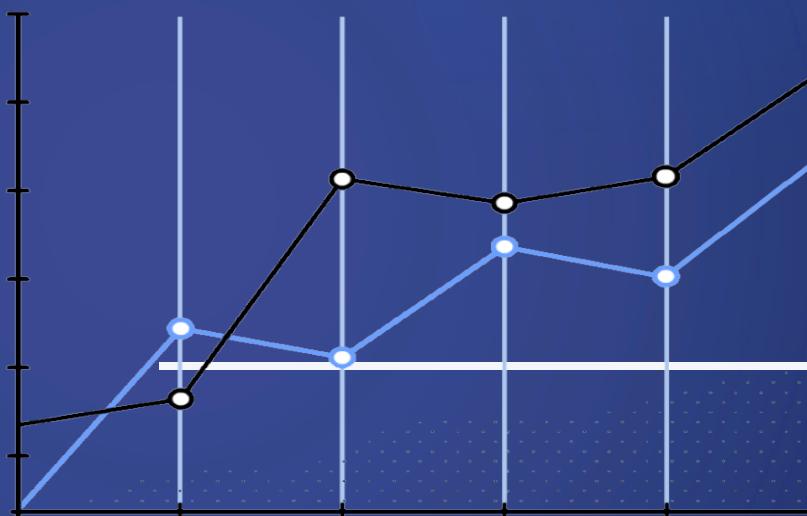




22f3001352  
RISHAV KUMAR

# BDM Capstone Project

Optimize Cost and Inventory Management for an  
Interior Designing firm



# About our firm

**Design De Interiors** is a promising and renowned interior designing firm based in Ranchi, which was established in 2016. The company focuses on providing interior designing solutions, including planning, project management, and execution for different types of properties including all residential, commercial, and retail. Over the years, Design De Interiors has built a good reputation in its area because of their quality and client satisfaction, completing a diverse range of projects from home makeovers to retail renovations. It is focused in designing, planning, and managing interior projects for homes, offices and shops. The firm operates in the B2C model, it delivers in end to end solutions for its clients.

The major business challenge which Design De Interiors faces is the instability of finished product costs due to fluctuating raw material prices and waste of materials which arises issues on inventory management. These issues impact the profitability of the firm and makes growth of the venture slow.



Fig. 1



Fig. 2

# Problem Statements

## **Problem Statement 1:**

Fluctuating raw material prices is a challenge for the firm to maintain consistent project costs, which affects client trust and profit margins.

## **Problem Statement 2:**

Ineffective inventory management results in a lot of material overuse and waste, which increases operational costs.

The primary objective of this project is to help Design De Interiors so that the company can stabilize costs of finished products and also minimize its material waste through better data management. The firm currently struggles with unpredictable raw material prices and inefficient inventory, which leads to increased costs and resource wastage. Addressing these issues will increase profitability and will support better business growth.

# Data Overview

## Data cleaning and preparation:

The data for this project was sourced directly from our firm Design De Interiors internal from there procurement records, which included prices and quantity of all raw materials that were used across 25 different project sites throughout the year of 2024. The data included material/item names, quantities purchased and consumed in which site, unit prices of each item, date of transactions, and amount spent on each transaction of the items. Following steps were taken for cleaning the data for further uses.

- **Removing duplicate** records that occurred due to multiple data entries.
- **Correcting inconsistent data formats**, particularly for dates, currency values, and item names to ensure uniformity.
- **Handling missing** by cross-verifying with purchase orders or excluding incomplete records when corrections were not possible.
- **Standardizing measurement units** to maintain consistency across all entries.
- **Transforming data** into Tabular format so that we can handle data properly for any kind of analysis.

## Columns in the dataset:-

1. **Date**: The date of each transaction is mentioned and is formatted as DD 'month\_name'-YYYY, which helps us for having chronological insights.
2. **Flat ID**: A serial number (1 to 25) represents different project sites, it is used in place of personal names for privacy of the clients.
3. **Item**: The specific material procured/used (e.g., Wood, Paint Primer, Ceramic Tiles, Shower Cubicle) for a project site.
4. **Unit**: The measurement unit for each item (e.g., Cft, Litre, Sqft, Nos, Mtr), it helps in having consistent ordering of goods.
5. **Quantity**: The number of units of each item procured in each transaction.
6. **Rate**: The unit price for each material at the time of transaction, it is a very important figure that we need analyse ahead.
7. **Amount**: The total cost for each transaction, it is calculated as Quantity × Rate.

# Data Analysis

Total amount spend distribution :

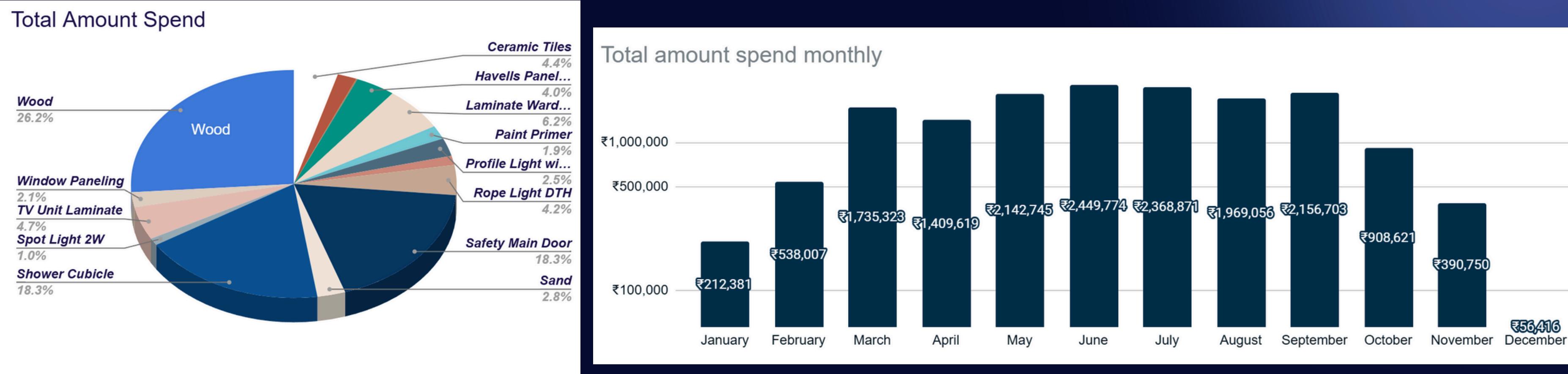


Fig. 3 : Pie chart of items for total amount spend

Fig. 3 shows that Wood, Safety main door and Shower cubical alone contributes to more than 60% of total amount spent by the firm on raw materials.

Fig. 4 : Monthly total amount spend

This shows a strong requirement of materials in months of May to September, and ironically, we found that these months have comparatively high prices compared to the entire year.

# ABC-XYZ analysis

We have classified items which were raw materials using abc/xyz classification. It is a great tool for analysis as it classifies the items as per their volatility in the demand and its amount value to the total amount deployed

The ABC analysis categorized materials based on their annual monetary consumption into:

- A: High value (top 70-80% of cumulative consumption value)
- B: Medium value (15% of cumulative consumption value)
- C: Low value (5% of cumulative consumption value)

Simultaneously, XYZ analysis classified items based on demand variability:

- X: Stable demand (<10% variability)
- Y: Moderate variability (10-25%)
- Z: High variability (>25%)

Item	Total Value	ABC Class	XYZ Class	ABC-XYZ
Safety Main Door	3,53,60,084.85	A	Z	AZ
Shower Cubicle	1,87,35,506.13	B	Z	BZ
Wood	42,73,163.16	B	Z	BZ
Laminate Wardrobe	10,10,463.43	B	Z	BZ
TV Unit Laminate	7,67,728.23	B	Z	BZ
Ceramic Tiles	7,13,536.43	B	Z	BZ
Rope Light DTH	6,94,211.73	C	Z	CZ
Profile Light with Wiring	6,59,824.09	C	Z	CZ
Havells Panel Light 10W	5,82,347.12	C	Z	CZ
Gypsum False Ceiling	5,01,236.45	C	Z	CZ
Duco Finish Bed Paneling	4,97,832.11	C	Z	CZ
Spot Light 2W	4,12,120.60	C	Z	CZ

**Table 1 : ABC-XYZ classification**

- All items in our data are classified as Z for demand variability, which indicates high unpredictability in monthly consumption of the items there is no uniform trend in procurement of the items monthly.
- The high-value items fall into AZ or BZ categories, while lower-value items are CZ.
- Only Safety main door is classified as AZ, that means it contributes very high in terms of amount value.

# Economic order quantity model

1. High volume and low unit cost Items (Ceramic Tiles, Sand, Paint Primer, PVC Pipes):
- Ceramic Tiles and Sand have the highest annual demand, with EOQs of approximately 1,235 units and 620 units, respectively.
  - Paint Primer and PVC Pipes also show high EOQs (207 and 247 units), which reflects they are regularly used with moderate unit costs.
2. High value and low volume items (Safety Main Door & Shower Cubicle):
- Safety Main Door and Shower Cubicle have very low EOQs, despite their high unit costs.
3. Moderate volume and moderate cost items (Wood, Laminate Wardrobe, TV Unit Laminate):
- Wood has an EOQ of about 60 units, having a balance between relatively high unit cost with consistent demand.
  - Laminate Wardrobe and TV Unit Laminate have EOQs in the 34-37 unit range, such items can be ordered in a bit large quantities.
4. Lighting and Electrical Items (Havells Panel Light 10W, Spot Light 2W, Rope Light DTH, Profile Light with Wiring):
- These items have EOQs ranging from 32 to 73 units, reflecting moderate demand, and holding costs.

Item	Annual Demand	Average Rate	Holding Cost	EOQ (units)
Ceramic Tiles	14,712	48.2	9.64	1,235
Duco Finish Bed Paneling	351	883.79	176.76	45
Gypsum False Ceiling	401	58.43	11.69	185
Havells Panel Light 10W	368	1,757.03	351.41	32
Laminate Wardrobe	481	2,100.50	420.1	34
PVC Pipes	1,618	132.16	26.43	247
Paint Primer	1,638	191.33	38.27	207
Profile Light with Wiring	352	1,190.26	238.05	38
Rope Light DTH	439	1,590.72	318.14	37
Safety Main Door	39	77,080.72	15,416.14	2
Sand	5,909	76.81	15.36	620
Shower Cubicle	56	53,417.49	10,683.50	2
Spot Light 2W	413	391.72	78.34	73
TV Unit Laminate	455	1,687.26	337.45	37
Window Paneling	436	799.51	159.9	52
Wood	1,741	2,446.94	489.39	60

**Table 2 : EOQ model**

The formula used:  $EOQ = \sqrt{2DS/H}$   
where:

- D = Annual demand for the item (units)
- S = Ordering cost per order (₹500 assumption as per the firm)
- H = Holding cost per unit per year (assumed as 20% of the average unit cost for storage)

# Price-Trend analysis

## Insights :-

### a. Ceramic Tiles

- Trend: Gradual increase till June, then a drop from Sep onwards.
- Regression Slope:
  - +₹0.7/month (till June), then negative.

### b. Paint Primer

- Trend: Steady rise till Sep, then a drop in Oct/Nov.
- Regression Slope:
  - +₹2.6/month (till Sep), then negative.

### c. Sand

- Trend: Rises till Sep, then drops sharply in Oct/Nov.
- Regression Slope:
  - +₹0.7/month (but with a spike in June-Sep, then sharp drop).

### d. Wood

- Trend: Strong increase from Feb to Jul, then sharp decline after Aug.
- Regression Slope:
  - Using all months: +₹58.6/month (but note the sharp drop after August skews the trend).

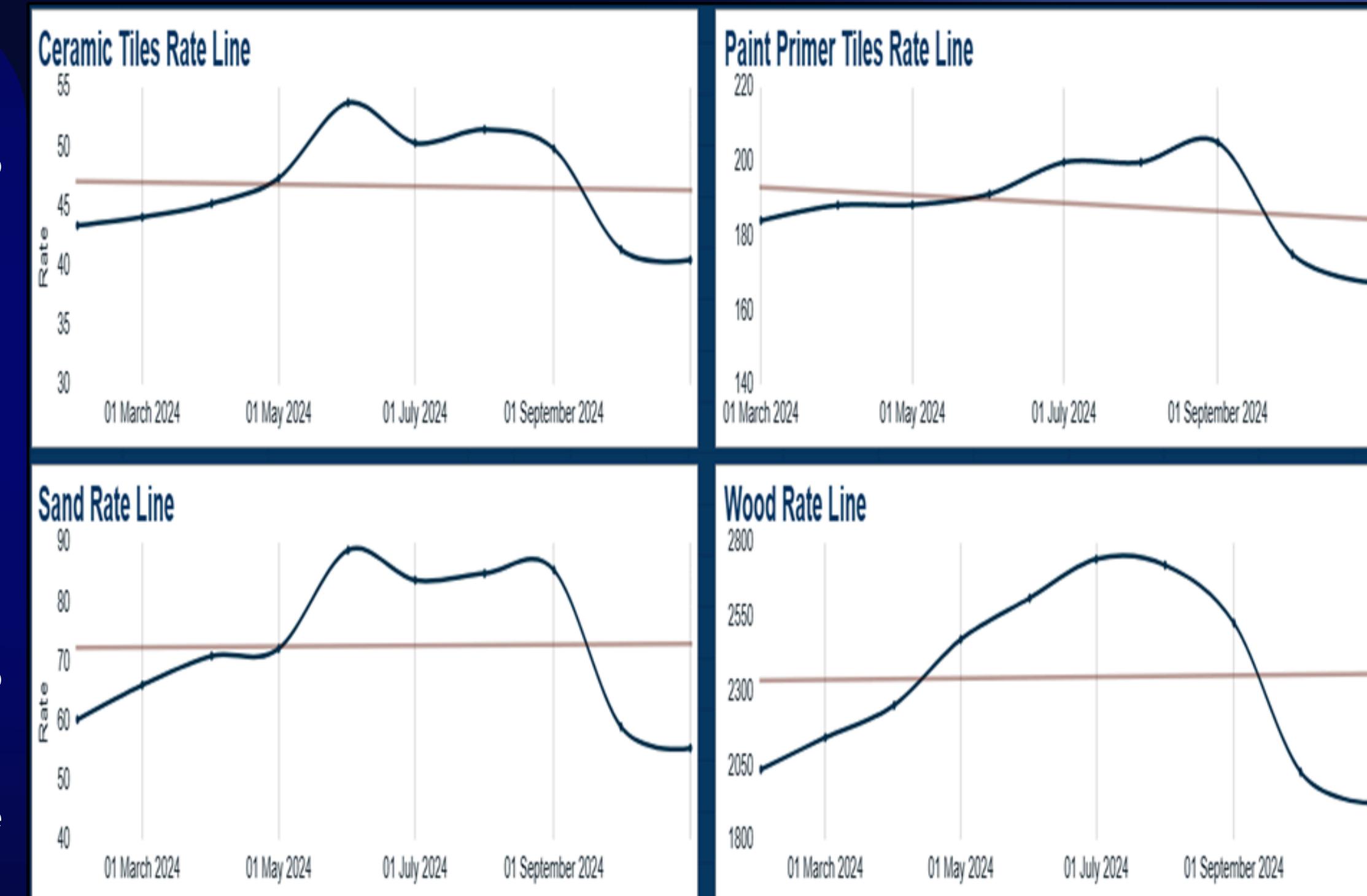


Fig. 5

# Recommendations

## SMART recommendations proposed:

- **Strategic Bulk Purchasing:** Implement advance bulk procurements of essential materials such as wood and ceramic tiles before forecasted mid-year price surges. The most ideal time for bulk buying and holding it will be May or June. Through this we aim for 7-10% cost savings due to price volatility surge.
- **EOQ Based Order Management:** Adopt EOQ guided ordering for materials with stable or moderately stable demand (e.g., Paint Primer, PVC Pipes) to optimize inventory holding costs and reduce order frequency. This would reduce of the costing of goods for roughly 8-10% within 6 months.
- **Flexible Procurement for Variable Demand Items:** For 'Z' category and high-value 'AZ' materials especially safety main door and shower cubicles, firm should establish attentive procurement processes which should be relying on smaller, in time orders and strong vendor partnerships along with monitoring price from other trustable vendors, to maintain availability without excess stock. This would reduce holding cost of goods to nearly 20% within an year of implementing.
- **Inventory Management System:** The firm should invest in a decent inventory management software service and use it for complete procurement and usage of every materials, this will automate the firm with continuous real time data which can be used for dynamic approaches of ABC-XYZ classification, EOQ order management, monitoring waste of each material in various project sites along with other analytical practices. Through this we can plan the waste usage properly which will cut the materials costs to 3-4%.
- **Vendor Relationship Management:** Negotiate flexible contracts and just in time delivery arrangements, especially for high value and unpredictable demand classified goods, to improve supply chain responsiveness. This would help to reduce the holding cost to nearly 10% and procurement cost to nearly 5%. This should begin implementation in this quarter of 2025 for effective impact.

# Thank You

Optimize Cost and Inventory Management for an Interior Designing firm  
BDM Capstone Project  
RISHAV KUMAR  
22f3001352



Fig. 5 : With firm owner

