CASE STUDY OF SATYANARAYAN GROCERY STORE

A Mid Term report for the BDM capstone Project

Submitted by

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1.Executive Summary :

This project is based on Satyanarayan Grocery Store, a local retail establishment situated in Bahanaga, Baleswar, Odisha. Known for its wide assortment of grocery essentials, the store specializes in a rich variety of dry fruits and pulses, catering to both daily consumers and bulk buyers in the region. Over the years, the store has built a reputation for quality offerings, yet it faces operational challenges related to cost control, pricing strategy, inventory management, and profit optimization. This analysis aims to identify patterns in revenue generation and inventory utilization to support data-driven decision-making for long-term business growth.

Primary data was collected for 32 days (March 1 to April 1, 2025) across eight product categories: rice, flour, toor dal, moong dal, urad dal, sugar, cooking oil, and dry fruits. The dataset includes daily metrics on purchase quantity and price, selling quantity and price, revenue, fixed and variable costs, and closing inventory. From this data, key insights emerged. Dry fruits contributed the highest profit margin (17.49%), followed by Moong Dal (10.42%) and Urad Dal (8.93%). Despite offering a modest margin of 6.01%, rice accounted for the highest total revenue (₹76,769). The overall gross profit for the month stood at ₹29,820, while net profit after deducting ₹5,500 in fixed costs was ₹24,320, yielding a net margin of 7.02%.

To address operational inefficiencies, the project used a multi-faceted analytical approach:

- Descriptive statistics helped identify product-wise sales trends and margin contributors.
- Inventory analysis provided insights into stock turnover and overstocking risks.
- Purchase-sell margin evaluation revealed gaps in pricing strategy.
- A cost-profit mapping highlighted inconsistencies between high-revenue and low-profit products.

These findings offer actionable insights for the business, including the need to reevaluate pricing

strategies for low-margin staples, optimize dry fruit inventory to maximize profitability, and reduce unnecessary bulk purchases that tie up working capital. Further analysis will aim to refine purchase planning and predict seasonal variations more accurately, ultimately enabling Satyanarayan Grocery Store to strengthen its financial health through evidence-based retail operations.

2. PROOF OF ORIGINALITY :

Business Name: Satyanarayan Grocery Store
Business Owner Name: MR. Satyanarayan Chakrabarty

Business Address: Bahanaga,Balasore,Odisha,756042

3. Metadata and Descriptive Statistics:

3.1 Metadata :

Metadata refers to “data about the data,” offering structured information about each variable collected, its measurement, and its relevance to the business problem. In this project, data was collected manually from Satyanarayan Grocery Store over 32 days (from March 1 to April 1, 2025). The store is known for its wide range of grocery items, especially in pulses and dry fruits. The dataset consists of three core sheets: **Sales**, **Purchase**, and **Inventory**. These sheets contain key metrics that were recorded daily for eight grocery items—Rice, Flour, Toor Dal, Moong Dal, Urad Dal, Sugar, Cooking Oil, and Dry Fruits—and form the basis of all subsequent analysis.

- ***Date (Format: YYYY-MM-DD)***

  Represents the specific day of observation.

  Used to analyze time trends, daily movements, and seasonal patterns.

- **Product Name (Categorical)**

  The name of the product being tracked (e.g., Rice, Moong Dal).

  Used to group and segment performance across different categories.

- **Quantity Sold (Kilograms – kg)**

  Number of units of each product sold per day.

  Essential for demand analysis, revenue generation, and sales forecasting.

- **Selling Price (Indian Rupees per Kilogram – ₹/kg)**

  Price at which each unit of the product was sold to customers.

  Helps evaluate pricing strategy, profit margin, and revenue performance.

- **Revenue (Indian Rupees – ₹)**

  Total income from each product per day, calculated as Quantity Sold × Selling Price.

  Used to measure product contribution to total sales and assess profitability..

- **Quantity Purchased (Kilograms – kg)**

  Number of units of each product purchased from suppliers.

  Important for procurement planning and stock replenishment analysis.

- **Purchase Price (Indian Rupees per Kilogram – ₹/kg)**

  The cost per unit incurred by the store to procure the product.

  Enables cost tracking and comparison with selling price for margin analysis.

- **Purchase Cost (Indian Rupees – ₹)**

  Total daily cost incurred for purchasing each item, calculated as Quantity Purchased × Purchase Price.

  Feeds into variable cost calculation and gross profit computation.

- **Closing Inventory (Kilograms – kg)**

  End-of-day available stock of each item as recorded daily.

  Drawn from the Inventory sheet to monitor stock levels, track inventory movement, and detect understocking or overstocking.

- **Fixed Costs (Indian Rupees – ₹)**
  Monthly non-variable expenses including rent, EMI, electricity, and others.
  Necessary to compute net profit and evaluate overall operational viability.
- **Gross Profit (Indian Rupees – ₹)**
  Profit before deducting fixed costs, calculated as Total Revenue – Total Variable Cost.
  Indicates the immediate profitability of store operations.
- **Net Profit (Indian Rupees – ₹)**
  Final profit after subtracting fixed costs from gross profit.
  Shows true business performance and financial sustainability.Store.

By analyzing daily sales and purchase quantities alongside pricing and inventory levels, we can uncover which products contribute most to revenue and profit, and where stock mismanagement may occur. Revenue and cost data help identify **high-margin vs low-margin products,** while inventory trends highlight **overstocking or stockout risks**. Together, these variables enable data-driven insights for **pricing, procurement, and inventory control** decisions.

3.2 Descriptive Statistics :

Descriptive statistics help summarize and interpret large datasets through central tendency and variability measures. For this project, statistics such as mean, median, mode, and standard deviation were computed for each product's daily sales quantity, selling price, purchase price, and inventory level, over the 32-day observation period (March 1 to April 1, 2025).

DESCRIPTIVE STATISTICS FOR SALES :

Rice shows the highest average daily sales (≈54 kg/day) and the highest maximum sales (108 kg), making it the store's **primary revenue driver** despite a modest profit margin. **Flour**, with a moderately high mean of 35.44 kg/day, also shows wide variability and strong skewness.This suggests **occasional large purchases**, likely by bulk buyers or retailers.

DESCRIPTIVE STATISTICS FOR SALES								
	RICE	FLOUR	TOOR DAL	MOONG DAL	URAD DAL	SUGAR	COOKING OIL	DRY FRUITS
Count	32	32	32	32	32	32	32	32
mean	53.69	35.44	10.00	8.10	8.00	8.28	11.47	2.28
std	21.86	20.81	4.95	4.11	4.56	3.47	10.28	2.53
min	20	14	4	2	2	4	0	0
25%	40	23	6	5.75	5	5.75	5	0
50%	48	29	8	8	6.50	8	8	2
75%	57	40	12.75	10	8.50	10	15	4.25
max	108	92	22	20	20	15	40	7
skewness	0.92	1.24	0.88	1.12	1.39	0.51	1.66	1.02

Toor Dal, Moong Dal, and Urad Dal have similar sales profiles: lower mean volumes, but notable right skewness. This indicates occasional spikes in demand that may correlate with local festivals or market disruptions.Dry Fruits and Cooking Oil exhibit very high skewness relative to their means. Most days they are sold in low quantities, but a few days have disproportionately high sales—highlighting them as premium products with irregular demand. Skewness across almost all products is positive, indicating that for most items, there were a few days with exceptionally high sales—pointing to right-skewed, non-normal demand distributions.

DESCRIPTIVE STATISTICS FOR REVENUE :

DESCRIPTIVE STATISTICS FOR REVENUE									
	RICE REV	FLOUR REV	TOOR DAL REV	MOONG DAL REV	URAD DAL REV	SUGAR REV	COOKING OIL REV	DRY FRUITS REV	TOTAL REV
Count	32	32	32	32	32	32	32	32	32
mean	2399	1457	1040	900	929	366	1701	1997	10824
std	987	852	505	458	555	156	1496	2216	5764
min	880	574	416	220	222	172	0	0	4564
25%	1800	943	648	636	582	250	705	0	7001
50%	2058	1203	832	880	749	344	1280	1745	7973
75%	2508	1640	1354	1100	1010	450	2216	3676	13310
max	4860	3772	2244	2260	2440	675	6600	6265	23720
skewness	0.87	1.11	0.93	1.18	1.35	0.58	1.48	1.72	1.03

The maximum daily revenue was recorded for Rice at ₹4,860, while the minimum was ₹880 Dry Fruits had a revenue range from ₹0 to ₹6,265, showing high variability. Cooking Oil also showed wide fluctuations, with a maximum of ₹6600 and minimum of ₹0. Flour ranged from ₹574 to ₹3,772, indicating stable yet moderately variable sales. The mean daily revenue was highest for Rice (₹2,399), followed by Dry Fruits (₹1,997), and Cooking Oil (₹1,701). Revenue from Toor Dal, Moong Dal, and Urad Dal remained relatively moderate, averaging around ₹1,000 per day. Sugar showed the lowest revenue trend, averaging just ₹366 per day. Most products showed right-skewed revenue patterns, with occasional spikes. Revenue trends indicate that high-volume staples (like Rice and Flour) ensure baseline stability. Meanwhile, low-volume, high-margin items (like Dry Fruits) drive profitability during peak sales days.

DESCRIPTIVE STATISTICS FOR PURCHASING COST :

DESCRIPTIVE STATISTIC FOR COST									
	RICE COST	FLOUR COST	TOOR DAL COST	MOONG DAL COST	URAD DAL COST	SUGAR COST	COOKING OIL COST	DRY FRUITS COST	TOTAL COST
Count	32	32	32	32	32	32	32	32	32
mean	2100	1466	926	903	1025	333	1928	1985	10666
std	5650	3556	2320	1931	2193	1030	5409	6088	14352
min	0	0	0	0	0	0	0	0	0
25%	0	0	0	0	0	0	0	0	0
50%	0	0	0	0	0	0	0	0	1125
75%	0	0	0	0	0	0	0	0	17198
max	17600	12300	9700	5940	6480	5040	25740	31680	50420
skewness	1.12	1.43	1.05	1.40	1.62	0.77	1.88	1.59	1.17

The purchasing cost data reveals significant variability across product categories, with bulk purchases creating extreme fluctuations. . Rice and Cooking Oil dominate costs (means: ₹2,100 and ₹1,928 daily), while Sugar remains the cheapest (mean: ₹333). Notably, 75% of days show zero purchases for most items, indicating intermittent bulk ordering rather than regular replenishment. High standard deviations (e.g., ₹5,409 for Cooking Oil) confirm erratic procurement patterns. The right-skewed distributions (skewness >1 for all items) highlight disproportionate spending on a few days, particularly for Dry Fruits (max: ₹31,680) and Cooking Oil (max: ₹25,740). This suggests inventory management leans toward bulk purchases, risking overstocking or cash flow strain. Strategic, frequent ordering could stabilize costs.

4. Detailed Explanation of Analysis process/method :

4.1 Data Cleaning and Preprocessing

The raw data collected from Satyanarayan Grocery Store was manually entered and reviewed for inconsistencies. Dates were formatted uniformly as YYYY-MM-DD to allow chronological

analysis across the sales, purchase, and inventory datasets. Missing entries, particularly for non-purchase or non-sale days, were treated as zeros to maintain numerical continuity. Product names were standardized to avoid mismatches during aggregation. All units of measurement were confirmed and labeled—quantities in kilograms and prices in Indian Rupees per kilogram. Duplicate rows and entry errors were checked using filters and conditional logic in spreadsheet tools. This data cleaning process ensured that the datasets used for analysis were accurate, consistent, and ready for computation, thereby avoiding calculation errors and misinterpretations during revenue and inventory assessments.

4.2 Analysis Process:

Descriptive statistics were computed for each product to summarize daily sales, purchase prices, and revenue patterns. Measures such as mean, median, standard deviation, minimum, and maximum were calculated to understand variation across the 32-day dataset. This helped identify product-wise trends and determine consistency or volatility in sales.

- Revenue was calculated using the formula:
  Revenue = Selling Price × Quantity Sold.
  This allowed daily and cumulative income estimation per product.
- Purchase cost was computed as:
  Purchase Cost = Purchase Price × Quantity Purchased.
  This provided insight into procurement expenses and helped evaluate purchasing behavior.
- Gross profit was obtained by subtracting total purchase cost from total revenue:
  Gross Profit = Revenue – Purchase Cost.
  To assess relative performance, profit margin was also calculated using:
  Profit Margin (%) = (Profit ÷ Revenue) × 100.

Inventory levels were analyzed using daily closing stock data from the inventory sheet. This helped identify overstocking and understocking patterns. Sudden drops in stock pointed to high sales days, while persistent high inventory highlighted potential slow-moving items.

Fixed costs such as rent, electricity, EMI, and miscellaneous expenses were aggregated to ₹5,500 per month. These were deducted from gross profit to calculate the store's net profit.

- Net Profit = Gross Profit – Fixed Costs.
  This helped assess the store's actual financial performance after considering essential recurring expenses.

Skewness was calculated for sales quantity and revenue distributions to understand asymmetry in demand. Most products exhibited positive skewness, indicating that demand was concentrated at lower values with occasional high spikes. This insight is critical for stocking decisions, especially for premium or irregular-demand products like dry fruits and cooking oil.Finally, high-performing products were identified based on a combination of revenue, gross profit, and profit margin. Rice emerged as the top revenue generator, while dry fruits and moong dal offered the highest profit margins. This analysis enables the store to adopt data-driven procurement and pricing strategies for sustained profitability.

5. Results and Findings :

Revenue and Profitability Patterns:

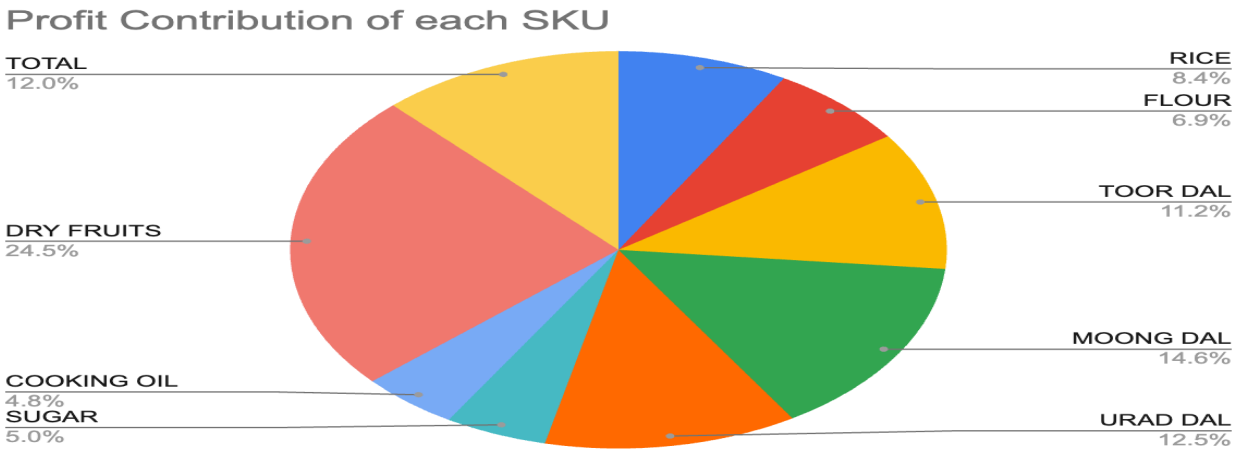

Figure 1.1

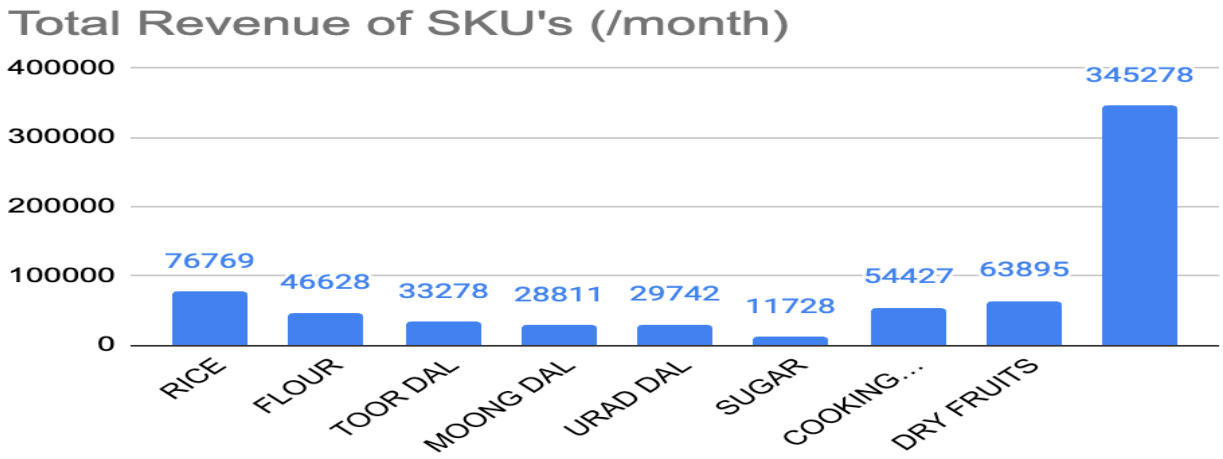

Figure 1.2

The analysis revealed that Rice consistently contributed the highest to total revenue, averaging ₹2,399.03 per day with a cumulative revenue of ₹76,769 across the month. However, its profit margin remained modest at 6.01%, indicating it plays the role of a volume-driven staple rather than a high-profit product. In contrast, Dry Fruits, despite having the lowest average daily sales (2.28 kg), showed an exceptionally high profit margin of 17.49%, contributing ₹11,175 in profit alone. This confirms that Dry Fruits are a high-margin, low-volume product, ideal for boosting profitability when marketed well.

Rice and Flour emerged as the most consistently sold products, with average daily sales of 53.69 kg and 35.44 kg respectively. These products had low variance in selling price, showing customer loyalty and stable pricing. On the other hand, Moong Dal, Urad Dal, and Toor Dal showed lower average daily sales but were often purchased by weight on alternate days, indicating possible stock-cycled purchase behavior by consumers. Cooking Oil and Dry Fruits showed highly skewed sales distribution with many days of zero sales followed by spikes, reinforcing their categorization as irregular but high-impact items.

Inventory Observations :

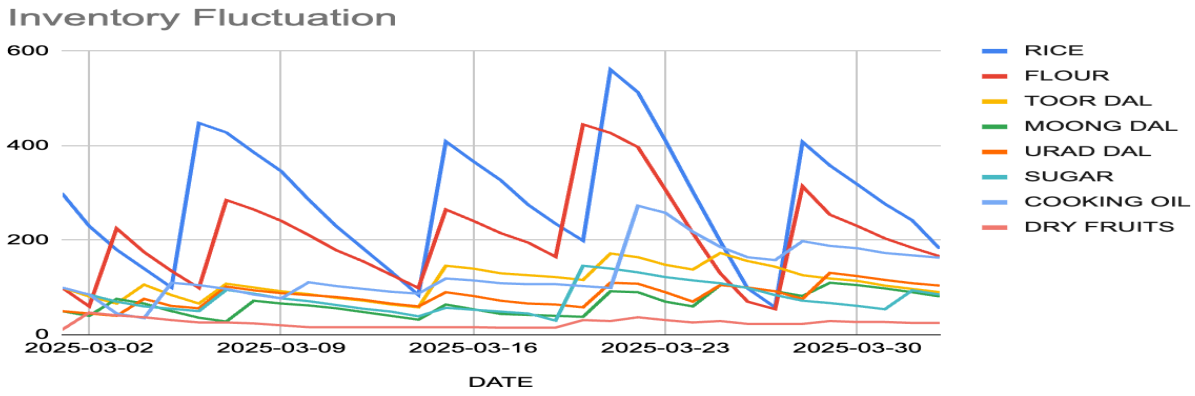

Figure 2

Inventory data revealed overstocking in several categories, particularly Urad Dal and Cooking Oil, during the mid-month period. Products like Rice showed a more balanced stock movement, indicating better alignment between procurement and demand. Dry Fruits consistently had low closing inventory, often under 30 kg, reflecting their status as a premium, fast-moving product despite low volume.

The analysis shows that Rice and Flour ensure consistent revenue, while Dry Fruits and Moong Dal offer the highest margins despite lower sales. Toor Dal and Urad Dal remain moderately profitable. The store follows bulk purchasing, leading to overstocking in some cases and zero stock replenishment in others. Revenue and cost distributions are positively skewed, reflecting occasional spikes. To improve operations, the shop owner can implement a dynamic restocking plan, promote high-margin items through offers, and reduce over-purchasing. Better alignment of inventory with demand trends and adjusting prices during peak days can help boost overall profitability