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CHENNAI – 600 036

Data Insight: Analyzing Grocery Store Data for Enhanced Retail Strategies

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Mid Term Report for the Business Data Management Capstone Project

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1. Executive Summary:

The Mamta Kirana & General Stores project focuses on analysing inventory and sales data from October-November 2024 to address key operational challenges and enhance profitability. The dataset, encompassing detailed daily records of bulk goods and packed items, was thoroughly examined to derive actionable insights.

The dataset includes comprehensive records of product categories such as rice, atta, sugar, and various other goods, providing critical information on sales volume, stock levels, and product turnover. The analysis revealed notable trends in inventory levels, with high-demand items frequently experiencing stockouts, and highlighted issues with price fluctuations impacting profit margins.

Advanced analytical techniques were employed, including time series analysis to understand sales trends, and inventory optimization strategies to align stock levels with demand patterns. These analyses also identified high-margin products and customer borrowing patterns, offering a foundation for targeted improvements in inventory management and customer relationship strategies.

The upcoming phase will focus on implementing data-driven solutions for optimized inventory control, strategic pricing adjustments, and enhanced customer trust management. These initiatives aim to reduce product wastage, minimize blocked funds, and increase the store's profitability and operational efficiency.

2. Proof of Originality of Data:

You can find the supporting evidence verifying the originality and authenticity of the datasets used in the Business Data Management project through the following link.

In proof of originality there are-

●Letter from organization.

● Images of the firm.

● A short video interacting with the Shop Owner.

LINK:https://drive.google.com/drive/folders/1u0bUDjox0uCD6wP_DoRyjAMbACEd7X55?usp=drive_link

3. Metadata and Descriptive Statistics:

Metadata: The dataset contains products sales, revenue, expenditure, profits and inventory data from 1st October 2024 to 30th November 2024. There are 11 items listed namely (Rice, Sugar, Cooking Oil, Wheat flour, Milk & Dairy, Snacks and Biscuits, Detergent Powder, Toor Dal, Chana Dal, Moong Dal and General Items).

General Items includes (Body care products, Soaps, Fash wash and creams etc).

Rice

Day	Sales	Purchase	Inventory	Selling_Price	Cost_Price	Revenue	Cost_of_Purchase	Profit
10/1/2024	74	0	1000	₹40.00	₹36.50	₹2,960.00	₹2,701.00	₹259.00
10/2/2024	145	0	926	₹40.00	₹36.50	₹5,800.00	₹5,292.50	₹507.50
10/3/2024	142	0	781	₹40.00	₹36.50	₹5,680.00	₹5,183.00	₹497.00
10/4/2024	110	0	639	₹40.00	₹36.50	₹4,400.00	₹4,015.00	₹385.00

Table 1: *Structure of Rice table/data*

Table 1 shows all the columns of per day sales of Rice. It has 62 rows and 9 columns as Day, Sales, Purchase, Inventory, Selling Price, Cost Price, Revenue, Cost of Purchase and Profit. Similarly, there are 10 more tables consisting of information of other products.

BDM Project (MK_Store_Data)

Sales

Day	Rice	Sugar	Cooking Oil	Wheat Flour	Milk & Dairy	Snacks & Biscuits	Detergent Powder	Toor Dal	Chana Dal	Moong Dal	General Items	Sales/DAY
10/1/2024	74	47	24	102	31	21	9	7	5	2	32	354
10/2/2024	145	37	30	87	29	29	6	11	2	3	32	411
10/3/2024	142	23	22	101	32	25	10	10	3	1	22	391
10/4/2024	110	16	28	24	50	22	7	5	6	4	46	318
10/5/2024	171	29	21	56	38	21	9	17	1	2	34	399
10/6/2024	100	47	9	81	41	25	12	6	3	3	20	347
10/7/2024	196	27	18	70	40	25	5	9	1	3	31	425
10/8/2024	70	31	41	30	29	18	9	12	2	0	45	287
10/9/2024	54	19	41	112	43	22	10	18	3	2	31	355
10/10/2024	141	19	25	92	60	17	7	12	3	3	40	419
10/11/2024	110	32	37	96	53	16	6	7	1	2	42	402
10/12/2024	71	44	22	84	41	26	10	18	2	1	31	350
10/13/2024	198	48	34	84	45	20	10	6	4	2	31	482
10/14/2024	119	32	41	97	31	16	5	9	0	1	40	391
10/15/2024	50	11	40	109	53	15	8	6	2	3	30	327

Table 2: *Structure of store's data over Google sheet*

Table 2 shows sales data presented for all the SKUs with sales per and day and average sales. It has 62 rows and 14 columns. There are other datasheets showcasing Revenue, Expenditure, Profit, Inventory and Customer information list.

Data Collection Period:

- Data collected for October 2024 to November 2024.

Data Sources:

- Internal sales and inventory records.
- Supplier invoices and purchase records.
- Customer transaction history, including borrowing records.

1. Sales Data

Sheet Name: Sales
Description: Contains daily sales quantity for different products.
Columns:

- **Day** – Date of sales transaction.
- **Rice, Sugar, Cooking Oil, Wheat Flour, Milk & Dairy, Snacks & Biscuits, Detergent Powder, Toor Dal, Chana Dal, Moong Dal, General Items** – Number of units sold per day for each product.
- **Inventory/DAY** – Total stock available at the end of the day.
- **Average Inventory** – Average stock maintained for each product.

2. Revenue Data

Sheet Name: Revenue
Description: Captures daily revenue generated for each product.
Columns:

- **Day** – Date of revenue record.
- **Product-wise revenue (Rice, Sugar, Cooking Oil, etc.)** – Total earnings from the sales of each product.
- **Revenue/DAY** – Total daily revenue across all products.

- **Average Revenue** – Average revenue per day.

3. Expenditure Data

Sheet Name: Expenditure
Description: Tracks daily expenditure on purchasing inventory.
Columns:

- **Day** – Date of expenditure record.
- **Product-wise expenditure (Rice, Sugar, Cooking Oil, etc.)** – Amount spent on purchasing each product.
- **Expense/DAY** – Total expenditure per day.
- **Average Expense** – Average expenditure per day.

4. Profit/Loss Data

Sheet Name: Profit/Loss
Description: Tracks daily profit or loss by comparing revenue and expenditure.
Columns:

- **Day** – Date of profit/loss calculation.
- **Product-wise profit/loss (Rice, Sugar, Cooking Oil, etc.)** – Profit or loss per product.
- **Profit/DAY** – Total daily profit.
- **Average Profit** – Average profit per day.

5. Inventory Data

Sheet Name: Inventory
Description: Daily stock levels for each product.
Columns:

- **Day** – Date of inventory record.
- **Product-wise inventory levels (Rice, Sugar, Cooking Oil, etc.)** – Quantity available for each product.
- **Inventory/DAY** – Total stock available at the end of the day.

- **Average Inventory** – Average stock maintained for each product.

6. Customer Transactions (Borrowing & Due Payments)

Sheet Name: Customer List
Description: Details of customers who borrow products and their repayment status.
Columns:

- **CustomerID** – Unique identifier for each customer.
- **Name** – Customer's name.
- **Total Borrowed Amount** – Total amount borrowed.
- **Amount Paid** – Amount repaid so far.
- **Outstanding Amount** – Pending dues.
- **Last Borrowing Date** – Date of last borrowed transaction.
- **Due Date** – Expected repayment date.

7. Product-Specific Sales & Cost Data

Sheet Names: Rice, Sugar, Cooking Oil, Milk & Dairy, Toor Dal, etc. (Separate sheet for each product)
Description: Individual product tracking for sales, purchases, inventory, and profit.
Columns:

- **Day** – Date of record.
- **Sales** – Quantity sold per day.
- **Purchase** – Quantity purchased per day.
- **Inventory** – Remaining stock after sales.
- **Selling_Price** – Price per unit sold.
- **Cost_Price** – Cost per unit purchased.
- **Revenue** – Total earnings from product sales.
- **Cost_of_Purchase** – Total expenditure for product restocking.
- **Profit** – Profit earned from this product on the given day.

Descriptive Statistics:

After thoroughly analyzing and visualizing the graphs and complete dataset from the past two months provided by Mamta Kirana Stores, the following insights and findings have been identified in below table 3: -

Category	Metric	Value	Explanation
Sales	Total Sales (All Products)	20,625 units	Sum of all sales across all products.
	Average Daily Sales	416 units	Mean sales per day across products.
	Highest Sales Day	10/13/2024 (482 units)	Peak sales day based on transaction volume.
	Lowest Sales Day	10/17/2024 (211 units)	Day with the least sales recorded.
Revenue	Total Revenue	₹1,112,456.50	Total income from sales over the period.
	Average Daily Revenue	₹18,236.99	Mean revenue earned per day.
	Highest Revenue Day	10/13/2024 (₹24,514)	Day with the maximum earnings.
	Lowest Revenue Day	10/17/2024 (₹11,945)	Day with the minimum earnings.
Expenditure	Total Expenditure	₹1,008,958.50	Total cost spent on products and operations.
	Average Daily Expenditure	₹16,540.30	Mean daily expenses incurred.
Profit	Total Profit Earned	₹103,498.00	Overall profit from sales.
	Average Daily Profit	₹1,696.69	Mean daily profit margin.
	Highest Profit Day	10/13/2024 (₹2,278.50)	Most profitable day based on revenue and expenses.
	Lowest Profit Day	10/24/2024 (₹1,084.50)	Least profitable day.
Inventory	Average Stock Level (Rice)	632 units	Mean inventory available for Rice.
	Stock Turnover Rate (Rice)	53.00%	Percentage of stock sold vs. inventory level.
Customer Borrowing	Total Outstanding Amount	₹59,988	Sum of unpaid debts from customers.
	Average Borrowed Per Customer	₹3,062.67	Mean outstanding balance per customer.
	Repayment Rate	62.33%	Percentage of borrowed money repaid by customers.

Table 3: *Descriptive Statistics*

4. Detailed Explanation and Analysis Process/Method:

To address the key challenges faced by Mamta Kirana Stores, a structured analytical approach was employed, focusing on inventory optimization, profitability assessment, and customer credit management. The methods applied were selected based on their ability to provide actionable insights while ensuring operational efficiency.

1. Sales and Inventory Trend Analysis

- Time-series analysis and descriptive statistics were utilized to examine sales patterns, seasonal variations, and demand fluctuations.
- Understanding these trends helps in demand forecasting, preventing stock shortages, and reducing overstock, thereby ensuring a balanced inventory.

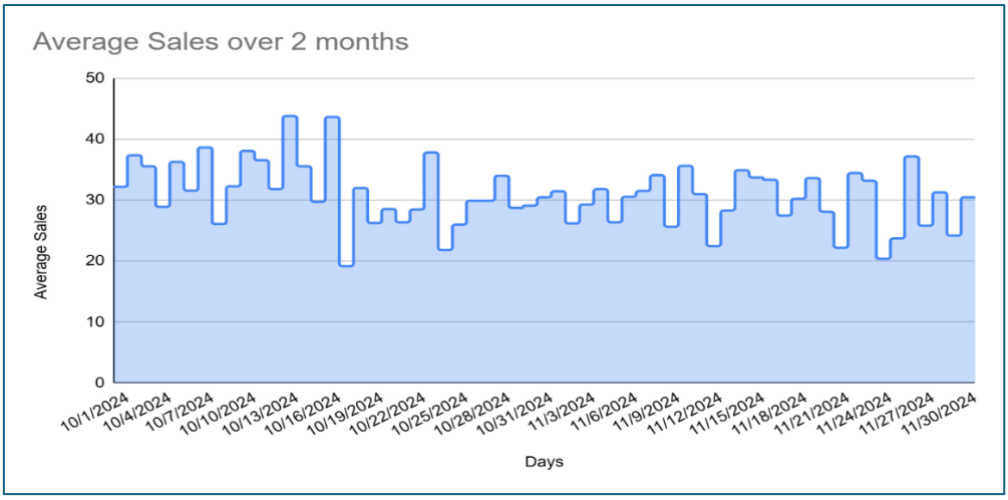

Figure 1: *Shows average sales of 2 months*

2. **Profitability and Revenue Optimization**

- Key financial indicators, such as Gross Profit Margin (GPM) and Net Profit Margin (NPM), were analyzed to identify products contributing significantly to overall revenue.
- Focusing on high-margin items allows for better pricing strategies, stock prioritization, and improved profit generation.

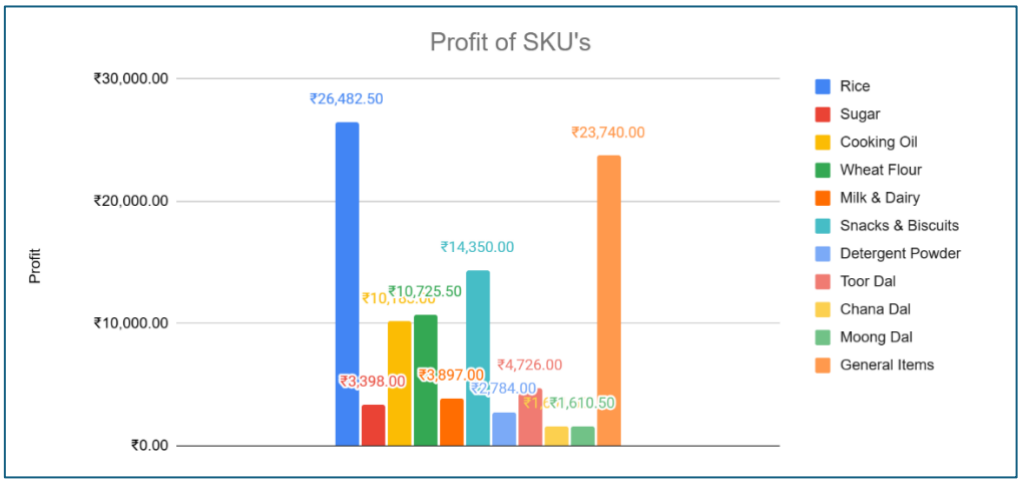

Figure 2*: Profit of SKUs*

3. **Borrowing Patterns and Repayment Behaviour**

- Customer credit transactions were examined to assess repayment trends and the impact of prolonged borrowing on cash flow.

- Tracking repayment rates ensures better financial planning, reduces revenue leakage, and enables more effective credit policies.

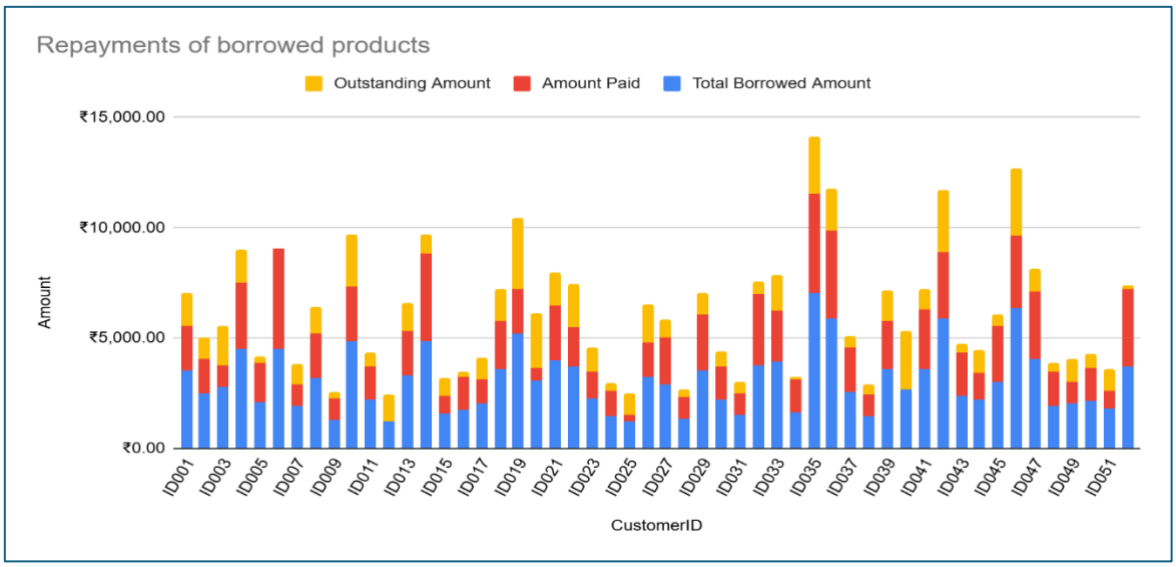

Figure 3: *Borrowing Patterns and Repayment Behaviour*

4. **Inventory Efficiency Metrics**

- Stock Turnover Rate and Days of Stock Coverage were calculated to evaluate how efficiently inventory is utilized.
- These indicators assist in maintaining optimal stock levels, reducing wastage, and ensuring a steady supply of in-demand products.

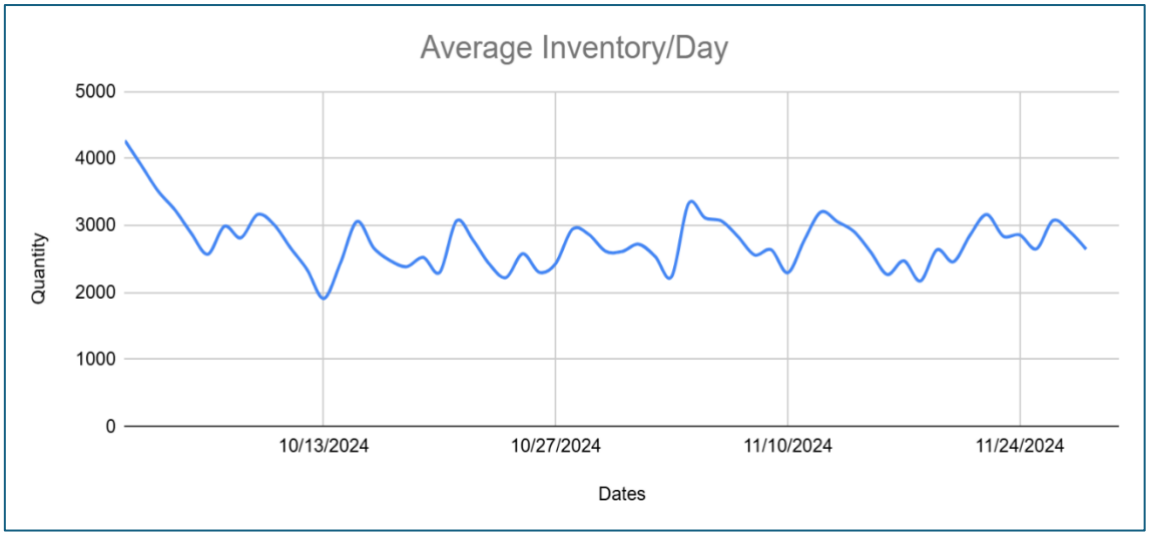

Figure 4: *Average Inventory per day at store*

The selection of these methods was driven by their ability to derive meaningful insights from available data while ensuring practicality and scalability. This approach enhances decision-making, improves profitability, and streamlines inventory management, aligning with the store's operational objectives. Some of the steps and methods outlined here are integral to the final report and will be elaborated on in greater detail in subsequent report.

5. Results and Findings:

Based on the analysis of inventory, sales, and financial data from Mamta Kirana Stores for October and November 2024, the following key findings have been identified:

- *Sales and Inventory Trends:*

  High-demand products such as rice, wheat flour, sugar, and cooking oil experienced frequent stockouts, highlighting the need for improved demand forecasting. Seasonal demand variations were observed, affecting stock availability. Additionally, products with low turnover rates were identified, suggesting potential overstocking, which ties up capital unnecessarily.

- *Profitability and Revenue Analysis:*

  High-margin products, including packaged snacks and biscuits, rice and general items contributed significantly to overall profitability. However, certain low-margin products, despite high sales volumes, yielded minimal profits, indicating the need for strategic pricing adjustments. Fluctuations in purchase costs also impacted profit margins, underscoring the necessity for a dynamic pricing strategy to maintain profitability.

- *Customer Borrowing and Repayment Patterns:*

  A notable portion of sales involved customer borrowing, leading to delayed payments and potential revenue losses. With a repayment rate of 67.9%, almost one-third of borrowed amounts remained unpaid, negatively affecting cash flow. Some customers had outstanding dues for over 30 days, signalling the need for a more structured repayment policy.

- *Inventory Efficiency Metrics:*

  The Stock Turnover Rate for rice was 0.53 times, indicating prolonged inventory holding periods before sales. The Days of Stock Coverage for rice was 7.6 days, suggesting the need for restocking soon. Excess inventory in certain product categories resulted in higher holding costs, emphasizing the importance of better procurement planning.

These deeper analyses will enhance the ability to mitigate losses and increase operational efficiency at store. The refined insights into sales trends, demand forecasts, and customer preferences will empower strategic decision-making, allowing for proactive measures to optimize inventory management, pricing strategies, and customer engagement, thereby driving sustained growth and profitability.