feb-2024, the revenue stood at an average ₹29,215 per project. Out of approximately 8 to 10 months project-wise data we have used all the data for analysis. The highest revenue was ₹52,850 which was observed in the 8th project in the month of December of 2023. With the use of a group distribution table, we can see that 10 months recorded a revenue of 25 to 30 thousand (it is also the mode of the sales data). With the range of ₹40 thousand (maximum sale amount – minimum sale amount) we can see that the data shows a high standard deviation of ₹12.5 thousand. Even the IQR which is Inter Quartile Range is high, ₹25.15 thousand.
Under the SKUs sheet in the spreadsheet, a list of 9 different categories which also have sub categories (for some of the categories) alongside separately extracted values of the charges (Making Charges and Polish Labor Cost).
For charges, we can see that highest amount for making charges was ₹11 thousand and the lowest amount for making charges was ₹1.5 thousand while the highest amount for Polish labour cost was ₹2.5 thousand and the lowest amount for Polish labour cost was ₹600. Having said that, we can also see that, the standard deviation for Making charges is high for the range of ₹9.5 thousand.

Analysis Process

The sales data (Project Number, corresponding Month, Manufacturing Cost & Selling Price) which was collected from the owner of the business, was loaded into MS Excel. An overall sales trend was plotted in the form of a line chart alongside a trendline plot to see if there exists a downtrend as well as if there is a downtrend then how fast the revenue is dropping. An average monthly revenue, standard deviation of the sales data, inter quartile range (IQR) of the data are found using AVERAGE, STDEV and QUARTILE functions which are built-in functions available in Excel. With appropriate criteria, using COUNTIF function of MS Excel, Number of months with above average sales and number of months with below average sales are calculated.

The revenue is calculated quarter-wise by summing up corresponding project-wise (monthly) values alongside the percentage drop in revenue for each quarter is also calculated. This data is then plotted onto a combo chart (bar + line) with each bar for each quarter and the line representing percentage change in revenue.

Particularly, the making charge and polish labor charges are extracted from the raw dataset and was formed in a tabular form. This data was plotted onto a combo chart (bar + line) with each bar representing the making charges for each month (each project) and the line representing the changes in polish labor cost.

After observing the data, it is seen that one SKU which is Sun mica/Lamination, contains same dimensions with same thickness alongside the same measuring quantity(pieces/sheets). This is why, the data for that particular SKU is also extracted and a line chart is plotted alongside a trendline plot, where y-axis is representing the price per piece/sheet of the SKU (Sun mica/Lamination) and x-axis is representing the amount which was consumed for the projects.

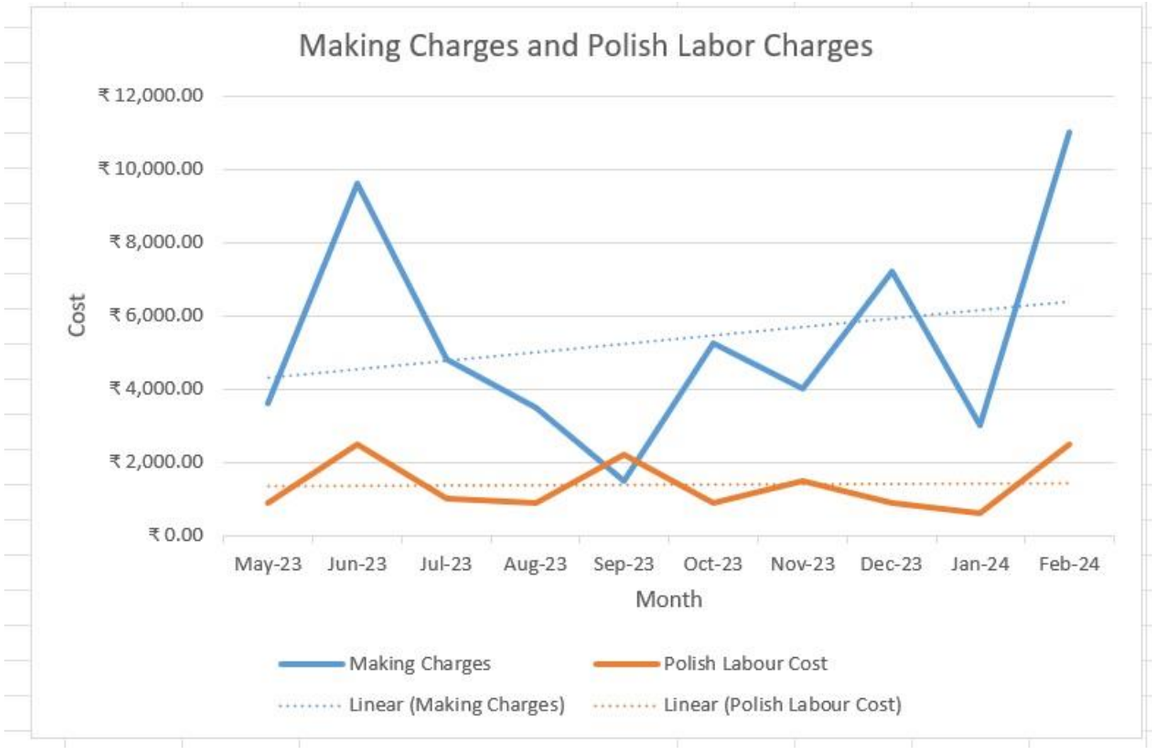
Results and findings

The overall sales graph shows a significant amount of fall in revenue generated by Pioneer Furnishers within a short span of time which is approximately 10 months.

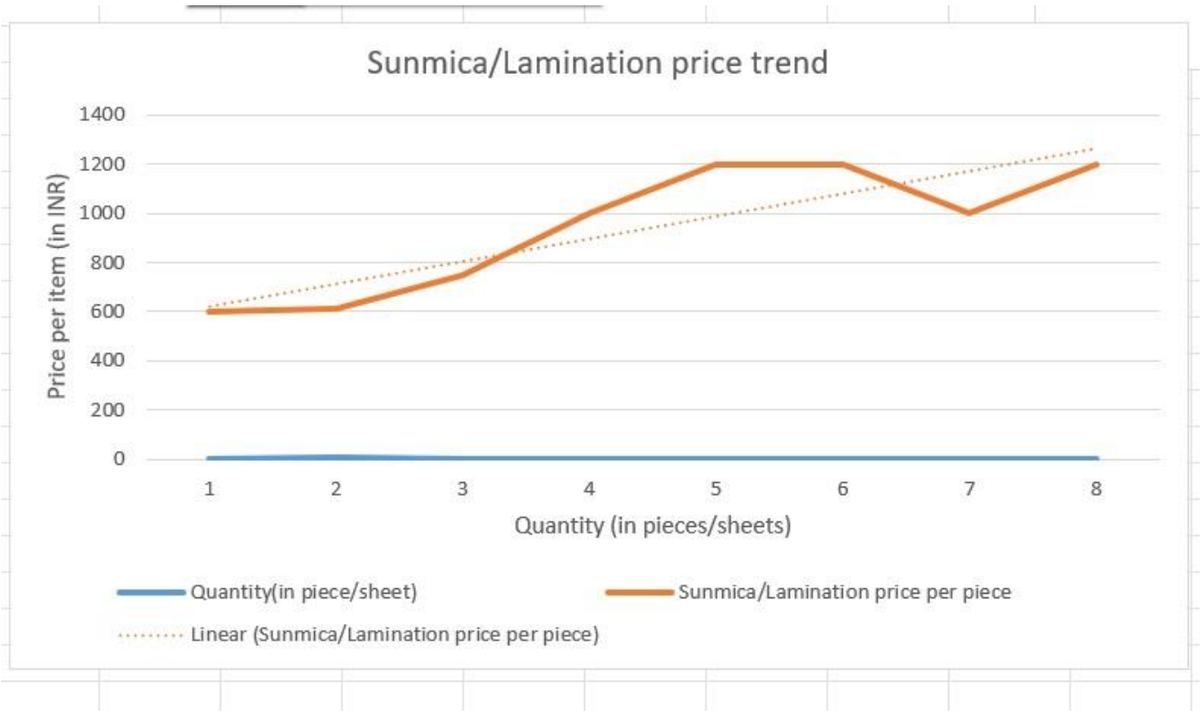
From the above line chart, we can see that the least sales are recorded in the month of February 2024 and the highest sales are recorded in the month of September 2023, while in Aug-2023 and Dec-2023 also had low sales. Also, we can see that, in the month of Jun-2023 and Jan-2024 had almost the same sales (approximately of same selling price of both the projects in those corresponding months).

From the quarterly revenue plot, we can see that during Q3 September there was an increase in sales. All the other quarters recorded falling revenues. I took the initial duration of the available data, Q2 2023, as the basis, the change of percentage of revenue is also plotted on the secondary axis. The graph shows that the drop was considerably high from Q3 2023 to Q4 2023.

From the above graph, we can see, that as compared to Making Charges, Polish labor cost did not increase in last 10 months that much but we can see that Making Charges have increased in past 10 months. The same inference we can get by plotting the trendline for both the variables, but for more clarity a proper line chart including for the variables (Making charges and Polish labor cost) is plotted below.



From the above line chart, by plotting 2 trendlines for both the variables (one each for Making Charges as and for Polish Labor Cost) we can clearly see that Making Charges have indeed increased in past 10 months.



Since, the company used enough sun mica/lamination for their projects, so after plotting the price per item (price per sheet) vs quantity consumed per project alongside a trendline plot, we can clearly see, that there is a significant amount of price hike happened in the past 10 months of timespan.

With all these analyses, it can be strongly recommended that the business should definitely work more on projects in which the asking for sun mica/Lamination is none or less. Also, the business needs to rework on hiring the workers who are directly involved in the manufacturing process. Another way which the business can work is very simple, where the business can only work on hiring the workers who are directly involved in manufacturing (with comparatively low per day wage) which will lead to less making charges. As a result, the business can quote the same selling price but will gain more profit and once a year the company can give bonus to those same workers.