

# **Optimizing Profitability and Operational Efficiency for M/S Shiv Shakti Traders**

**A Midterm Report for the BDM Capstone Project**



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# 1 Executive Summary

The project aims to boost the profitability and operational efficiency of M/S Shiv Shakti Traders, a food grain trading business in Daha, Madhepura, Bihar. The company faces several challenges, such as low profit margins due to high competition, significant transportation and labour costs, and grain quality issues. Increased competition has led to local buyers purchasing grains directly from farmers, raising purchase prices for M/S Shiv Shakti Traders. High operational costs stem from labour and transportation expenses, including repeated weighing and storage. Quality issues arise from inadequate moisture checking tools, resulting in the storage of low-quality paddy, weight shortages, and order rejections. Additionally, high transportation costs and occasional vehicle shortages lead to delays and order cancellations due to price fluctuations.

To tackle these problems, the project proposes several strategies. These include conducting market analysis and negotiating directly with farmers to reduce costs, implementing efficient labour management practices, adopting moisture management measures to improve paddy quality, performing quality checks and profit analysis between local and interstate sales, and optimizing transportation routes while negotiating better transport rates. Data is collected from ledger books focusing on metrics such as paddy weight, costs, profits, and transportation expenses. Excel is used for data management, profit calculations, and visualization, while Python and machine learning tools are used to create charts and graphs to illustrate data and identify patterns.

The expected outcomes include enhanced grain quality through better moisture management, reduced operational costs through efficient labour and transportation practices, and increased profitability by optimizing expenses and improving market competitiveness. These measures aim to streamline operations, improve resource utilization, and ensure the long-term sustainability of M/S Shiv Shakti Traders in a competitive environment.

## 2 Proof of Originality

Name of Business: M/s Shiv Shakti Traders

Address: Daha-Babhani, Gamhariya, Madhepura, Bihar , 852131

Employee: Dilip Kumar(Proprieter), Dhirendar Kumar(Manager), 3 Staffs

Type of Business: B2B

### 2.1 Links to Letterhead, Images, Video

| Description   | Link                       |
|---|----------------------------|
| Letter from the Organization  | <a href="#">Click here</a> |
| Visual Overview, Data Extraction from Ledger and Bills, Snippets of Data after Cleaning | <a href="#">Click here</a> |

|   |                            |
|---|----------------------------|
| A video of the proprietor's conversation with Dilip Kumar | <a href="#">Click here</a> |
|---|----------------------------|

**Tabel 1: Proof of Originality**

### 3 Metadata

I've gathered data in two categories: Purchasing and Selling of paddy.

The purchasing data involves acquiring and stocking paddy, which often occurs in smaller quantities that are not suitable for immediate sale.

On the other hand, the selling data encompasses transactions where paddy is sold to mills or occasionally to other trading businesses. These distinct data types provide insights into our operations, from procurement to sales strategies and market interactions.

#### 3.1 Metadata of Purchasing Paddy

| Column Name   | Data type | Description   |
|---------------|-----------|---|
| Date          | Date      | This includes the date, month, and year of both purchases.  |
| Customer Name | String    | These names belong to small farmers, small businessmen.   |
| Type of Paddy | String    | Types of paddy typically found in this region include BB11, Mota, Chaudhani, Hybrid.  |
| Weight        | Numerical | Although the business commonly measures weight in tons, I am using kilograms for ease of calculation.                       |
| Rate          | Numerical | Similarly, rates are usually given in quintals, but I have collected them in kilograms for easier calculation and analysis. |
| Labour Cost   | Numerical | These are the costs incurred while loading and unloading the paddy and weighing it before storage.                          |
| No. of Bags   | Numerical | The number of bags unloaded or loaded by the labourers.   |

|                 |           |   |
|-----------------|-----------|---|
| Purchase Amount | Numerical | The price incurred for the given weight of paddy, calculated by multiplying the weight by the rate. |
|-----------------|-----------|---|

**Table 2: Description of Columns of Purchasing Data**

### 3.2 Metadata for Selling Paddy

Although there are 14 columns in the data, some are self-explanatory, and some have already been mentioned in the table above.

The self-explanatory columns are Date, Customer Name, Weights (in kgs), Cost Price, and Selling Price.

Some columns have already been explained in the table above, such as Rate, Types of Paddy, Number of Bags, and Labour Cost.

The Total Cost Price is calculated as weight multiplied by cost price.

The Total Selling Price is calculated as weight multiplied by selling price.

| Column Name               | Data Type | Description  |
|---------------------------|-----------|--|
| Shortage                  | Numerical | Shortage is the loss in weight (kgs) during transportation                                       |
| Shortage Loss             | Numerical | Shortage loss is loss in weight multiplied by cost price   |
| Transportation cost       | Float     | Transportation cost is in terms of tons but for the ease of calculation it has been taken in kgs |
| Total Transportation cost | Numerical | Transportation cost multiplied by total weight of paddy  |
| Profit                    | Numerical | Profit after subtracting all the expenses, moisture cost, labour cost, transportation cost etc . |

**Table 3: Description of Columns of Selling Data**

## 4 Descriptive Statistics

### 4.1 Descriptive Statistics for Purchasing Data

The analysis of the purchase amount reveals that the average purchase amount is approximately 39,716.78, with a median value of 24,068.00, indicating that half of the purchase amounts are

below this amount and half are above. The most frequently occurring amount is 1,656. There is a significant variation as shown by the standard deviation of 53,835.29. The standard error of 2,301.83 suggests a reasonable precision in the mean estimate. The data ranges widely from a minimum purchase price of 782 to a maximum of 455,063. In total, the sum of all purchase prices amounts to 21,725,079 across 547 recorded transactions. This summary provides a comprehensive understanding of the central tendency and variability within the purchase amount data.

| <b>Purchase Amount (in INR)</b> |          |
|---------------------------------|----------|
| <b>Mean</b>                     | 39716.78 |
| <b>Median</b>                   | 24068.00 |
| <b>Mode</b>                     | 1656     |
| <b>Std Deviation</b>            | 53835.29 |
| <b>Std Error</b>                | 2,301.83 |
| <b>Minimum</b>                  | 782      |
| <b>Maximum</b>                  | 455063   |
| <b>Sum</b>                      | 21725079 |

**Table 4: Descriptive Statistics for Purchase Amount**

#### **4.2 Descriptive Statistics for Selling Data**

The analysis of the selling amount data reveals that the average selling amount is approximately 520,084.20, with a median value of 533,276.50, indicating that half are below this amount and half are above. The most frequently occurring amount is 614,156. The data shows a considerable variation as evidenced by a standard deviation of 138,293.75 and a standard error of 20,128.45, reflecting the precision of the mean estimate. The minimum selling amount recorded is 86,480, while the maximum is 775,980, demonstrating a wide range in the dataset. The total sum of all selling prices is 22,883,705, spread across transactions. These statistics provide a thorough understanding of the distribution and variability of the selling amounts, highlighting both central tendency and dispersion within the data.

| <b>Sales Amount (in INR)</b> |           |
|------------------------------|-----------|
| <b>Mean</b>                  | 520084.20 |
| <b>Median</b>                | 533276.50 |

|                      |           |
|----------------------|-----------|
| <b>Mode</b>          | 614156    |
| <b>Std Deviation</b> | 138293.75 |
| <b>Std Error</b>     | 20128.45  |
| <b>Minimum</b>       | 86480     |
| <b>Maximum</b>       | 775980    |
| <b>Sum</b>           | 22883705  |

**Table 5: Descriptive Statistics for Sales Amount**

## **5 Detailed Explanation of Analysis Process/ Method**

The process of data analysis involves several key steps: defining the problem, collecting data, organizing and transforming it, applying analysis techniques, and drawing conclusions.

The first step, data acquisition, required collecting four months of data and was the most challenging part of the process. It involved reaching out to various sources and ensuring the accuracy and completeness of the data collected.

Next, I focused on investigating the core aspects of the business to pinpoint specific challenges that needed attention. This involved conducting detailed interviews with stakeholders and analyzing historical records to understand recurring issues and areas for improvement.

I collected two types of data: one for purchases and another for sales. In the Data Cleaning step, I checked for inconsistencies, missing values, and outliers that could impact the results. This step was crucial to ensure that the data used for analysis was accurate and reliable. I used various tools to automate the cleaning process and to handle large datasets efficiently.

Descriptive Analysis followed, where I used various statistical techniques to summarize and explore the data. This included calculating the mean, average, profit, and standard deviation to gain insights into the overall dynamics of the data. These metrics helped to provide a clear picture of the business performance and to identify trends and patterns.

For data entry and analysis, I utilized both Excel and Python. Excel was used to enter data into spreadsheets, which were then analyzed in Python.

I used Excel's built-in charts and Python's matplotlib library to create various charts to visualize trends and conduct analysis. These visualizations made it easier to communicate findings to stakeholders and to support decision-making.

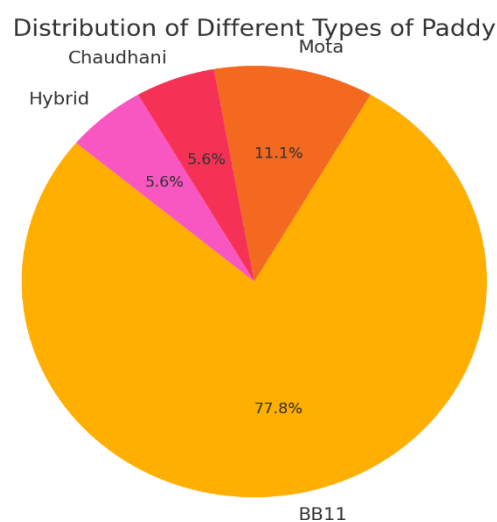
To understand the market, I visited similar businesses in the local area. This helped me identify factors that can affect profit and customer retention.

Additionally, I conducted a Labor Analysis by visiting the same area to understand labour pricing. I found that some areas charged 3.5 per bag/packet, others charged 4 per bag/packet, and some labourers charged based on quintals. This analysis provided insights into cost variations and potential areas for cost savings.

Lastly, I performed a Comparative Analysis to compare different types of paddy, such as BB11, Mota, and Chaudhani.

I also analyzed the profit of mills within Bihar versus those outside Bihar. This comprehensive approach provided valuable insights into the shop's operations and market dynamics, helping to inform strategic decisions and to identify opportunities for growth.

## 6 Results and Findings



**Figure 1: Different types of Paddy Distribution in November**

### Findings:

- **BB11:** Represents the majority of the transactions with 77.8%.
- **Mota:** Accounts for 11.1% of the total transactions.
- **Hybrid:** Makes up 5.6% of the transactions.
- **Chaudhani:** Also contributes to 5.6% of the transactions.

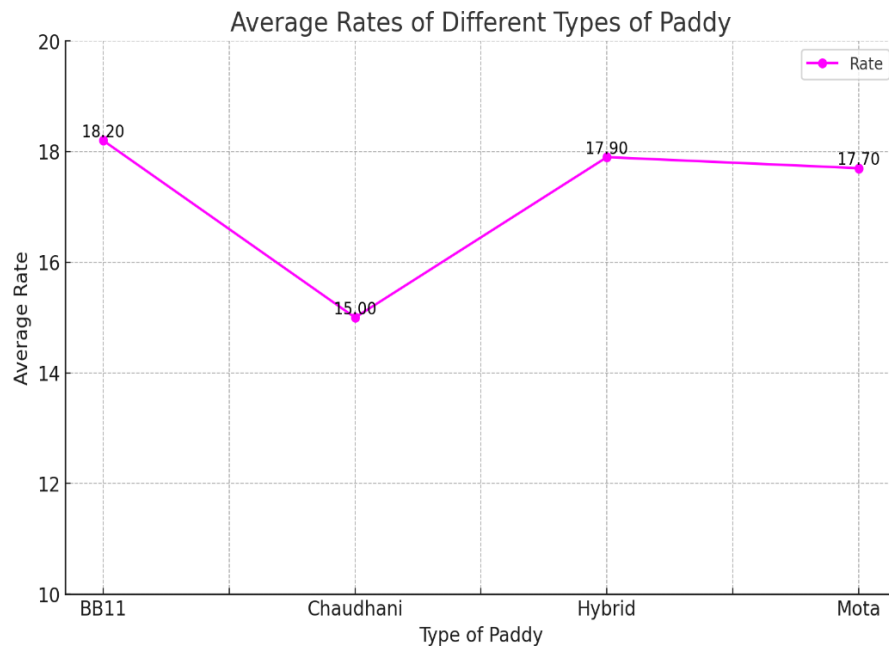
### Insights:

- **Dominance of BB11:** BB11 is the predominant type of paddy, indicating either a higher preference or availability in the market.
- **Diversity:** Although BB11 dominates, there is a noticeable presence of other types like Mota, Hybrid, and Chaudhani, showing diversity in paddy types being transacted.



### Trends:

- **Market Preference:** The significant majority share of BB11 suggests a strong market preference or reliance on this type of paddy.
- **Potential Growth for Other Types:** The presence of Mota, Hybrid, and Chaudhani, although smaller, indicates potential areas for market growth or focus in future transactions.



**Figure 2: Average Rates of Different Types of Paddy**

### Findings:

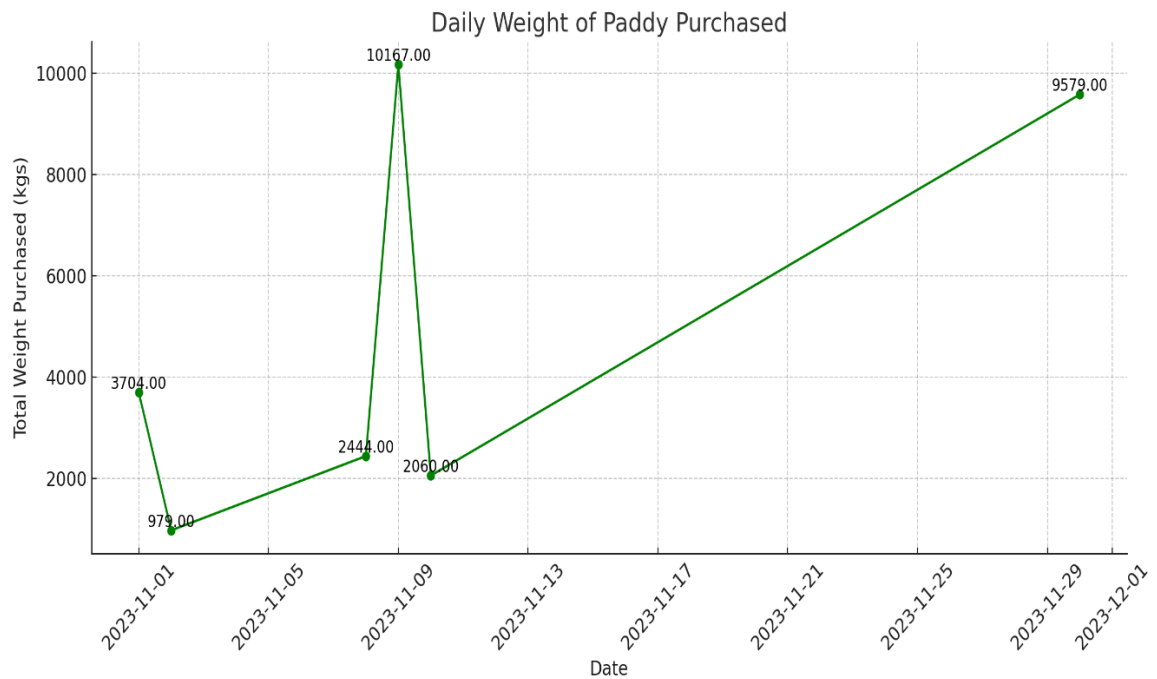
- **BB11:** Has an average rate of 18.20.
- **Chaudhani:** Has the lowest average rate of 15.00.
- **Hybrid:** Commands an average rate of 17.90.
- **Mota:** Has a stable rate of 17.70.

### Insights:

- **BB11 Premium:** The higher average rate for BB11 indicates its market value and possibly better quality or demand compared to other types.
- **Chaudhani's Lower Value:** The significantly lower rate for Chaudhani suggests it might be considered of lower quality or less in demand.
- **Competitive Rates for Hybrid and Mota:** Both Hybrid and Mota have competitive rates, indicating they are valued slightly less than BB11 but higher than Chaudhani.

### Trends:

- **Market Value:** BB11 holds a higher market value, consistent with its dominance in the transaction volume.
- **Price Stability:** The rates for Hybrid and Mota show stability, which could indicate consistent demand and supply in the market.
- **Potential for Price Adjustment:** The lower rate for Chaudhani suggests there could be potential for price adjustments if quality improvements or increased demand occur.



**Figure 3: Daily Weight of Paddy Purchased**

### Findings:

- The chart shows the total weight of paddy purchased each day in kilograms, with annotations for every data point.

### Insights:

- **Peak Days:**
  - The highest weight of paddy was purchased on 09-11-2023, with a total of 10,167 kgs.
  - The second-highest purchase occurred on 30-11-2023, with 9,579 kgs.
- **Low Points:**
  - The lowest purchase occurred on 02-11-2023, with only 979 kgs.
- **Overall Trend:**
  - A significant spike on 09-11-2023.
  - A gradual increase in purchasing towards the end of the month.

## Trends:

- **Purchasing Patterns:**
  - The chart reveals specific days with high purchasing activity, which could be linked to market conditions, availability, or strategic purchasing decisions.
  - Daily fluctuations highlight the variability in purchasing behaviour.
- **Growth Trend:**
  - There is a noticeable growth trend towards the end of the month, indicating increased purchasing activities.

In the final phase of my analysis, I will concentrate on identifying the common ground and developing solutions to effectively address the various challenges. This is just the initial analysis, and I will provide a comprehensive analysis, solutions, and recommendations in the final phase of my report.