Leveraging Data-Driven Solutions to Resolve Inventory and Payment Challenges at Prapti Seva LLP

A mid-term submission report for the BDM capstone Project

Submitted by

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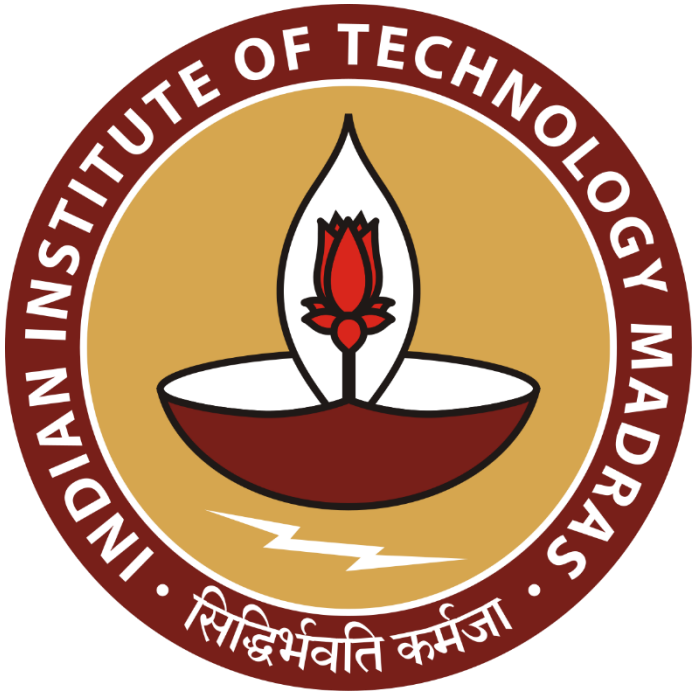

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1. Executive Summary and Title

This project explores data-driven strategies to address two major operational issues at Prapti Seva LLP, a for-profit enterprise founded on March 18, 2020, and based in Pune, Maharashtra. Specializing in the wholesale and retail distribution of household goods, personal care items, and construction equipment, the company serves both B2B and B2C clients across diverse sectors. With a workforce of 20–25 employees across sales, logistics, administration, and digital operations, Prapti Seva operates six days a week, from 9:30 AM to 7:00 PM.

A notable strength of the organization lies in its use of digital tools for managing operations and transaction records. However, the increasing scale and complexity of business have exposed gaps in data accuracy and invoicing workflows, often due to manual entry and reconciliation efforts. These issues have led to inefficiencies, impacting both operational performance and compliance.

To investigate these challenges, 12 months of primary data (January–December 2024) were analyzed, focusing on purchase invoices and client-wise sales records.

The first analysis addressed inventory issues. Stock Movement Analysis revealed irregular purchasing of key items like EME00000, suggesting reactive procurement. ABC Analysis showed that five products accounted for over 60% of the total purchase value, indicating the need for tighter inventory control on high-priority Class A items.

The second analysis examined cash flow disruptions. Sales vs Collection Trend Analysis highlighted significant lags, especially in May and July. Client-wise analysis revealed specific customers with high outstanding dues and poor recovery, underscoring the need for focused receivables management.

2. Proof of Originality

Primary Data: The primary data of 12 months (January 2024 to December 2024) is collected from Prapti Seva LLP (Columbia Technosales LLP) arranged in two spreadsheets as given below:

- Purchase invoice data (Jan 2024 to Dec 2024): {click here}
- Client wise total sale data (May 2024 to Sept 2024): {click here}

Company Office Images: Google Drive Link: {click here}

Interaction Video: {click here} (original interaction video duration: 17 mins) (shared edited version)

Letterhead from the organization: {click here}

3. Metadata and Descriptive Statistics

3.1 Metadata

Purchase invoice data (Jan 2024 to Dec 2024): {click here}
The metadata for the above referred google excel file along with its respective sheets is displayed in the below Table 1:

table 1: Purchase data

Sheet name	Columns	Data type	Units	Description
Purchase Invoice Data	S.No	integer	-	Serial number of the entry
	Sales Office	string	-	Regional or branch office managing the sale
	Business Vertical	string	-	Line of business under which the product/service falls
	Order Type	string	-	Classification of the sales order
	Sales Order No	string/integer	-	Unique identifier for the sales order
	Item No	string/integer	-	Line item number of the order
	Plant	string	-	Code for the plant responsible for dispatch
	Inv No	string/integer	-	Unique invoice number issued
	Inv Date	date	dd/mm/yyyy	Date on which the invoice was issued
	Product Code	string	-	Internal product identification code
	Description	string	-	Description of the product
	UoM	string	-	Unit of Measure (e.g., Nos, Kg, Ltr)
	Qty	float	Units	Quantity of items sold
	Rate	float	Rupees	Rate per unit before tax or discount
	Discount	float	Rupees	Discount applied on the item
	Inv Wo Tax	float	Rupees	Invoice value excluding tax
	Total Inv Val	float	Rupees	Total invoice value including all charges
	Sh Name	string	-	Likely short for “Shipping Name” – the name to whom goods were shipped

	Po No	string	-	Purchase order number received from client
	Po Date	date	dd/mm/yyyy	Date on which purchase order was issued
	End User Name	string	-	Name of the final customer or client receiving the goods
	LR No	string	-	Lorry Receipt number for tracking the dispatched goods

Client wise total sale data (May 2024 to Sept 2024): {click here}
The metadata for the above referred google excel file along with its respective sheets is displayed in the below Table 2:

Table 2: Sale Data

Sheet name	**Columns**	**Data type**	**Units**	**Description**
Customer wise Sales Data	Date	date	dd/mm/yyyy	Date of transaction or invoice
	Particulars	string	-	Description or notes about the transaction
	Buyer	string	-	Name of the customer/client
	Voucher Type	string	-	Type of accounting voucher (e.g., Sales, Receipt)
	Voucher No.	string/integer	-	Unique voucher number
	GSTIN/UIN	string	-	GST Identification Number or Unique Identification Number of the buyer
	Value	float	Rupees	Net invoice value excluding taxes
	Gross Total	float	Rupees	Invoice value including applicable GST and other charges
	SALES GOODS	float	Rupees	Value of goods sold (core sales component)
	Collection	float	Rupees	Amount received from the buyer
	CGST 9%	float	Rupees	Central GST applied at 9%
	SGST 9%	float	Rupees	State GST applied at 9%
	TCS @0.1%	float	Rupees	Tax Collected at Source at 0.1%
	ROUND OFF	float	Rupees	Rounded value adjustment made to the invoice
	IGST 18%	float	Rupees	Integrated GST applied at 18% (for inter-state sales)
	WRITE OFF	float	Rupees	Amount written off due to non-collection or settlement

	TCS @1%	float	Rupees	Tax Collected at Source at 1% (typically on high-value goods)
	SERVICE CHARGES	float	Rupees	Additional charges applied for services rendered

3.2 Descriptive Statistics:

The Descriptive Statistics Table is given at the beginning of every sheet for both the datasets present in the dataset link itself.

4. Detailed Explanation of Analysis Process

The data analysis is divided into the following subparts

4.1 Data Collection

This primary data has been collected in two parts from January 2024 to December 2024 (12 months) and May 2024 to September 2024, first one is the raw purchase data in the format of invoices extracted from software provided by the company's sole supplier (evac) the second data is total Sales data, Overall trade with each customer over the span of five months extracted from Tally accounting software. After collecting the above mentioned data I have systematically organized both the datasets which will further aid in comfortable viewing and analysis of the data.

4.2 Data Cleaning and Preprocessing

The primary data was spread across two Excel files: one detailing invoiced dispatch materials and the other containing customer transaction records. Both files required significant formatting adjustments. Unnecessary and incomplete rows and columns, including blank or unnamed columns, were removed to ensure clean data structure. In the dispatch materials dataset, key fields such as invoice dates, order numbers, item quantities, and financial values were standardized, and all text-based fields like "Sales Office" and "End User Name" were cleaned for uniformity. Similarly, the customer transaction sheet contained improperly labeled columns and extra unnamed fields which were cleaned and removed. This preprocessing step ensured both datasets were well-formatted and analysis-ready, simplifying downstream tasks such as merging, aggregation, and visualization.

4.3. Analysis Process:

For the problem statement 1 (Inventory Management Inefficiencies and Stockout Challenges), the following two analyses were conducted:

4.3.1. Stock Movement & Consumption Analysis:

Objective: To visualize the purchase behavior of inventory items across time and detect irregularities or patterns in stock inflow that may lead to stockouts or overstocking.

Qualitative Summary:

This analysis plotted monthly quantities purchased of each inventory item using a stacked bar chart. Irregular spikes in specific months and absence of purchase in others can signal poor planning, batch buying, or missed procurement cycles. Items with sporadic or inconsistent movement should be more tightly monitored.

Quantitative Method:

We grouped invoice data by Product Code and Month, and computed:

Total Quantity Purchased per Month $= \sum i(\text{Qty}i)$

Where Qty is the number of units purchased for each product in a given month. This was visualized over time using a time-series stacked bar chart to detect inconsistencies.

4.3.2. ABC Analysis:

Objective: To classify products into high, medium, and low-priority categories based on their cumulative purchase value, helping optimize inventory focus and control.

Qualitative Summary:

The Pareto principle (80/20 rule) was applied to identify the top contributors to procurement cost. Class A items (top ~70% cumulative value) should receive more attention and tighter inventory controls. Class C items (bottom ~10%) can have more relaxed policies.

Quantitative Method:

For each product:

Total Value=$\sum$(Qty * Rate)

Then for each item:

% Contribution for an item = (Item Total Value / Grand Total Value) * 100

Then compute cumulative percentage and assign:

- A: Top 70%
- B: Next 20%
- C: Remaining 10%

For the problem statement 2 (Cash Flow Disruptions Due to Delayed B2B Payments), the following analyses were conducted:

4.3.3. Sales vs Collection Trend Analysis:

Objective: To identify monthly trends in sales and actual collections, and measure payment delays or gaps that may cause working capital stress.

Qualitative Summary:

By plotting Sales and Collection values month-wise, we identified misalignment in revenue generation and cash inflow. In months where collections significantly lagged behind sales, the firm would experience liquidity stress and be forced to delay procurement or operations.

Quantitative Method: For each month:

This was plotted as a line chart to visually compare both over time.

Monthly sales = ∑(value)

Monthly Collection = ∑(Collection)

This was plotted as a line chart to visually compare both over time.

4.3.4. Customer-Wise Delay/Contribution Analysis:

Objective:

To identify which customers are contributing the most to sales, and assess how much of their dues remain unpaid to prioritize recovery efforts.

Qualitative Summary:

By analyzing the total sales and collections per customer, the firm can understand the relative reliability of its clients. This analysis reveals which customers are responsible for the highest outstanding amounts and which are paying on time. High outstanding balances from key clients may indicate systemic delays or credit abuse.

Quantitative Method:

For each customer:

Recovery % = (Collection / Sales) × 100

Customers were ranked by outstanding amounts and recovery percentage to identify high-risk clients. A bar chart was used to visualize the top 10 customers with the largest dues.

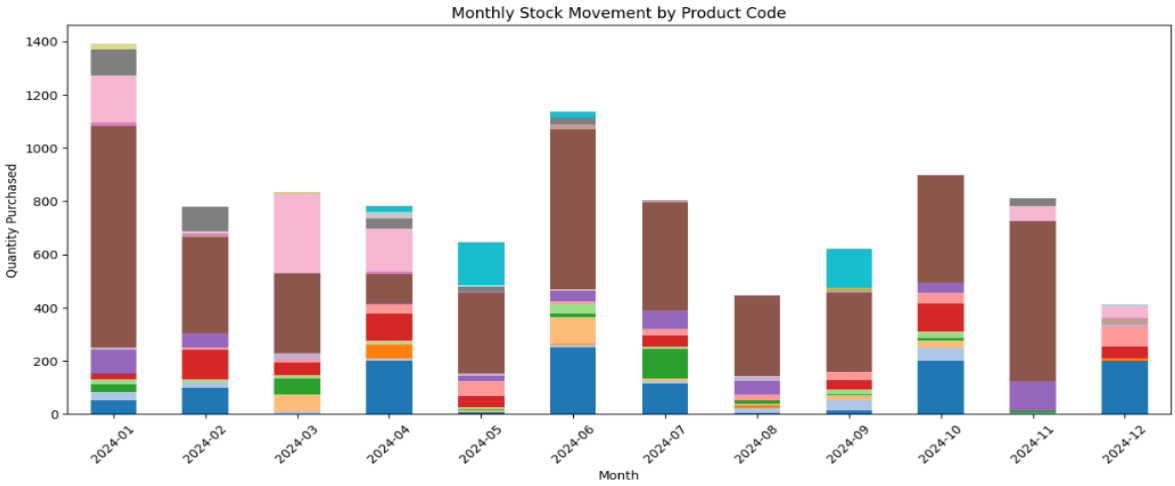
5. Results and Findings

5.1. Stock Movement & Consumption Analysis

By referring to the stacked bar chart (Fig 1) we conducted a month-wise quantity analysis of each product.

The analysis reveals clear movement trends, showing which products are consistently purchased across months and which are more seasonal. For instance, Product Code EME00000 had the highest consumption, especially in January and June. In contrast, some other products like EWTF014 and CP00114 appear in fewer months with much lower volume.

Fig 5.1.1: Stacked Bar Chart



Insights:

- The stacked bar chart highlights the monthly distribution of quantities purchased for each product.
- From this visual, it is evident that EME00000 is a high-movement item and is likely a core product in the firm's operations.
- The purchase patterns indicate steady stock movement for certain products and help identify low-moving items that may require stocking reevaluation.

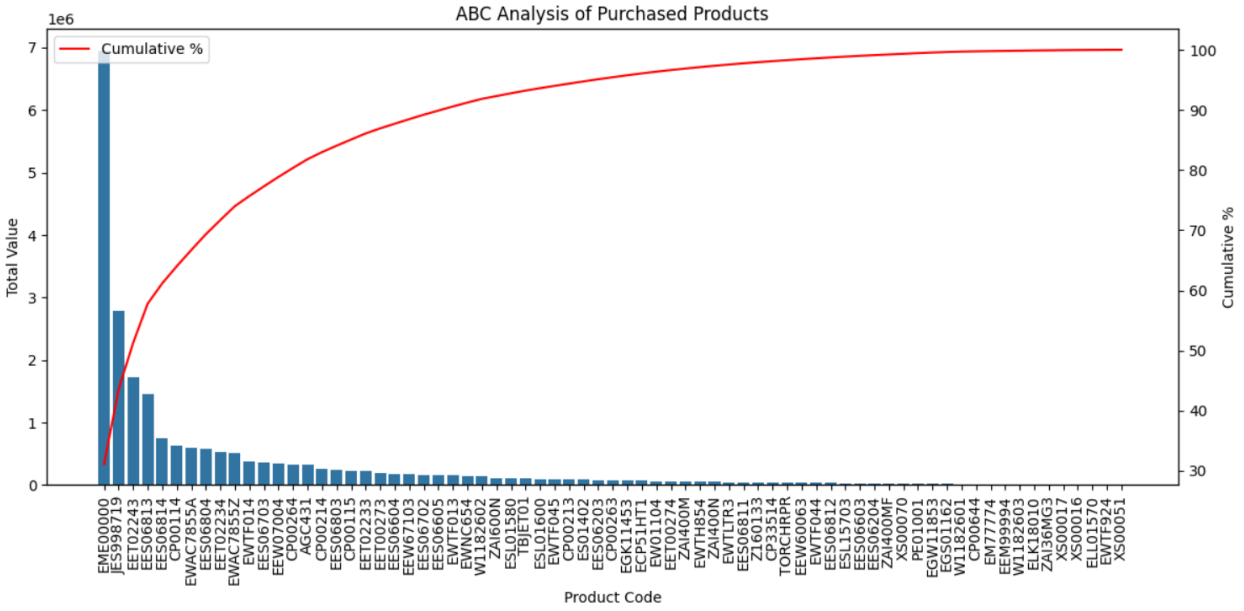
This analysis helps Prapti Seva LLP to optimize procurement cycles, reduce overstocking of slow movers, and ensure uninterrupted supply for high-demand items.

5.2. ABC Analysis

By using the cumulative value and contribution method, we calculated the Weighted Inventory Contribution for each product using total purchase value (Qty × Rate). Products were then categorized into A, B, and C classes based on the 70-20-10 Pareto rule.

The analysis gives a clear indication of which products contribute the most to the firm's inventory value and need the most attention.

Fig 5.2.1: Pareto Bar



Insights:

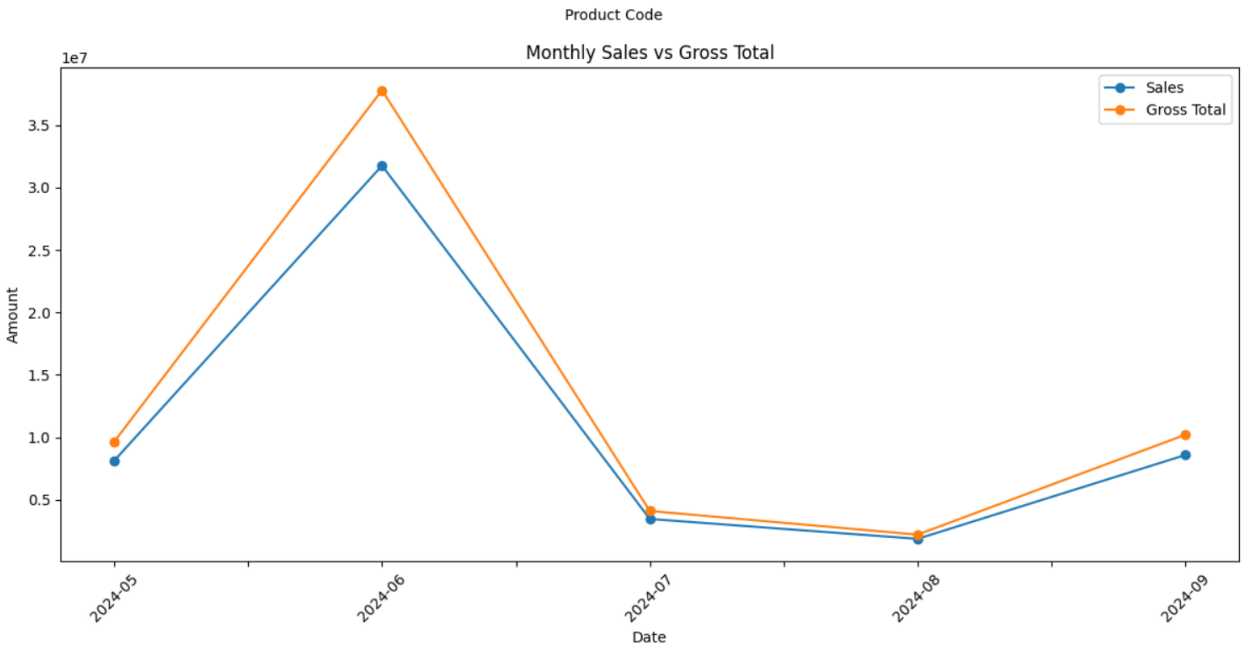
- The Pareto chart shows a steep contribution curve at the beginning, with top products (e.g., EME00000 and JES998719) falling into Category A.
- These top 3–5 items account for more than 70% of the total purchase value.
- Category B includes moderately contributing items, and Category C products (e.g., CP00114) contribute very little and can be stocked in lower frequency or volume.

This ABC classification allows the firm to prioritize procurement and inventory control, ensuring maximum capital efficiency is directed toward high-value products.

5.3. Sales vs Collection Trend Analysis

By plotting the **monthly Sales and Gross Totals** across 2024, we created a dual-line graph (Fig 3) to understand how sales trends align with actual payments received. This comparison helps monitor collection performance and revenue flow.

Fig 5.3.1: Sales vs Gross Line Char



Insights:

- The chart indicates a strong alignment in most months, but a few months (e.g., June and September) show a higher Sales figure compared to Gross Collection.
- The dip in July and August followed by a surge in September indicates seasonal fluctuations or delayed collections.
- This trend analysis helps pinpoint months where cash inflow lagged behind billing, signaling a need for better follow-up and credit control during those periods.

Understanding this collection pattern allows the business to forecast liquidity needs more accurately and improve working capital planning.

5.4. Collection Efficiency Ratio Analysis

Using the sales dataset, we computed each buyer's total sales, total collection, outstanding dues, and recovery percentage. This data was visualized in a bar chart (Fig 4.1) showing the top 10 customers with the highest outstanding amounts.

Fig 5.4.1: Bar Chart of Top Outstanding Customers

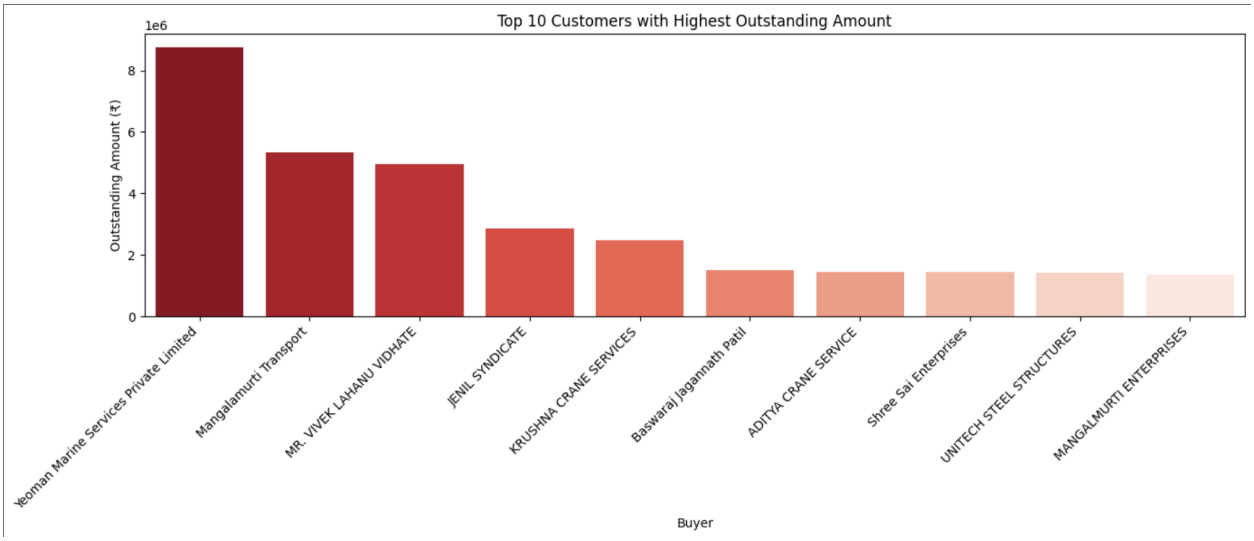


Fig 5.4.1: Top 10 customers

Top 10 Customers by Outstanding Amount:

	Buyer	Sales	Collection	Outstanding	% Recovered
92	Yeoman Marine Services Private Limited	10823964.0	2076036.0	8747928.0	19.179997
43	Mangalamurti Transport	6615522.0	1268793.0	5346729.0	19.179031
42	MR. VIVEK LAHANU VIDHATE	6125190.0	1174810.0	4950380.0	19.179976
28	JENIL SYNDICATE	3477880.3	630036.7	2847843.6	18.115537
32	KRUSHNA CRANE SERVICES	3062595.0	587405.0	2475190.0	19.179976
7	Baswaraj Jagannath Patil	1845947.0	354053.0	1491894.0	19.180020
0	ADITYA CRANE SERVICE	1803994.0	346006.0	1457988.0	19.179997
75	Shree Sai Enterprises	1803994.0	346006.0	1457988.0	19.179997
84	UNITECH STEEL STRUCTURES	1762041.0	337959.0	1424082.0	19.179974
39	MANGALMURTI ENTERPRISES	1678134.0	321866.0	1356268.0	19.179994

Insights:

- The buyer with the highest outstanding is *Yeoman Marine Pvt Ltd* with ₹2,076,376.40 dues, despite having a 118% recovery rate (indicating previous period carry-forward collections).
- Other high-outstanding customers include *Navin Agencies* and *Sonia Healthcare*.
- The % Recovered values help differentiate between customers who are genuinely delayed versus those whose dues may reflect delayed invoice dates.

This analysis helps prioritize customer follow-ups and allows the business to reduce Days Sales Outstanding (DSO) by focusing on high-value late payers.