

Optimizing Working Capital Management through Credit Control at M/S Sarada Builders & Suppliers

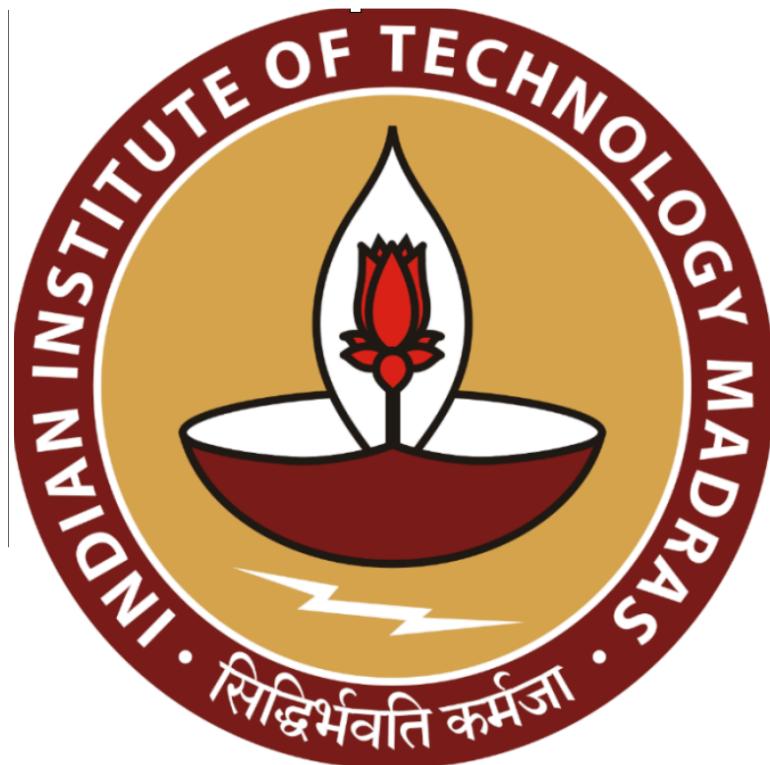
Mid-Term Submission for the Project on Business Data Management

Submitted by

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1. Executive Summary:

The mid-term submission presents a comprehensive data-driven analysis of the operational and financial performance of **M/S Sarada Builders & Suppliers**, a retail building materials firm located in **Swarupnagar Bazar, North 24 Parganas, West Bengal**, founded by **Mr. Suman Ghosh**. The analysis is based on **primary handwritten invoice data**, manually digitized into Excel for analytical processing.

Key highlights of this analysis include:

1. Objective of the Study

To investigate and provide analytical solutions to three major challenges faced by the firm:

- Delayed customer payments and cash flow disruption
- Lack of customer segmentation for credit control
- Inefficient inventory movement leading to working capital blockage

2. Nature and Source of Data

- The dataset consists of 222 day-wise invoice records collected from May 2025 to November 2025.
- Each record includes fields such as Invoice No., Date of Sale, Customer Name, Customer Type, Product Name, Product Type, Quantity, Rate, Total Amount, Payment Method, Payment, Due Payment, Cost Price, Profit, and Remark.

3. Initial Analytical Approach

- Descriptive statistics were applied to understand business performance scales, customer concentration patterns, and seasonal sales fluctuations.
- Payment-related variables were analyzed to assess outstanding dues and their impact on liquidity.

4. Analytical Methods Mapped to Problems

- **RFM Analysis** → Customer segmentation based on Recency, Frequency, and Monetary value (Problem: credit control and payment delay).
- **ABC Analysis** → Identification of high-value products contributing most to revenue (Problem: inventory prioritization).
- **FSN Analysis** → Classification of fast-, slow-, and non-moving products (Problem: capital blockage in low-movement stock).

2. Proof of Originality of the Data

The dataset used in this project is primary, original, and manually collected from the business source. All transactional data used for the analysis was obtained directly from the physical handwritten invoice register maintained by **Mr. Suman Ghosh** the owner of the shop **M/S. Sarada Builders & Suppliers**. The data has been digitalised carefully to the google sheets. The dataset captures genuine sales transactions from **May 2025 to November 2025**, including customer names, materials sold, quantities, payment amounts, and pending dues.

The following link leads to the proof of originality : [Click here](#)

Multiple supporting pieces of evidence have been included to validate the authenticity of the data:

- **Owner's Permission Letter** – A signed and stamped declaration from the proprietor authorizing the use of the firm's sales register for academic purposes.
- **Photographs of the Invoice Register and Shop Premises** – Images of the handwritten sales book, billing area, and storage yard have been submitted to verify the source of the data.
- **Video Interaction with the Owner** – A short recorded discussion with Mr. Suman Ghosh confirming the legitimacy of the dataset and granting approval for academic use.
- **Excel File (Converted Dataset)** – The dataset used for analysis is a digitized version created by manually entering each invoice entry from the physical register.

These components collectively confirm that the dataset is authentic, primary, and manually collected by the student directly from the business, and has not been sourced or copied from any online or secondary dataset.

3. Metadata and Descriptive Statistics

- **Metadata:**
 - **invoice.csv:**

| Invoice No. | Date of Sale | Customer Name | Customer_Type | Product Name | Product Type | Quantity | Rate | Total Amount | Payment Method | Payment | Due Payment | Cost Price | Profit | Remark |
|-------------|--------------|----------------|-----------------|----------------|--------------|----------|------------------|--------------|----------------|---------|-------------|------------|--------|----------------|
| 1 | 2025-05-04 | Anirban Das | Retail Customer | 5/8" Stone | Stone | 505 CFT | 8000 PER 100 CFT | 40400 | Cash | 40400 | 0 | 38,400 | 2,000 | Paid |
| 2 | 2025-05-04 | Khan Builder's | Builder's | Coarse Sand | Sand | 850 CFT | 7000 PER 100 CFT | 59500 | Cash | 49500 | 10000 | 55000 | 4500 | Partially Paid |
| 3 | 2025-05-04 | Hasan Mondal | Retail Customer | 5/8" Stone | Stone | 400 CFT | 8000 PER 100 CFT | 32000 | Cash | 32000 | 0 | 30000 | 2000 | Paid |
| 4 | 2025-05-04 | Hasan Mondal | Retail Customer | Lafarge Cement | Cement | 50 BAG | 370 PER BAG | 18500 | Cash | 18500 | 0 | 18000 | 500 | Paid |
| 5 | 2025-05-04 | Roni Builder's | Builder's | Coarse Sand | Sand | 850 CFT | 7000 PER 100CFT | 59500 | Cash | 54500 | 5000 | 55000 | 4500 | Partially Paid |
| 6 | 2025-05-05 | Tamal Biswas | Builder's | Coarse Sand | Sand | 850 CFT | 6470 PER 100 CFT | 55000 | Cash | 40000 | 15000 | 53000 | 2000 | Partially Paid |

- **Dataset Purpose:** Contains sales invoice records for a construction materials supplier. Tracks sales, payments, customer types, products, and financial metrics like profit and due payments.
- **Time Period:** From May 4, 2025, to November 30, 2025.
- **Total Records:** 222 invoices (RangeIndex: 1 to 222).
- **Fields (Columns) Description:**

1. **Invoice No.:** Unique identifier for each invoice.
2. **Date of Sale:** Date when the sale was made (YYYY-MM-DD).
3. **Customer Name:** Name of the customer or business.
4. **Customer_Type:** Categorization of customer (e.g., Retail Customer, Builder's, Contractor).
5. **Product Name:** Name of the product sold (e.g., "5/8" Stone", Coarse Sand, Bricks,Cement).
6. **Product Type:** General category of the product (e.g., Stone, Sand, Cement, Bricks, Dust).
7. **Quantity:** Amount sold, with units specified (e.g., CFT, KG, BAG, PIECE).
8. **Rate:** Price per unit (e.g., "8000 PER 100 CFT").
9. **Total Amount:** Total sale value for the invoice.
10. **Payment Method:** Mode of payment (Cash, Online).
11. **Payment:** Amount paid against the invoice.
12. **Due Payment:** Remaining unpaid amount.
13. **Cost Price:** Cost of goods sold for the invoice.
14. **Profit:** Profit earned (Total Amount - Cost Price).
15. **Remark:** Payment status or note (e.g., Paid, Partially Paid, Full Payment Due, Advance Payment).

4. Descriptive Statistics:

- **Numerical Data Analysis:**

| | Invoice No. | Date of Sale | Total Amount | Payment | Due Payment | Cost Price | Profit |
|-------|-------------|----------------------------------|---------------|---------------|---------------|---------------|--------------|
| count | 222.000000 | 222 | 222.000000 | 222.000000 | 222.000000 | 222.000000 | 222.000000 |
| mean | 111.500000 | 2025-08-07 12:32:25.945945856 | 19810.869369 | 19588.810811 | 17532.504505 | 18584.783784 | 1226.085586 |
| min | 1.000000 | 2025-05-04 00:00:00 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| 25% | 56.250000 | 2025-06-12 00:00:00 | 0.000000 | 5000.000000 | 0.000000 | 0.000000 | 0.000000 |
| 50% | 111.500000 | 2025-07-25 12:00:00 | 0.000000 | 10000.000000 | 13022.000000 | 0.000000 | 0.000000 |
| 75% | 166.750000 | 2025-10-16 18:00:00 | 55957.750000 | 32000.000000 | 27145.750000 | 53750.000000 | 2000.000000 |
| max | 222.000000 | 2025-11-30 00:00:00 | 130000.000000 | 130000.000000 | 205748.000000 | 117500.000000 | 12500.000000 |
| std | 64.230055 | NaN | 29337.245507 | 21700.246660 | 21935.992665 | 27435.154069 | 2283.282139 |

The dataset consists of 222 invoices with several financial columns. Here is a breakdown of key metrics:

1. **Invoice No.:** Ranges from 1 to 222, evenly distributed (mean = 111.5).

2. **Total Amount:**

- **Mean:** ₹19,810.87

- 75% of invoices are below ₹55,957.75, but the max is ₹130,000, indicating some high-value sales.
- High standard deviation (₹29,337.25) suggests wide variability in invoice amounts.

3. Payment:

- Mean: ₹19,588.81
- 50% of invoices received payments up to ₹10,000, but 25% received ₹32,000 or more.

4. Due Payment:

- Mean: ₹17,532.50
- Max due payment is ₹205,748, far exceeding the max total amount, indicating possible outstanding balances or data discrepancies.

5. Cost Price:

- Mean: ₹18,584.78

6. Profit:

- Mean profit: ₹1,226.09
- 75% of transactions show profit \leq ₹2,000, but max profit is ₹12,500, indicating a few high-margin sales.
- High std dev (₹2,283.28) relative to mean suggests inconsistent profitability.

Significance of Statistics:

The descriptive statistics provided reveal important business insights:

1. Sales Distribution:

- The upper quartile (75%) shows significant sales activity, indicating that a smaller subset of invoices drives revenue.

2. Payment Behavior:

- Median payment is ₹10,000, but mean is nearly double, influenced by high-value payments in the top quartile.
- Due Payment max value exceeding Total Amount suggests potential errors in recording or carried-over balances.

3. Profitability Insights:

- Low average profit (**₹1,226**) relative to cost and sale amounts indicates thin margins or high volume of low-profit sales.
- Presence of zero cost prices may distort true profit analysis—requires data validation.

4. Data Quality Issues:

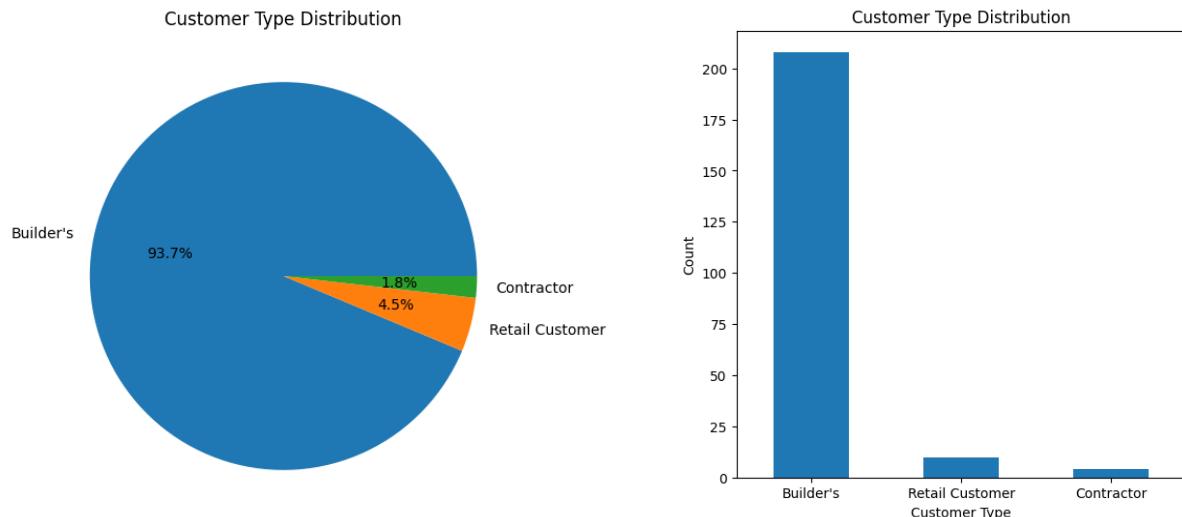
- Zeros in **Cost Price, Profit, and Total Amount** for many records may indicate incomplete data.
- **Date of Sale** stats show a timestamp with nanoseconds, which is unusual for sales data and may reflect system export issues.

5. Business Implications:

- The wide spread in **Total Amount** and **Payment** suggests diverse customer segments or product types.
- High **Due Payment** values highlight potential cash flow risks if not managed.

• Categorical Data Analysis

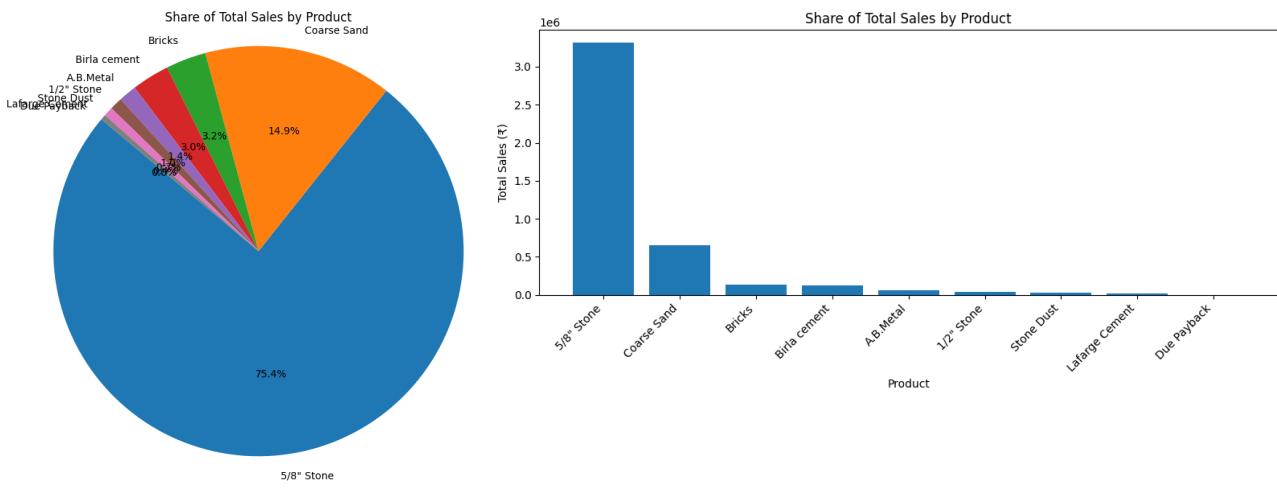
• Customer Type:



There are three types of customer in this builder's shop, Builder's business, Retail Customer and contractor.

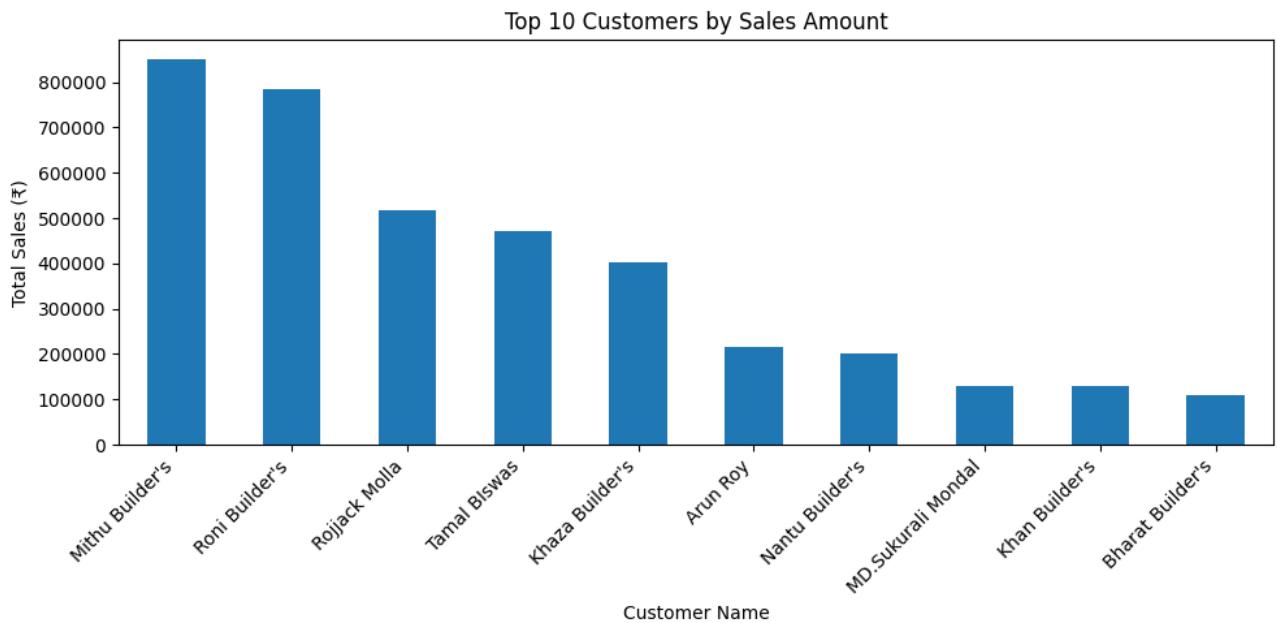
The Builder's business dominate (93.7%) in the customer type while retail customers only hold fraction of the customer type(4.5%) and contractor only holds 1.8% segments.

• Product Performance:



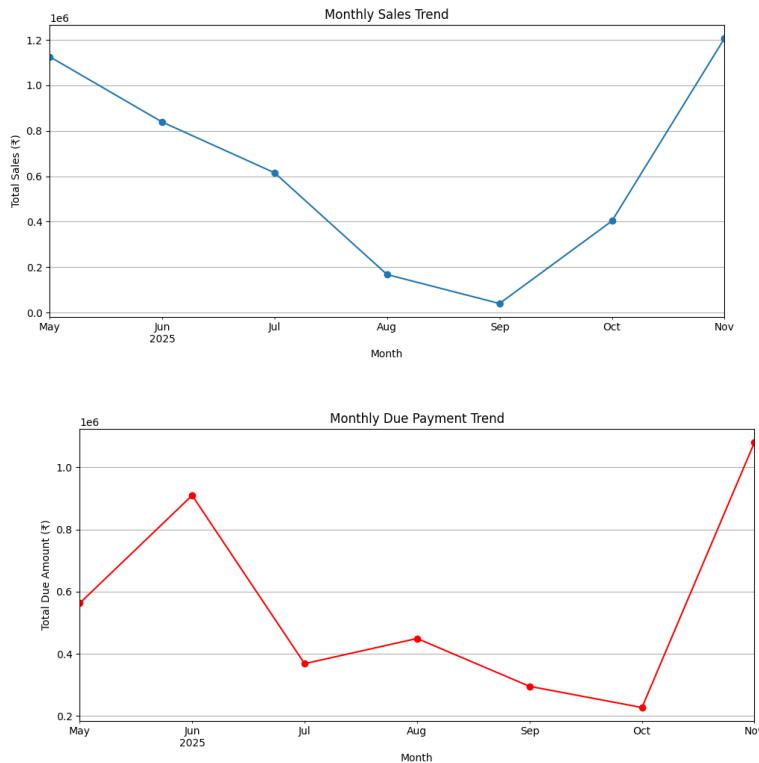
The *5/8" stone* sells more than other products(74.5%) and *coarse sand* sells the second highest(14.9%) and *bricks*(3.2%) is third most selling even though the percentage is significantly low .

- **Customer Concentration:**



Top 10 customers show extreme sales variation (₹100K-800K range), with Mithu Builder's as the clear market leader, creating high dependency risk.

- **Monthly Trends:** Both sales and due payments show similar seasonal patterns with identifiable peaks, suggesting consistent credit terms and seasonal business cycles.

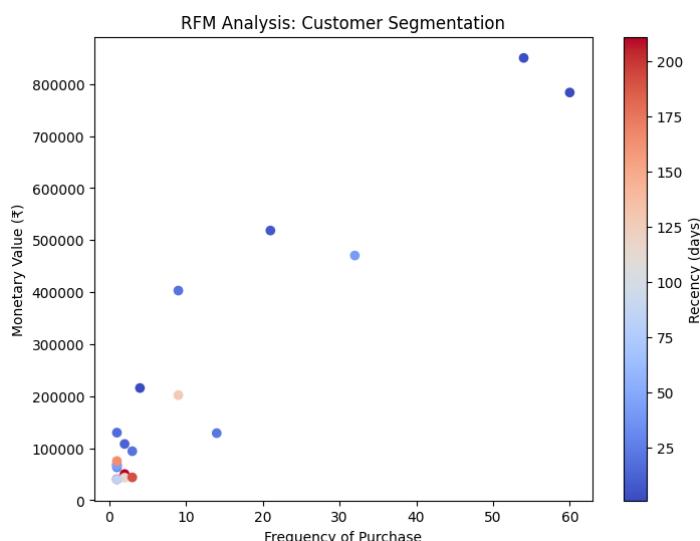


5. Detailed Explanation of Analysis Process/Method

1. **RFM analysis for customer segmentation:** RFM analysis shows clear revenue concentration

| index | Customer Name | Recency | Frequency | Monetary |
|-------|--------------------|---------|-----------|----------|
| 0 | Anirban Das | 211 | 1 | 40400 |
| 1 | Arun Roy | 1 | 4 | 215748 |
| 2 | Bharat Builder's | 13 | 2 | 108220 |
| 3 | Hasan Mondal | 211 | 2 | 50500 |
| 4 | Khan Builder's | 22 | 14 | 129000 |
| 5 | Khaza Builder's | 20 | 9 | 403093 |
| 6 | MD. Mozam Mondal | 19 | 1 | 68800 |
| 7 | MD.Sukurali Mondal | 16 | 1 | 130000 |
| 8 | Mithu Builder's | 3 | 54 | 850351 |
| 9 | Moti Mondal | 117 | 2 | 43469 |
| 10 | Naim Mondal | 20 | 3 | 94327 |
| 11 | Nantu Builder's | 128 | 9 | 202079 |
| 12 | Rasid Daptry | 191 | 3 | 44000 |
| 13 | Rojack Molla | 7 | 21 | 516569 |
| 14 | Roni Builder's | 1 | 60 | 783854 |
| 15 | S.R.Builder's | 25 | 1 | 63310 |
| 16 | Saha Builder's | 43 | 1 | 66300 |
| 17 | Sankar Bose | 84 | 1 | 40000 |
| 18 | Tamal Biswas | 42 | 32 | 470506 |
| 19 | Tutul Molla | 164 | 1 | 75487 |

among a few customers. Roni Builder's, Mithu Builder's, Rojick Molla and Tamal Biswas are the “champion”



customers, with very high monetary value and frequent recent purchases. They should receive top priority, personalised service and flexible yet well-monitored credit terms.

A second cluster, including **Khaza Builder's** and **Khan Builder's**, shows consistent repeat purchases and strong

spending potential, making them suitable for **loyalty building, cross-selling and early-payment discount offers**.

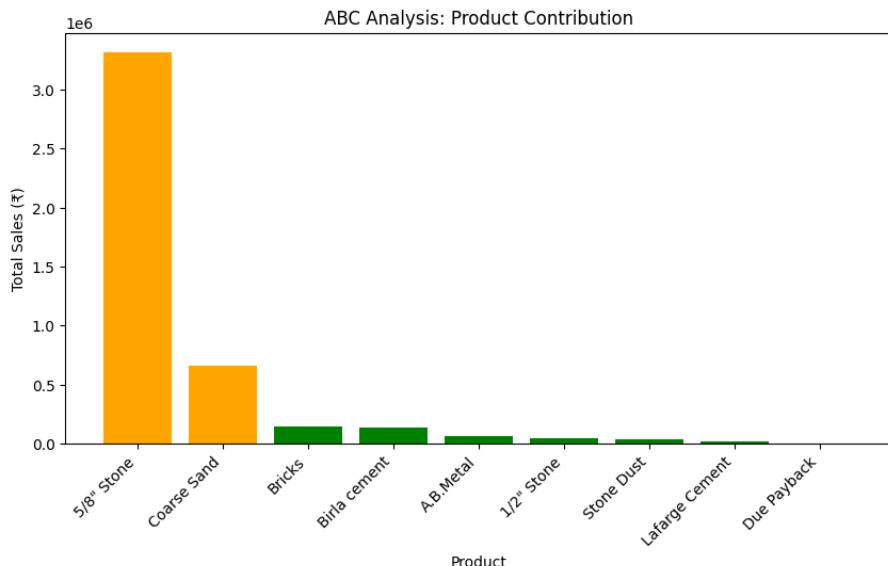
Another group — **Anirban Das, Hasan Mondal, Rasid Daptry, Tutul Molla, Nantu Builder's and Moti Mondal** — shows **high bill amounts but long recency and low frequency**, making them **credit-risk customers** who require **strict credit limits and proactive follow-up**.

Recent but mid-tier customers such as **Arun Roy, Bharat Builder's and Naim Mondal** should continue under a **standard credit policy**, with terms upgraded only if they increase purchases. Low-value one-time buyers are best handled through **cash / very small credit** with minimal tracking effort.

Overall, RFM helps classify customers as **champion, loyal, at-risk and low-value**, enabling **targeted credit control and improved working-capital management** for M/S Sarada Builders & Suppliers.

2. ABC Analysis for Product Contribution: ABC analysis highlights **extreme revenue dependence on one core product**

| | Product Name | Sales Value | Cumulative % | Class |
|---|----------------|-------------|--------------|-------|
| 0 | 5/8" Stone | 3316142 | 75.400914 | B |
| 1 | Coarse Sand | 655000 | 90.294003 | C |
| 2 | Bricks | 140000 | 93.477259 | C |
| 3 | Birla cement | 130000 | 96.433139 | C |
| 4 | A.B.Metal | 62031 | 97.843572 | C |
| 5 | 1/2" Stone | 44044 | 98.845024 | C |
| 6 | Stone Dust | 32296 | 99.579355 | C |
| 7 | Lafarge Cement | 18500 | 100.000000 | C |
| 8 | Due Payback | 0 | 100.000000 | C |



dependence on one core product. 5/8" Stone contributes approximately ₹33,16,142, accounting for ~75.4% of total sales, placing it in **Class A**, which requires the **highest priority in stock availability, supplier reliability and pricing negotiation**. The **secondary contributor, Coarse Sand**, generates ₹6,55,000 (~15%) and is classified as **Class B**, implying it must be **monitored regularly with controlled stocking**.

All remaining products — **Bricks, Birla Cement, A.B.**

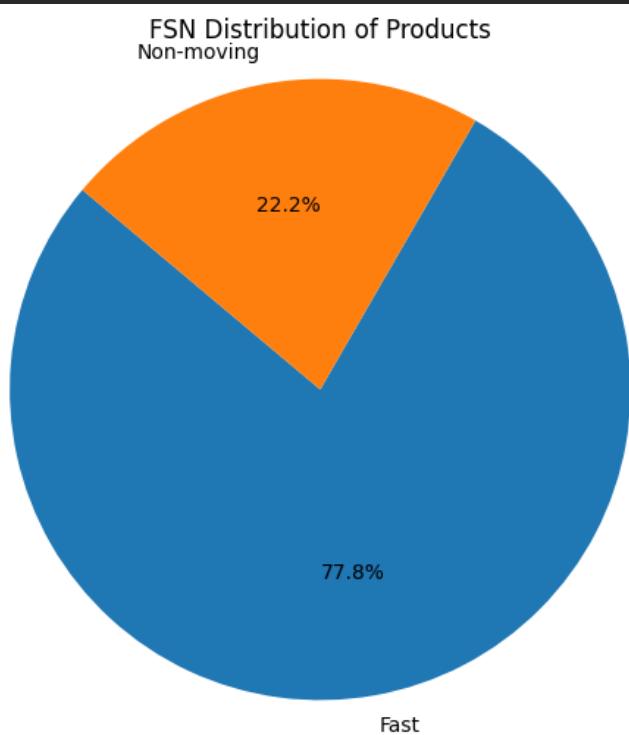
Metal, 1/2" Stone, Stone Dust and Lafarge Cement — collectively contribute less than 10% of revenue and fall under **Class C**, meaning they have low turnover and low business impact. Overstocking these items can unnecessarily block working capital and reduce inventory efficiency.

From an operational perspective, **Class A** requires continuous availability and fast reordering, **Class B** requires balanced inventory control, and **Class C** should be purchased based on actual demand to avoid excess stock.

Overall, the business is **highly sensitive to the supply and demand of 5/8" Stone**, making efficient stocking of A and B class products and restricted procurement of C class items essential for **profitability and working-capital optimisation** at M/S Sarada Builders & Suppliers.

3. FSN Analysis for Inventory Movement: The FSN pie chart indicates that **77.8% of products**

| Product | Total Quantity Sold | Days Since Last Sale | Category |
|------------------|---|----------------------|------------|
| 0 1/2" Stone | 40040 KG | 12 | Fast |
| 1 5/8" Stone | 505 CFT400 CFT36040 KG36140 KG200 CFT40040 KG3... | 1 | Fast |
| 2 A.B.Metal | 40020 KG | 20 | Fast |
| 3 Birla cement | 500 BAG | 15 | Fast |
| 4 Bricks | 5000 PIECE4000 PIECE5000 PIECE | 6 | Fast |
| 5 Coarse Sand | 850 CFT850 CFT850 CFT850 CFT200 CFT850 CFT850 ... | 98 | Non-moving |
| 6 Due Payback | Due PaybackDue PaybackDue PaybackDue PaybackDu... | 0 | Fast |
| 7 Lafarge Cement | 50 BAG | 210 | Non-moving |
| 8 Stone Dust | 40370 KG | 19 | Fast |



are **Fast-moving** and **22.2% are Non-moving**, showing that most SKUs are active while a smaller portion is blocking inventory without regular sales.

5/8" Stone (1 day since last sale) and Due Payback (0 days) are extremely fast-moving, while **1/2" Stone, Bricks, A.B. Metal, Birla Cement and Stone Dust** also show recent and consistent sales. These items should receive **priority in replenishment, safety stock planning and warehouse space**, as they directly support daily business operations.

On the other hand, **Coarse Sand (98 days since last sale) and Lafarge Cement (210 days)** fall under **Non-moving**

products, reflecting very weak demand and posing high risk of dead stock, especially for cement which may deteriorate over time. Such items **lock working capital unnecessarily** and require **strict purchase control, discounts, bundling or clearance strategies** to reduce holding costs.

Overall, FSN analysis clearly differentiates **revenue-driving items from idle stock**. For M/S Sarada Builders & Suppliers, ensuring **continuous availability of fast-moving products** while **minimising or liquidating non-moving inventory** will significantly enhance **cash flow, storage utilisation and working-capital efficiency**.

6. Results and Findings :

Analytical visualisations were used to evaluate customer behaviour and inventory performance of M/S Sarada Builders & Suppliers.

1. RFM Analysis – Customer Segmentation

The RFM scatter plot shows a **small group of “Champion” customers with high frequency, high spending and recent purchases**, contributing the largest share of revenue. A second cluster of **loyal customers** exhibits regular purchases and good monetary value. A **high-value but irregular segment** has large bills but long gaps since last purchase, posing **credit risk** and requiring strict follow-up. **Low-value dormant customers** should not receive significant credit.

Overall finding: Cash-flow issues arise mainly from irregular high-value and dormant customers, highlighting the need for **segment-wise credit policies**.

2. ABC Analysis – Product Contribution

The ABC chart shows **5/8" Stone contributes ~75% of total revenue**, making it the critical product for continuous stocking. **Coarse Sand adds ~15%** as a secondary contributor, while all other products together contribute **<10%**.

Overall finding: The business is **highly dependent on one core product**; prioritising A and B class items can improve **profitability and cash flow**.

3. FSN Analysis – Inventory Movement

The FSN pie chart reveals **77.8% Fast-moving items** and **22.2% Non-moving items**. Non-moving products (e.g., Lafarge Cement) create **dead stock and working-capital blockage**.

Overall finding: Inventory replenishment should **focus on fast movers**, while purchase of **non-moving items must be minimised or clearance-driven**.