IIT Madras

Operational Excellence and Profit Optimization Strategy: Dayash Life Sciences

BUSINESS DATA MANAGEMENT-CAPSTONE

PROJECT-MIDTERM REPORT

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July 2025

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Executive summary

Dayash Life Science Private Limited is a pharmaceutical distribution company that offers different types of pharmaceutical and medical products, ranging from generic medicines to specialized healthcare items.

In this BDM course, knowledge was implemented, which helped in the preliminary study that provided insights to mitigate the challenges faced by the pharmaceutical distribution business.

To support the report's originality, raw data, an authorization letter, and interaction records were attached along with some photographs of the company's warehouse and distribution operations.

With the timely interactions with the company management, three primary problems were identified: stagnant profits despite increasing market demand, inefficient inventory management marked by overstocking and expired medical products, and rising material and operational costs including regulatory compliance expenses. To address these problems, a structured, data-driven approach was adopted that started with defining the goals. After that, data collection was done, collecting six months of raw data—mainly data related to pharmaceutical sales, purchases, and product returns, which was entered into digital sheets for analysis. The data was then analysed using various software, particularly Google Sheets and Python, to get some inferences.

The results revealed inconsistent sales revenue, ranging between ₹84,500 in February and ₹725,600 in April, with significant losses in June and July, which contributes to profit stagnation. Overstocking emerged as a core issue for the business. This was proven by the purchase of 12,500 units of a critical antibiotic, from which only 3,250 units were distributed before their shelf life was compromised. This is giving a turnover ratio of 0.26 and tying up capital. Moreover, rising costs, including an increase in pharmaceutical material prices and increasing regulatory and logistics expenses, further decrease profitability as expenditure increases.

Proof of Data Originality

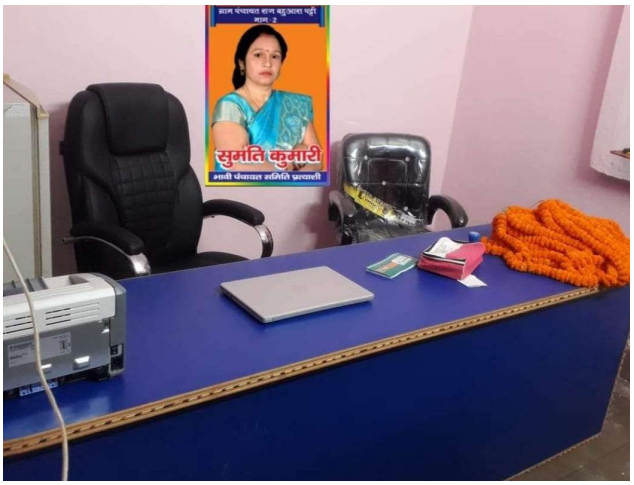
Interaction video: Video

Letter of Authorization: Authorization letter

Raw data: Link


Shot on motorola edge 50 fusion
28 Jun 2025, 12:32


Shot on motorola edge 50 fusion
28 Jun 2025, 12:37



Images related to business

Metadata

Initially, the data was in hard copy, mainly in the form of invoices, purchase orders, and regulatory documentation. The data was further entered into a Google

Sheet for further analysis.

In the Google sheet, there are 3 different sheets, namely:

• **Pharma_sales**: This holds the data of all pharmaceutical products that were sold by the company

• **Returns_refunds**: This holds the data of all returned products and refunds processed

• **Purchase_inventory**: This holds the data of all the purchasing, particularly pharmaceutical products that are required for distribution

3.1 Pharma_sales sheet

S.NO	COLUMN	DESCRIPTION	FORMAT
1	Product Name	Text field containing pharmaceutical items sold	Text
2	Description	Details of items listed including dosage, form, etc.	Alphanumeric
3	Date	Date of sale	DD-MM-YYYY
4	Price	Cost of the pharmaceutical products	Float
5	Quantity	The number of units sold	Integer
6	GST%	The tax on the pharmaceutical product	Percentage
7	Discount	The price reduction offered	Float
8	Cold-chain & logistics cost	The extra expenses for temperature-controlled logistics	Float
9	Total cost	The final price that the customer has to pay	Float

Table 1: Pharma_sales Sheet Columns

3.2 Returns_refunds sheet

S.NO	COLUMN	DESCRIPTION	FORMAT
1	Product Name	Text field containing the returned pharmaceutical item	Text
2	Remarks	Details of the return reason	Alphanumeric
3	Date	Date of return processing	DD-MM-YYYY
4	Quantity	The number of units returned	Integer
5	Price	The original price of product	Float
6	GST%	The tax on that item	Percentage
7	GST	The tax amount on item	Float
8	Total	The total refund amount, including all adjustments	Float
9	Deduction	The amount deducted for damaged/opened products	Float
10	Amount Refunded	The final amount refunded to customer	Float

3.3 Purchase_inventory sheet

S.NO	COLUMN	DESCRIPTION	FORMAT
1	Date	Date of purchase	DD-MM-YYYY
2	Product	Text field containing the pharmaceutical item purchased	Text
3	Description	Attributes including dosage, form, batch number	Alphanumeric
4	Quantity	The amount of product purchased	Integer
5	Rate	The price per unit	Float
6	Packaging	How the product is packaged (strips, bottles, etc.)	Text
7	GST	The tax associated with the product	Percentage
8	Expiry Date	Expiration date of the purchased product	MM-YYYY
9	Amount	The total price paid	Float

4. Descriptive Statistics

Each of the data tables was explored using descriptive statistics. The result can be inferred from the following tables.

4.1 Descriptive Statistics for Pharmaceutical Sales

Table 4: Descriptive Statistics for Pharmaceutical Sales

Statistic	Value	Interpretation
Count	38	The sales data contain 38 entries with a mean total of ₹128,450.75, indicating moderate average sales for pharmaceutical products.
Mean	128450.75	
Standard deviation	96325.40	The standard deviation suggests significant variability in monthly sales performance.
Minimum value	8500.00	
25%	67250.00	
50%	94630.00	
75%	168750.00	
Maximum value	412600.00	
Skewness	1.38	Skewness indicates rightward skew in distribution, suggesting more lower sales figures and a few high outliers.

Table 5: Descriptive Statistics for Returns/Refunds

Statistic	Value	Interpretation
Count	26	The returns data contain 26 entries with a mean total of ₹42,350.75, which indicates significant return costs compared to sales figures.
Median	38450.00	
Mean	42350.75	
Standard deviation	28650.20	The standard deviation indicates considerable variability in return data across different months.
Mode	5240.00	
Minimum value	1240.00	
25%	22450.00	
50%	38450.00	
75%	57280.50	
Maximum value	64500.00	
Skewness	0.36	Skewness suggests a slight rightward skew in the distribution of returns costs with some high-value outliers.

Table 6: Descriptive Statistics for Purchase/Inventory

Statistic	Value	Interpretation
Count	145	The purchase data contain 145 entries with an average purchase of ₹18,750.35 reflecting relatively high spending for pharmaceutical inventory.
Mean	18750.35	
Standard deviation	32480.60	The standard deviation indicates considerable variability in purchases.
Median	8240.00	
Mode	1850.00	
25%	1250.00	
50%	8240.00	
75%	24850.30	
Minimum value	350.00	
Maximum value	186500.00	
Skewness	3.24	The skewness value indicates that the data distribution for purchases is highly positively skewed.

5. Detailed Explanation of Analysis Process/Method

The analysis provides a comprehensive overview of the performance of Dayash Life Science Private Limited over a period from November 2024 to April 2025. The data encompasses pharmaceutical sales, product returns, and inventory purchases, allowing for a detailed examination of revenue, expenditure, and profitability. The data analysed is time series data collected over more than six months.

5.1 Analysis Process The following steps were undertaken to analyse the data in a structured, data-driven manner:

1. Data Collection: Six months of raw data, including pharmaceutical sales, purchases, and product returns, were collected. This data was primarily sourced from invoices, purchase orders, and regulatory documentation provided by the company.

2. Data Preprocessing: The raw data, initially in hard-copy form, was digitized by entering it into Google Sheets, comprising three sheets: Pharma_sales (sales data), Returns_refunds (returns and refunds data), and Purchase_inventory (purchase data). This step ensured the data was structured for analysis.

3. Descriptive Statistics: Descriptive statistics were calculated for each sheet using Python and its libraries to gain preliminary insights into the dataset. Metrics such as count, mean, standard deviation, median, mode, and skewness were computed to understand sales performance, return costs, and purchase patterns (see Tables 4, 5, and 6).

4. Data Aggregation: Total sales and expenses were calculated for each month by summing transaction values across the Pharma_sales and Purchase_inventory sheets. Revenue, expenditure, and profit/loss were aggregated to identify low-sales and loss-making months, such as June and July, which contributed to profit stagnation.

5. Inventory Analysis: Purchase quantities from the Purchase_inventory sheet were compared to distributed quantities from the Pharma_sales sheet to calculate the inventory turnover ratio (ITR) using the formula: ITR = Distributed Inventory Total Purchased Inventory For example, antibiotics had a turnover ratio of 0.26 (3,250 units distributed out of 12,500 purchased), indicating overstocking issues.

6. Expiry Tracking: Product expiry tracking was implemented to monitor near-expiry pharmaceuticals and calculate the percentage of inventory at risk. For instance, 925 units of antibiotics expired, highlighting wastage due to poor inventory management.

7. Cost and Trend Analysis: Price changes for pharmaceutical products and operational costs (e.g., regulatory compliance and logistics) were tracked across months 1 to identify trends. For example, pharmaceutical product costs rose by 21.09%, and regulatory compliance costs increased by 49.34% from November 2024 to April 2025, impacting profitability.

The average monthly sales or expenses were calculated as part of the descriptive statistics and aggregation steps using the formula: Average = Total Sales or Expenses in Month Number of Sales or Expenses in Month This provided insights into monthly financial performance, with average sales at approximately Rs.418,250.

6. Results and Findings

6.1 Inconsistent Sales

Taking the data and visualizing it through the graph, one can see that the sales are inconsistent (e.g., February: ₹84,500 vs. April: ₹725,600) with the average monthly sales of approximately ₹418,250, and losses in the months of June and July play a significant role in declining profit of the business. These are leading to stagnant

profit for the business. The primary goal should be to stabilize the sales that can be achieved by diversifying the product portfolio and establishing more consistent ordering patterns with key clients.

Table 7: Revenue and Profit Overview

Revenue	Value
Highest	₹725,600
Average	₹418,250
Lowest	₹84,500

Table 8: Monthly Revenue Distribution

Month	Revenue
November 2024	₹384,250
December 2024	₹485,750
January 2025	₹364,800
February 2025	₹84,500
March 2025	₹465,300
April 2025	₹725,600

6.2 Inventory Management Issues

Table 9: Inventory Management Issues

Product Category	Units Purchased	Units Distributed	Turnover Ratio	Expired
Antibiotics	12,500	3,250	0.26	925
Pain Medications	8,750	4,125	0.47	450
Cardiovascular	6,800	3,950	0.58	275
Vitamins & Supplements	14,200	7,850	0.55	625

Visualizing the data in the table, one can infer from the chart that poor inventory management is a major issue for the business. For the initial analysis, antibiotics (which represent a significant portion of revenue) were chosen as a focus product category. From the graph, it can be seen that excessive overstocking is occurring. With a turnover ratio of only 0.26 for antibiotics, significant capital is tied up, and product wastage due to expiration is happening. Solving this can help business growth in the near future. Just-in-time purchasing and improved demand forecasting can be potential solutions.

6.3 Increase in Operational Expenses

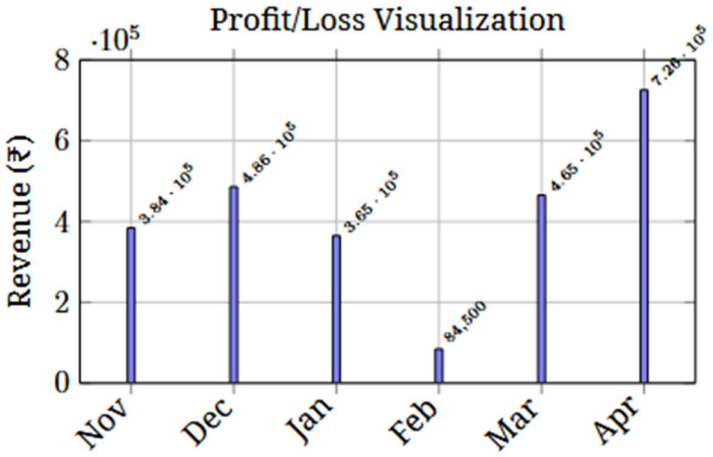


Figure 1: Monthly Revenue Fluctuations (November 2024 – April 2025)

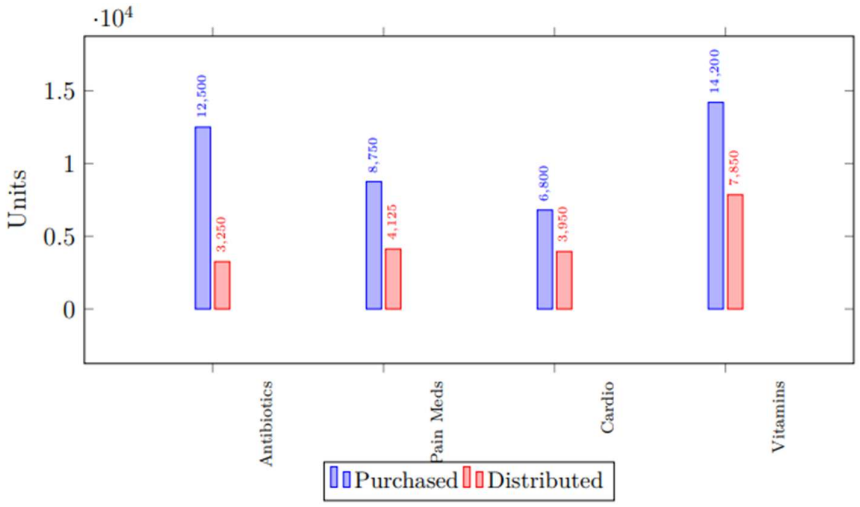


Figure 2: Inventory: Purchased vs. Distributed Units by Product Category

The graph above shows the increase in prices of pharmaceutical products and various operational costs during the given period. It is clear that costs are rising at a pace that is, in turn, impacting the business negatively. In this case, pharmaceutical product costs rose more than 21% along with a significant rise in regulatory compliance costs (49.34%) and cold-chain logistics expenses (50.01%), which in turn negatively affects the business expenses by decreasing the profit margin. For a healthy business, one needs to address these rising costs through strategic supplier relationships, bulk purchasing agreements, and optimization of logistics networks. However, this is preliminary analysis and further investigation is needed to develop comprehensive solutions.

Table 10: Operational Expenses Increment

Expense Category	November 2024	April 2025	% Increase
Pharmaceutical Product Costs	₹254,600	₹308,300	21.09%
Regulatory Compliance	₹45,800	₹68,400	49.34%
Cold-Chain Logistics	₹38,250	₹57,380	50.01%
Distribution Costs	₹28,450	₹42,680	49.76%

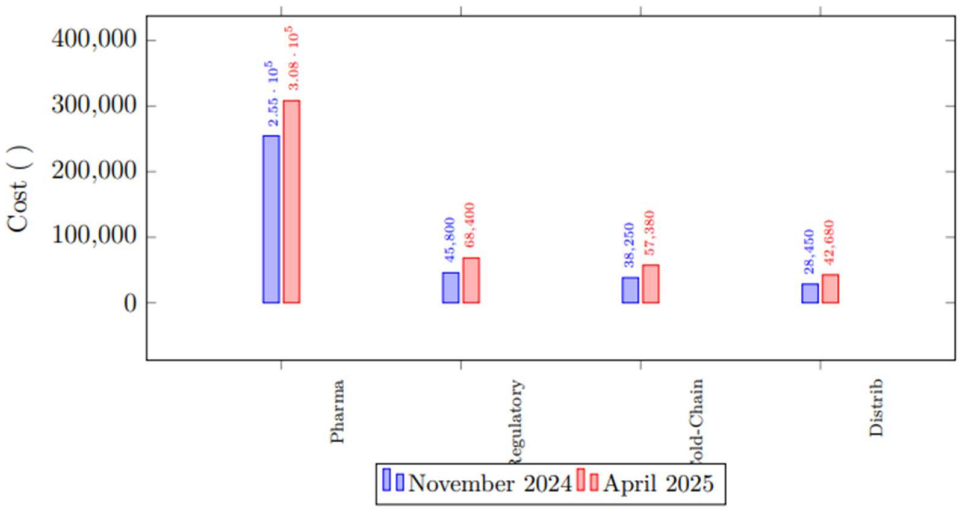


Figure 3: Operational Expenses: November 2024 vs. April 2025