

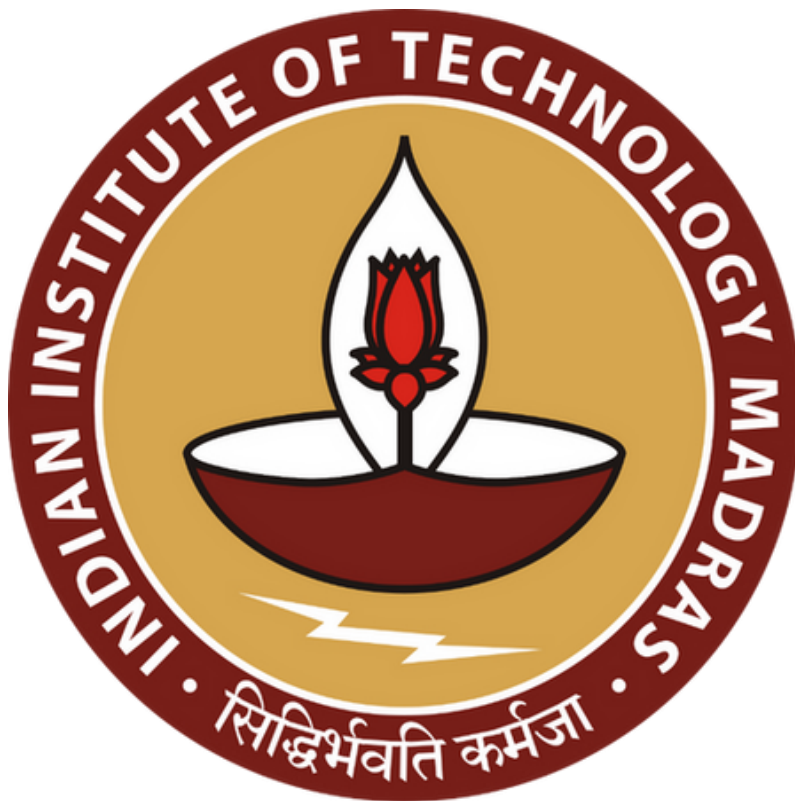
# **Stock Optimization to Increase Market Recognition and Expand Business**

**A Final report for the BDM capstone Project**

Submitted by

**Name:** Aayush Krishna

**Roll number:**23F1002879



IITM Online BS Degree Program,  
Indian Institute of Technology, Madras,  
Chennai Tamil Nadu, India, 600036

## Contents

1. Executive Summary	3
2. Detailed Explanation of Analysis Process/Method	4-5
3. Results And Findings	6-15
4. Interpretation of Results and Recommendations	16-17

## **Declaration Statement**

I am working on a Project Title “**Stock Optimization to Increase Market Recognition and Expand Business**”. I extend my appreciation to **TVS- Sneha E Auto Rickshaw Pvt Ltd**, for providing the necessary resources that enabled me to conduct my project.

I hereby assert that the data presented and assessed in this project report is genuine and precise to the utmost extent of my knowledge and capabilities. The data has been gathered through primary sources and carefully analyzed to assure its reliability.

Additionally, I affirm that all procedures employed for the purpose of data collection and analysis have been duly explained in this report. The outcomes and inferences derived from the data are an accurate depiction of the findings acquired through thorough analytical procedures.

I am dedicated to adhering to the information of academic honesty and integrity, and I am receptive to any additional examination or validation of the data contained in this project report.

I understand that the execution of this project is intended for individual completion and is not to be undertaken collectively. I thus affirm that I am not engaged in any form of collaboration with other individuals, and that all the work undertaken has been solely conducted by me. In the event that plagiarism is detected in the report at any stage of the project's completion, I am fully aware and prepared to accept disciplinary measures imposed by the relevant authority.

I agree that all the recommendations are business-specific and limited to this project exclusively, and cannot be utilized for any other purpose with an IIT Madras tag. I understand that IIT Madras does not endorse this.



Signature of Candidate: (**Digital Signature**)

Name: Aayush Krishna

Date : 01-01-2025

# Stock Optimization to Increase Market Recognition and Expand Business

---

## 1. Executive Summary

The project, titled "**Stock Optimization to Increase Market Recognition and Expand Business**," presents an in-depth analysis of stock optimization strategies to improve Sneha Auto Pvt Ltd's market recognition and business growth. Focusing on data from May 2024 to October 2024, the analysis uses methodologies such as ABC analysis, Demand Forecasting, and Turnover Ratio computation to identify inefficiencies and opportunities in inventory management. The methodology integrates with advanced tools like Microsoft Excel for ABC categorization, trend analysis, and visualization, coupled with Python-based visualization.

The findings reveal that the TVS King Zs+Fi-BsVI 4sCNG 30Ltr, which accounts for 83% of total income, is the dealership's best-performing model, with an 80.95% turnover percentage. In comparison, the TVS King Zk Fi Nf Wine accounted for only 2% of revenue and had a turnover ratio of 33.33%, highlight areas for improvement in market engagement. Over-purchasing in June 2024 resulted in a inventory surplus for specific models, but more balanced inventory planning in October 2024 resulted in a near-alignment of demand (27 units) and supply (24 units).

The analysis classified models into ABC categories, with Category A models, such as the TVS King Zs+Fi-BsVI 4sCNG 30Ltr, being prioritized for dynamic replenishment and improved supplier coordination. On the other hand, because they only accounted for 2.19% of revenue, Category C models were identified as needing cost-cutting initiatives like inventory reduction and promotional tactics.

To address identified challenges, the analysis suggests applying predictive analytics to improve demand forecasts, keeping a 10% buffer stock for high-demand models, and improving supplier coordination to shorten lead times. Targeted promotions, pricing modifications, and progressive inventory reductions are being considered for underperforming models. These activities are intended to align inventory levels with demand, reduce holding costs, and increase profitability.

By implementing these strategies, Sneha Auto Pvt Ltd can preserve its competitive advantage and strengthen its position in the competitive CNG rickshaw industry.

## **2. Detailed Explanation of Analysis Process/Method**

### **1. Data Collection, Preparation and Segmentation**

The analysis began with data collection from Sneha Auto's manual records, spanning May 2024 to October 2024, including purchase logs and sales transactions. The data was digitized into Excel for further analysis. Key steps in preparation included:

- **Standardizing Data:** Ensuring consistency across sheets using uniform column names and formats using Microsoft Excel.
- **Handling Missing Data:** Estimating missing values using trends or confirming them with Sneha Auto's team.
- **Date & Model Standardization:** Aligning date formats and model names for uniformity across datasets using Excel's DATE and TEXT functions.

The data was segmented into two key categories for focused analysis:

- **Purchase Sheet:** Details on vehicle models, quantities, and suppliers.
- **Sales Sheet:** Transaction information, including quantities sold, prices, discounts, and taxes.

### **2. Data Examining and Understanding**

- Inventory gaps were identified by analyzing the link between demand and supply:
  - **Demand Analysis:** By continuously tracking real-time sales data, high and low-demand models were identified based on their sales quantities.
  - **Supply Analysis:** Real-time inventory updates allowed me to compare purchased amounts with actual sales to identify overstocked or understocked models quickly.
- Further, I conducted **ABC analysis** to classify CNG rickshaw models based on sales value and purchase volume:
  - **A-items:** High-value models with high sales and revenue contribution were given priority.
  - **B-items:** Moderately selling models that require balanced inventory management.
  - **C-items:** Low-demand models, often overstocked and required promotional strategies.
- In addition to static analysis, **Real-time inventory analysis** was incorporated to better align stock levels with ongoing sales and demand patterns.
  - **Stock-Level Adjustments:** With real-time inventory tracking, I was able to compare the actual sales with the purchased quantities, instantly identifying

overstocked models that needed attention.

- **Continuous Demand and Supply Monitoring:** Real-time updates on sales allowed me to track demand trends dynamically, identifying high and low-demand models as they emerged.
- This dynamic approach enhanced inventory management and contributed to better alignment between supply and demand, reducing both stock-outs and overstock situations.

#### 4. Key Metric Computation, Forecasting, and Validation

Critical metrics were calculated to assess performance:

- **Turnover Ratio:** Evaluated how quickly inventory was sold per model.
  - $\text{Turnover Ratio} = \text{Average Inventory} / \text{Sales}$
- **Sales Growth:** Measured changes in revenue and sales volume across months.
- **Profit Margins:** Estimated profitability by considering purchase costs, taxes, and discounts.
  - $\text{Profit Margin} = (\text{Revenue} - \text{Costs}) / \text{Revenue}$

**Demand forecasting** utilized moving averages and trend lines to predict future demand for popular models, enabling better inventory planning. These forecasting insights were supported with visualizations, such as line graphs, created in Excel.

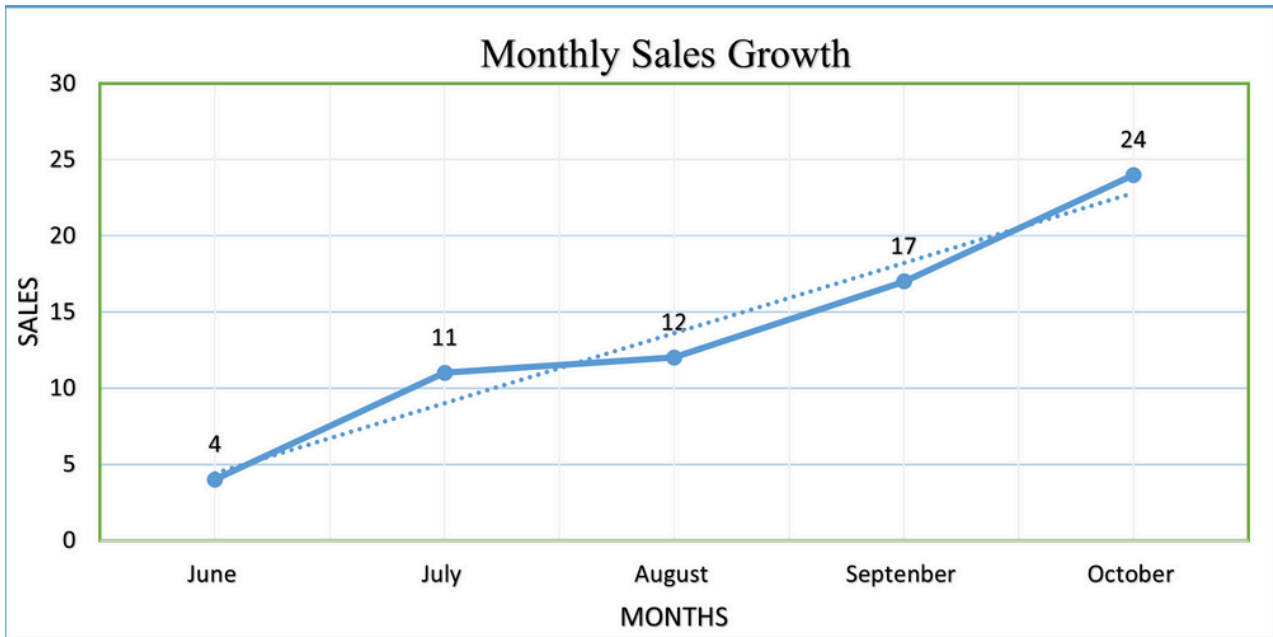
#### 5. Tools I Used

For analysis I have mainly focused with **Microsoft Excel and Python:**

- Excel was great for quick summaries, charts, and visualizing data in a simple way.
- Pivot table and graphs were used to procure a clear understanding of the current inventory state and changes.
- Matplotlib library under Python helped to create some charts in simpler way and is beneficial for clear visualization.

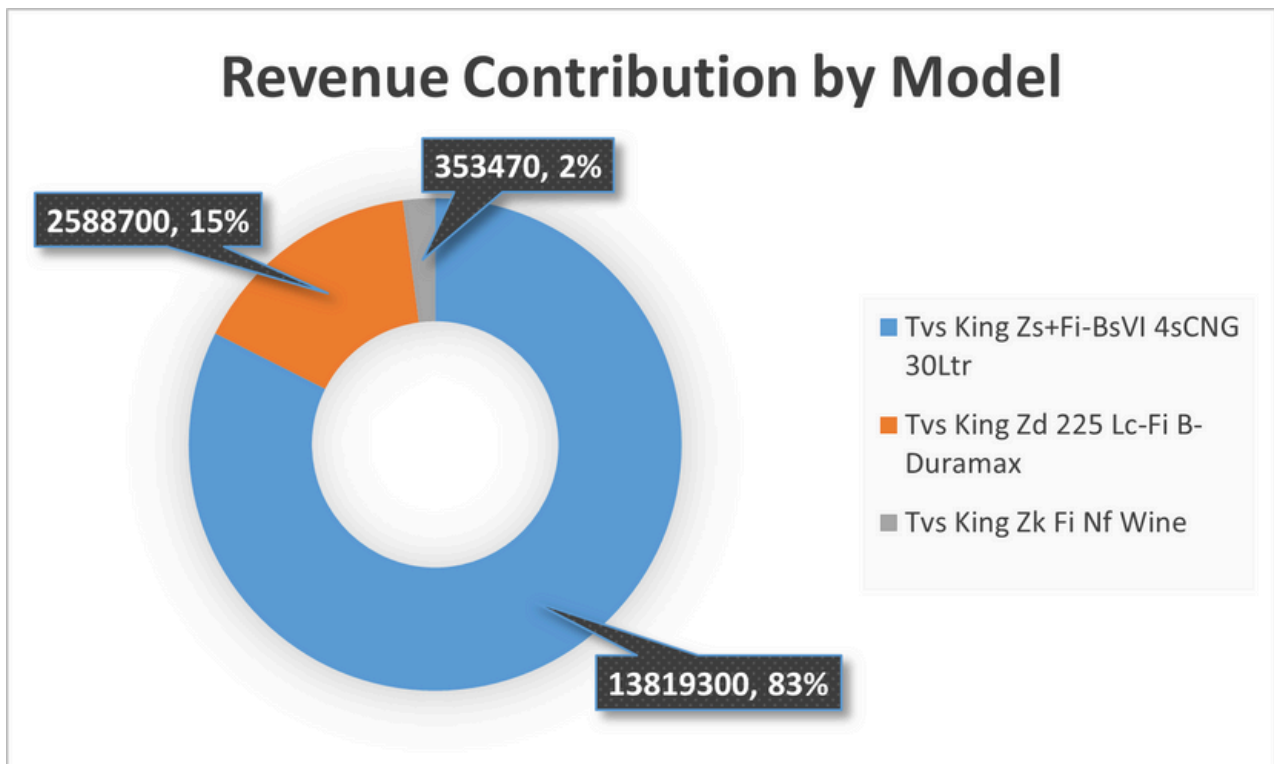
**\*\*The data and analysis I did can be seen here**  [Project Data & Analysis](#)

### 3. Results & Findings



*Fig.1. Monthly Sales Growth trends*

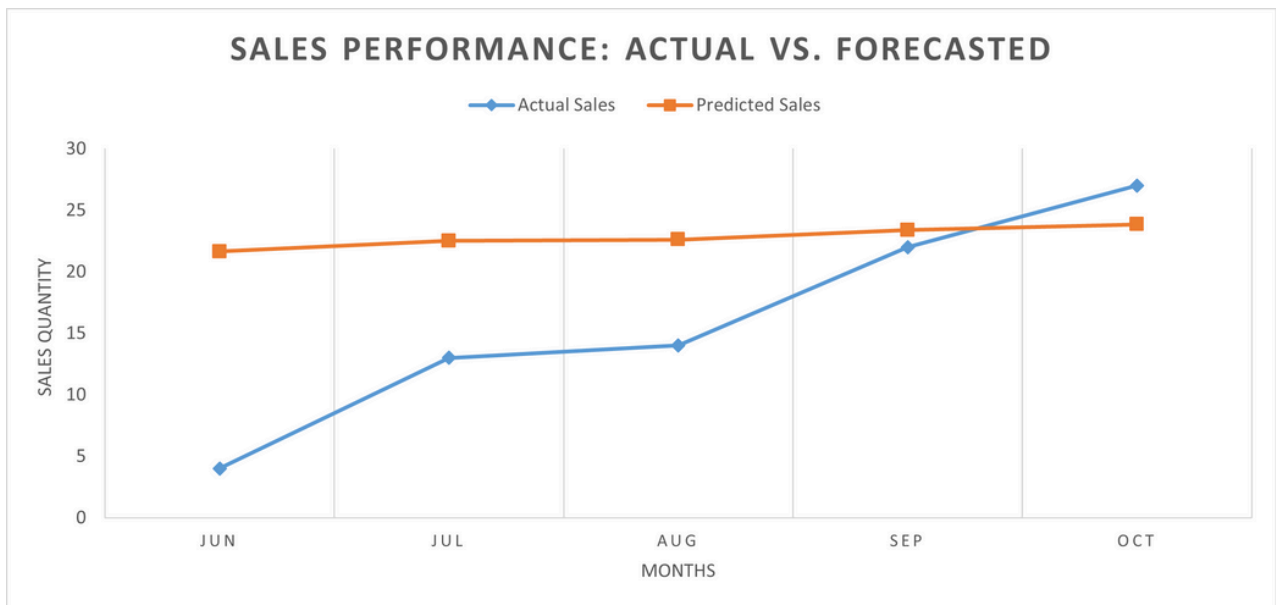
- The sales count shows a gradual increase over the months, with a noticeable peak in September 2024 and October 2024. This trend suggests a steady recovery and growth in sales over time, though it is important to acknowledge external factors contributing to fluctuations, particularly around the peak months.
- While a linear trendline indicates steady growth, some deviation in the sales pattern is visible. This could be attributed to varying market conditions or promotional activities. The linear model does not fully capture the seasonal demand shifts, particularly those seen during festive months like September and October.
- The sharp increase in sales during September 2024 and October 2024 likely stems from seasonal factors, particularly festive demand. These months often experience higher consumer spending, driven by holiday shopping. Festive promotions and targeted marketing campaigns may have also played a significant role in driving this surge in sales.



*Fig.2. Model wise Revenue Contribution*

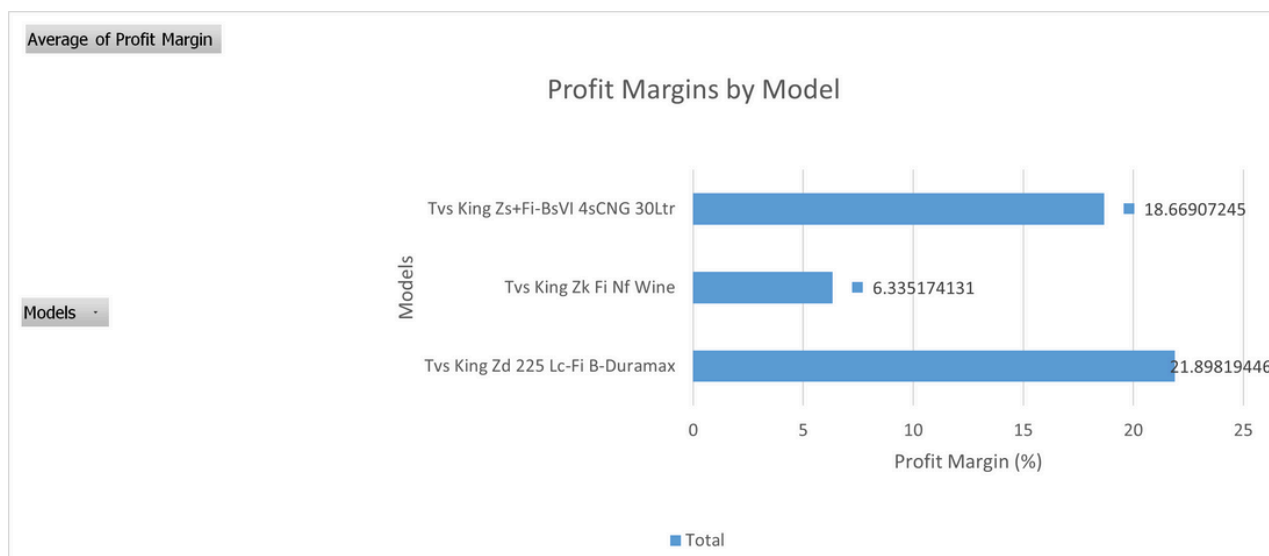
- The **TVS King Zs+Fi-BsVI** contributes 83% of the revenue, driven by its affordability, fuel efficiency, and durability. These features align well with customer preferences, especially in price-sensitive markets, making it the most popular choice and dominating overall sales.
- Model like the **TVS King Zk Fi Nf Wine** contribute minimally to revenue with 2% of revenue, likely due to factor such as lower customer awareness. These issues prevent the model from competing effectively against more popular, affordable alternatives.
- To improve sales of underperforming models, the dealership can implement targeted promotions and adjust pricing strategies. Additionally, optimizing inventory for high-demand models while exploring ways to raise awareness and improve the value proposition of lower-performing models could help boost their sales.





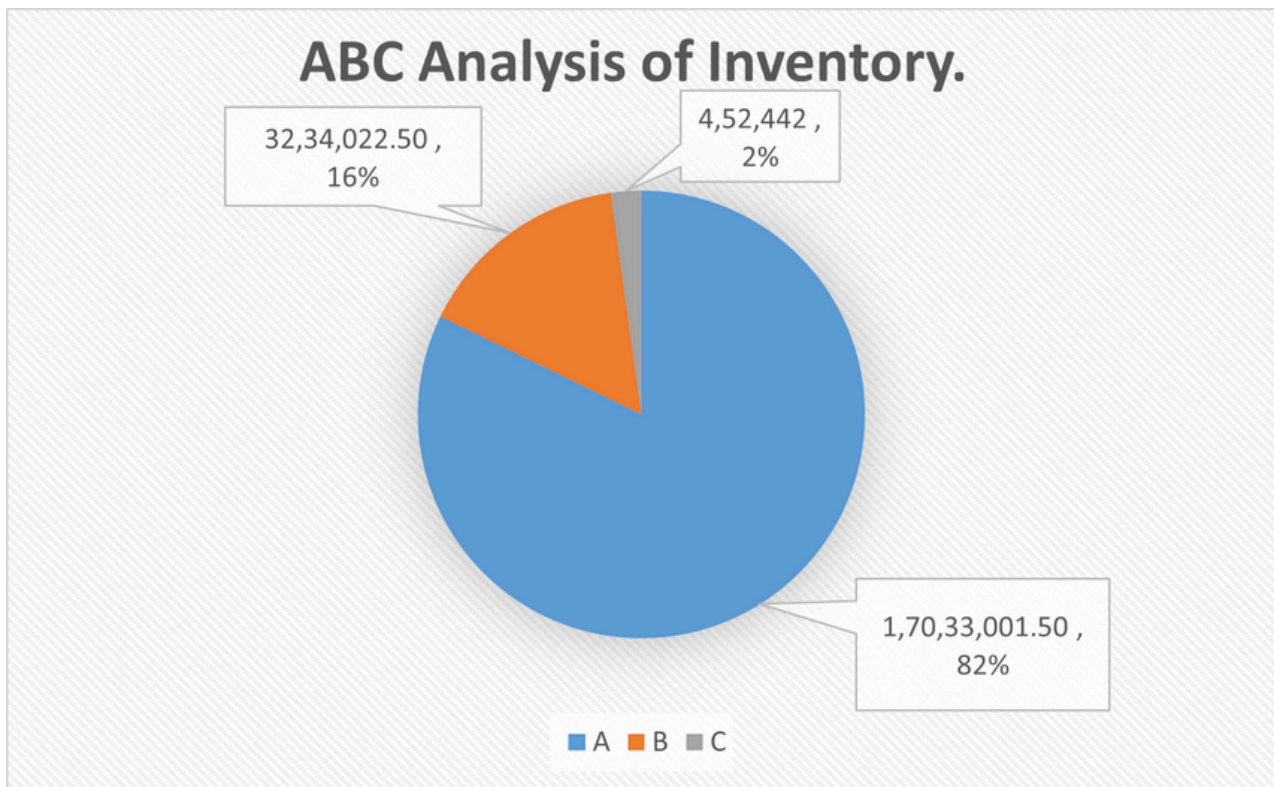
*Fig.3. Actual vs Forecasted Sales Performance*

- As shown in Fig. 3, forecasted sales for June–July 2024 exceeded actual performance due to overestimations. This might have occurred because of an overly optimistic view of market conditions or failure to account for external factors that affected the sales performance during these months.
- Another contributing factor to the gap between forecasted and actual sales could be delays in implementing key marketing and promotional strategies. These delays have prevented the dealership from effectively reaching potential customers early on, causing the actual sales to fall short of the forecasted figures in the beginning.
- By September 2024 and October 2024, actual sales coped up and exceeded forecasted figures. This can be attributed to the seasonal increase in demand, particularly during the festive period. The festive season typically sees higher consumer spending, contributing to a natural sales boost for the dealership.
- During the later months, the dealership likely implemented more effective promotional campaigns, which played a role in driving actual sales above forecasted levels. These campaigns, such as special offers or targeted marketing, helped boost customer engagement and sales, correcting the earlier gap between forecasted and actual sales.



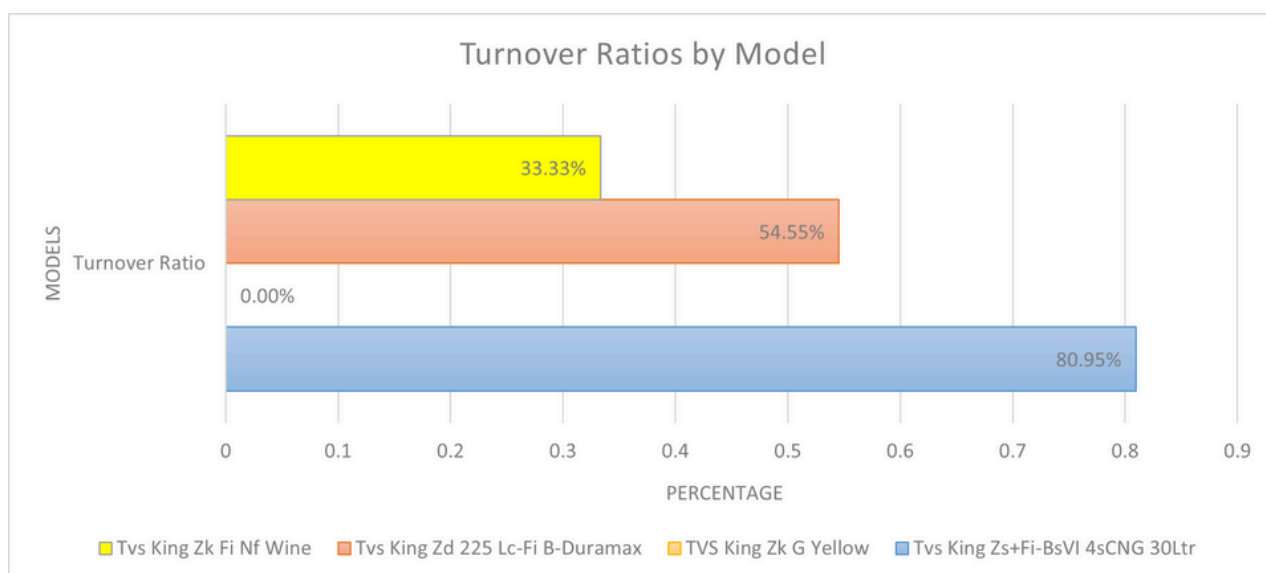
*Fig.4. Profitability Comparison Across Models in Percentage*

- The model **TVS King ZD 225 Lc-Fi B-Duramax** has the highest profit margin at 21.89%, indicating its strong profitability. This is due to its moderate sales performance that contributes to its profitability, as it is consistently moving in the market and generating solid returns. Its combination of pricing and steady sales makes it a key model for maximizing business profits.
- The **TVS King Zs+Fi-BsVI 4sCNG 30Ltr** achieves a respectable 18.66% profit margin, reflecting consistent revenue generation. This margin is driven by the model being one of the best-selling products from the dealership. Also, its operational efficiency and growing demand in the eco-friendly vehicle segment further support its strong performance, ensuring a steady income stream for the business.
- The **TVS King Zk Fi Nf Wine** shows the lowest margin with 6.33%. This is primarily due to its lack of strong sales, as it is not performing well in the market. The reduced demand for this model suggests that it may need reevaluation, including a review of its pricing or marketing strategy, in order to increase its sales and profitability.
- Models with high margins should be prioritized for marketing optimization. Lower-margin models need strategies such as cost reduction, targeted promotions to increase their profitability.



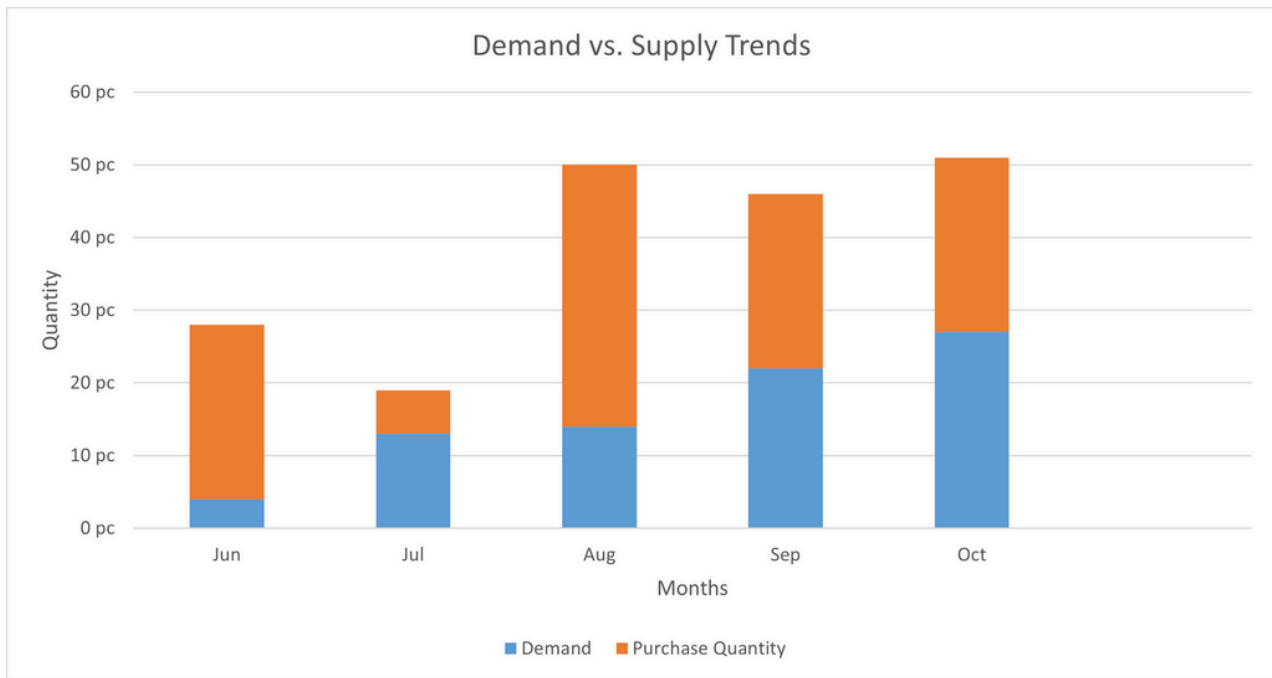
*Fig.5. ABC Inventory Classification: Contribution to Total Inventory Value*

- **Category A**, represented by the **TVS King Zs+Fi-BsVI 4sCNG 30Ltr**, makes up 82.22% of the total revenue, highlighting its dominant role in the business. This model makes a major contribution to overall sales and profitability, emphasizing the crucial need of efficiently managing its stock.
- **Category B** includes the **TVS King Zd 225 Lc-Fi B-Duramax**, which accounts for 15.59% of the total revenue (raising the total value to 97.81%). Although not as significant as Category A, this model still plays an important role in maintaining profitability with a moderate share of sales. Proper inventory management is essential to avoid overstocking or stockouts.
- **Category C** consists of the **TVS King Zk Fi Nf Wine**, which makes up only 2.19% of the total revenue. This model represents low-value, slow-moving products that contribute minimally to the overall revenue. While Category C items may not be a major concern in terms of sales, they still need to be managed effectively to minimize waste and storage costs.



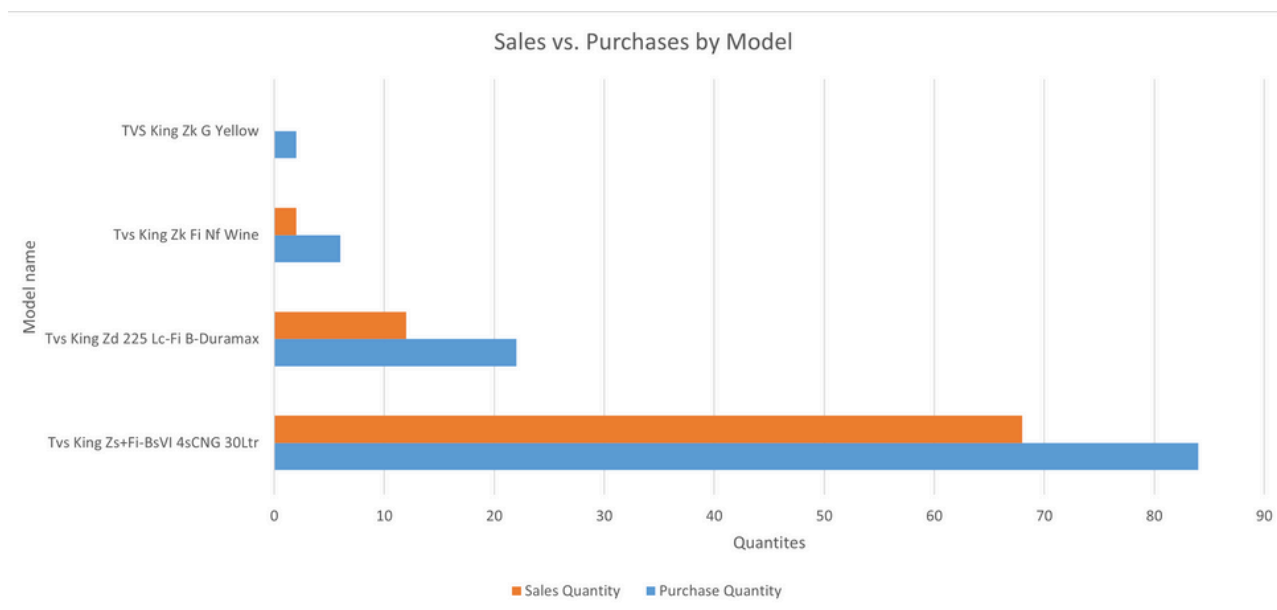
*Fig.6. Turnover Ratios of Models: Sales Performance and Inventory Movement*

- The **TVS King Zs+Fi-BsVI 4sCNG 30Ltr** has an impressive turnover ratio of 80.95%, signifying its strong sales performance and effective inventory management. The high turnover rate indicates that it is a popular model among customers, which is likely due to both strong market demand and effective logistics.
- The **TVS King Zd 225 Lc-Fi B-Duramax** exhibits a turnover ratio of 54.55%. This reflects steady demand but indicates that the model is not as fast-moving as the top-performing product. While it continues to contribute positively to the business, its turnover implies that a strategic restocking and inventory management are required to sustain its performance.
- The **TVS King Zk Fi Nf Wine** has a turnover ratio of 33.33%. This low turnover indicates poor inventory movement, due to a variety of factors, for example low market demand. Also, the low sales rate suggests that the model may not be performing well in the market, either because it does not meet customer preferences or because of challenges related to marketing/promotion.
- The **TVS King Zk G Yellow** has a turnover ratio of 0%. This indicates that the product is not moving at all and may require immediate attention. The lack of sales could be due to a mismatch in market demand, poor marketing efforts, or an ineffective pricing strategy.



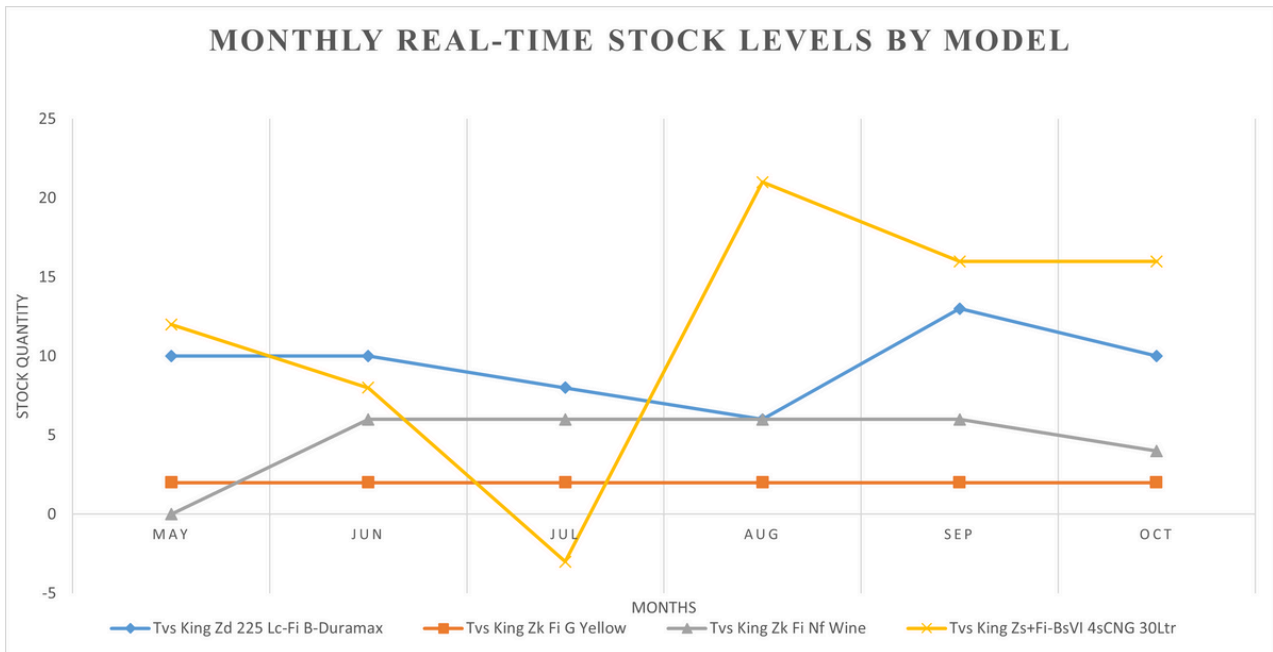
*Fig.7. Monthly Trends in Demand vs. Supply*

- The graph reveals significant monthly variations in both demand and purchase quantities, indicating inconsistent inventory management practices. For example, in August, purchases spike to 36 units against a demand of 14 units, potentially reflecting a projection of higher seasonal demand.
- June experienced a mismatch where purchases far exceeded actual demand. This surplus could be attributed from overestimating demand and inaccurate forecasting, leading to excess stock that may not have been immediately required in the market.
- October demonstrates a more balanced relationship between demand and purchases, with a demand of 27 units closely aligning with the purchase quantity of 24 units. This suggests improvements in inventory management practices during this month, potentially reflecting a shift toward more accurate forecasting and efficient supply chain coordination.
- June's high purchase volume, with low demand, poses a risk of excess inventory. Excess inventory could arise from misaligned planning or an attempt to benefit from early procurement deals, leading to higher storage costs and potential strain on working capital.



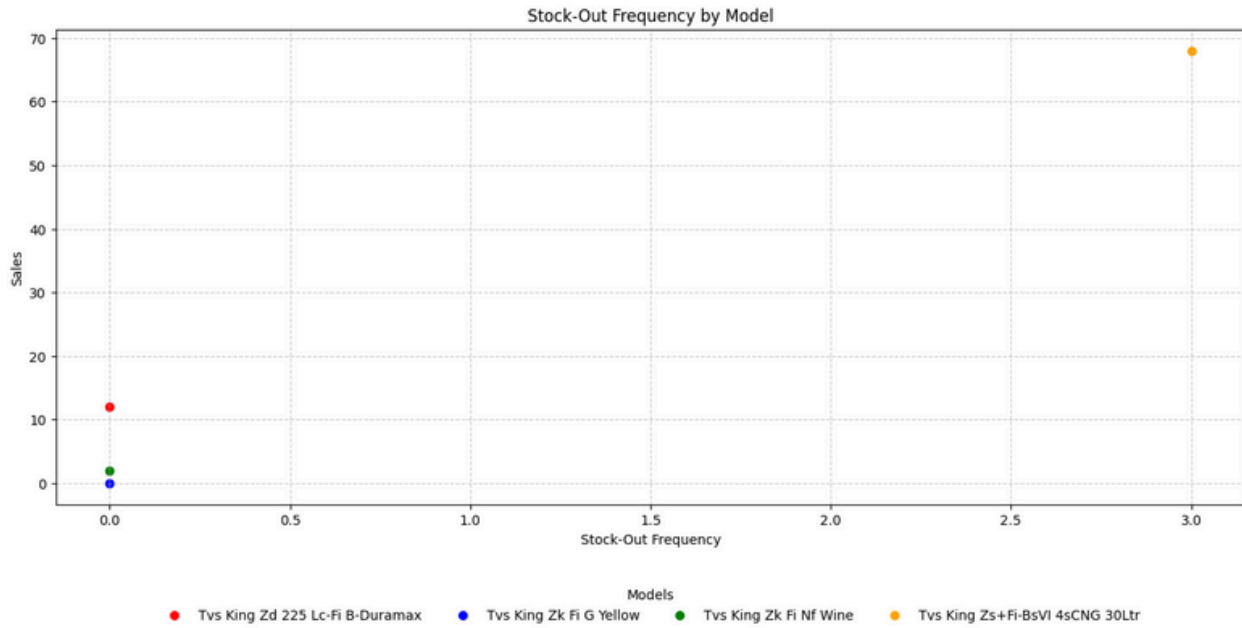
*Fig.8. Sales vs. Purchases Breakdown*

- The **TVS King Zk Fi Nf Wine** exhibit higher purchase quantities compared to sales, indicating a potential overestimation of demand for these models. This over-supply could lead to excess stock that remains unsold, resulting in increased inventory holding costs.
- The **TVS King Zd 225 Lc-Fi B-Duramax** model demonstrates a purchase quantity (22 units) that exceeds the sales quantity (12 units), indicating an overstock situation. Despite being the most profitable model, this surplus inventory could tie up capital and increase storage costs. However, since it's the most profitable, it's important to ensure that inventory is managed to avoid stockouts in the future while minimizing overstocking risks.
- The **TVS King Zs+Fi-BsVI 4sCNG 30Ltr** model appears to have a well-balanced supply strategy, with purchases (84 units) closely matching with sales (68 units). This alignment reflects an efficient procurement process where stock levels are optimized to meet demand without overburdening the inventory.
- The **TVS King Zk G Yellow** model, with a purchase quantity of 2 units and no sales, suggests inefficiencies in inventory allocation for niche models with low demand. The lack of sales highlights a mismatch between supply and demand. This could indicate that the model is not popular enough to justify even the minimal procurement .



*Fig.9. Monthly Trends in Real-Time Stock by Models*

- The **TVS King Zs+Fi-BsVI 4sCNG 30Ltr** represented by **yellow line**, being the highest-demand product, shows significant fluctuations in stock levels, with a peak in August followed by a decline. This trend indicates supply challenges or inconsistencies in restocking to meet the robust and consistent demand. The August peak reflects an overstocking in anticipation of higher sales, response to previous stock-outs.
- Models like the **TVS King Zk Fi Nf Wine** represented by **gray line** and **TVS King Zk G Yellow** represented by **orange line** reflect limited purchase and sales quantities. Their flat stock levels in the graph are consistent with their low purchase and sales figures, indicating stable but minimal activity. These models may have low or declining demand.
- The blue line for **TVS King Zd 225 Lc-Fi B-Duramax** shows a progressive fall, indicating its good sales figure. This trend indicates the need for enhanced stock replenishment processes to avert shortages.
- The **TVS King Zs+Fi-BsVI 4sCNG 30Ltr** is prioritized in supply chains due to its popularity, while the **TVS King Zd 225 Lc-Fi B-Duramax** remains crucial as the most profitable model. The lowest-selling models (orange and gray) are managed conservatively, avoiding excess inventory.



*Fig.10. Stock-Out Frequency vs Sales by Models*

- The **TVS King Zs+Fi-BsVI 4sCNG 30Ltr** has the highest stock-out frequency, aligning with its high demand. This indicates challenges in inventory planning and supply chain responsiveness.
- The **TVS King Zd 225 Lc-Fi B-Duramax** (blue) and **TVS King Zk Fi Nf Wine** (gray) show moderate to minimal sales (12 and 2 units, respectively) and corresponding low stock-out risks. However, their limited demand necessitates a careful balance to avoid overstocking and wastage.
- The **TVS King Zk G Yellow** (orange) with no sales and only 2 units purchased reflects minimal to no demand, confirming low stock-out risk but indicating potential product obsolescence and lack of market traction.
- High-demand models like the yellow **TVS King Zs+Fi-BsVI 4sCNG 30Ltr** should be prioritized for dynamic restocking with real-time demand insights. Lower-demand models, such as the gray, and orange models, require a conservative stocking approach to minimize holding costs and optimize inventory levels.



## **4. Interpretation of Results and Recommendations**

The analysis of data from May 2024 to October 2024 reveals significant insights into the demand, inventory, and supply chain performance at Sneha Auto Pvt Ltd. Using historical sales and inventory data, the analysis identifies major dealership strengths, limitations, and optimization opportunities.

- **Demand Analysis**

- Sales trends (Fig. 1) show a seasonal peak in September and October 2024, which is driven by festive demand and targeted promotional activities. The TVS King Zs+Fi-BsVI model (Fig. 2) generates revenue due to its affordability and efficiency, while underperforming versions such as the TVS King Zk Fi Nf Wine struggle due to low customer demand and ineffective marketing. Earlier gaps between forecasted and actual sales (Fig. 3) highlight forecasting inaccuracies, though improvements were evident later in the year as strategies aligned better with market demand.

- **Inventory Optimization**

- Frequent stock-outs for high-demand models like TVS King Zs+Fi-BsVI (Fig. 10) shows insufficient inventory planning, while overstocking for low-demand models like TVS King Zk Fi Nf Wine (Fig. 8) indicates inefficiency. ABC classification (Fig. 5) shows Category A models require precise stock management to prevent stock-outs, while Category C models need cost-saving measures. Turnover ratios (Fig. 6) highlight strong sales for high-demand models and slowdown for others, indicating the need for inventory reallocation.

- **Supply Analysis**

- Purchases in June 2024 (Fig. 7) exceeded actual demand, reflecting inefficiencies in purchase planning. By October 2024, improved alignment between demand and supply was achieved. Real-time stock tracking (Fig. 9) highlighted inconsistencies in replenishment for high-demand models, showing supply chain delays or mismatches that resulted in missed sales opportunities.

## Recommendations

To address the challenges and capitalize on the opportunities identified in the analysis, the following strategies are recommended to optimize demand management, inventory, and improve overall business performance:

- **Enhance Demand Forecasting:** Use advanced predictive analytics, incorporating seasonal trends, promotions, and historical data to improve demand accuracy.
- **Optimize Inventory for High-Demand Models:** Prioritize real-time tracking and dynamic restocking for Category A items while arranging shorter delivery times with suppliers for high-demand models.
- **Revamp Strategies for Low-Performing Models:** Conduct customer trials for Category C models to gather feedback, improve awareness through targeted campaigns, and implement phased discounts to clear inventory.
- **Strengthen Supply Chain Coordination:** Collaborate with suppliers to synchronize procurement with demand forecasts and implement safety stock policies for high-margin models.
- **Promotional and Marketing Initiatives:** Conduct targeted campaigns during peak seasons and raise awareness for underperforming models through value-based promotions.
- **Continuous Improvement:** Regularly monitor inventory turnover and stock-outs and assess model profitability to adjust inventory policies accordingly.

These steps aim to achieve a balanced inventory, maximize profitability, and position Sneha Auto as a leader in the CNG rickshaw market.