

# Forecasting and Vendor Managed Inventory Optimization for an FMCG Company

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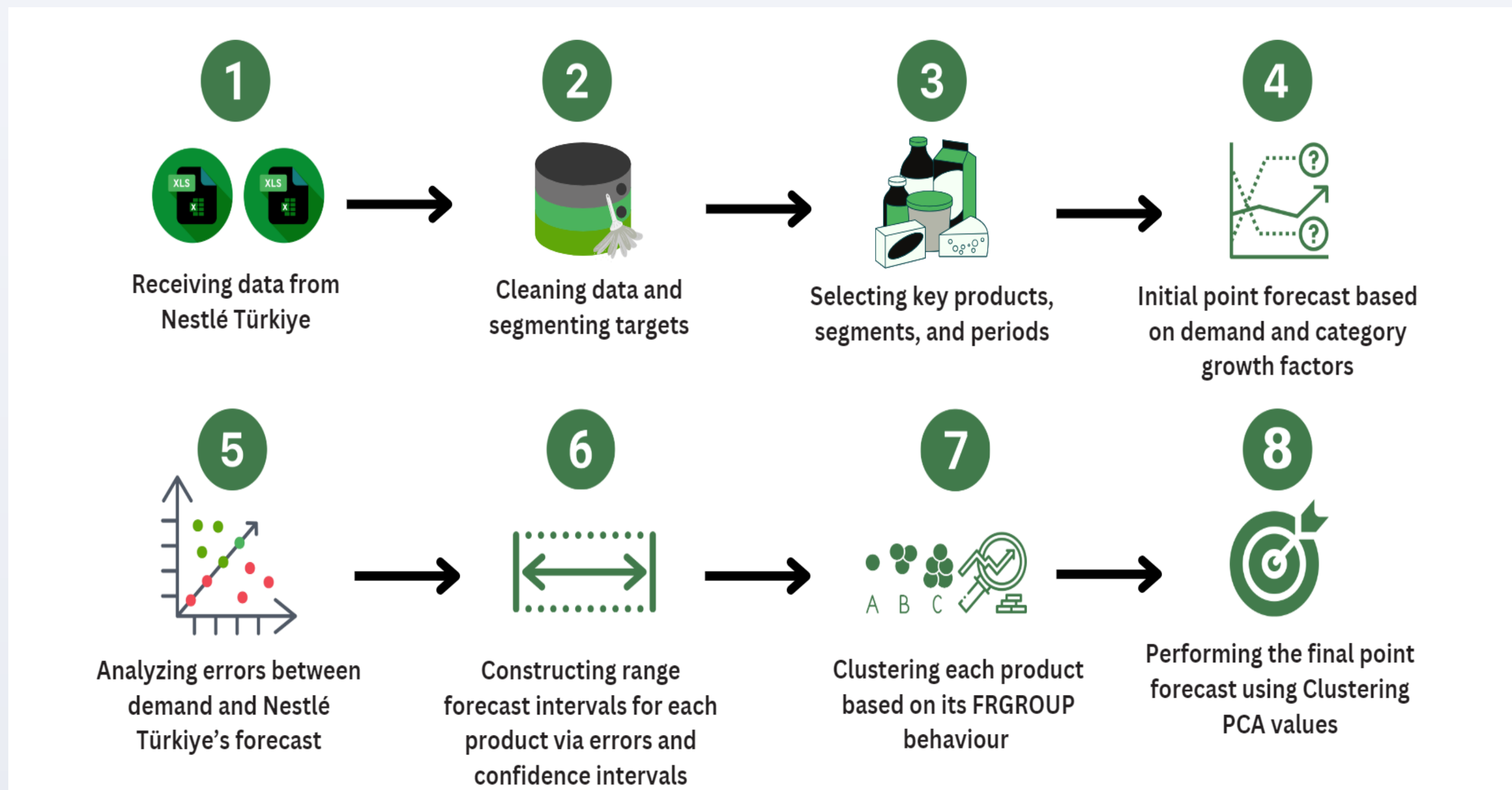
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### ABSTRACT

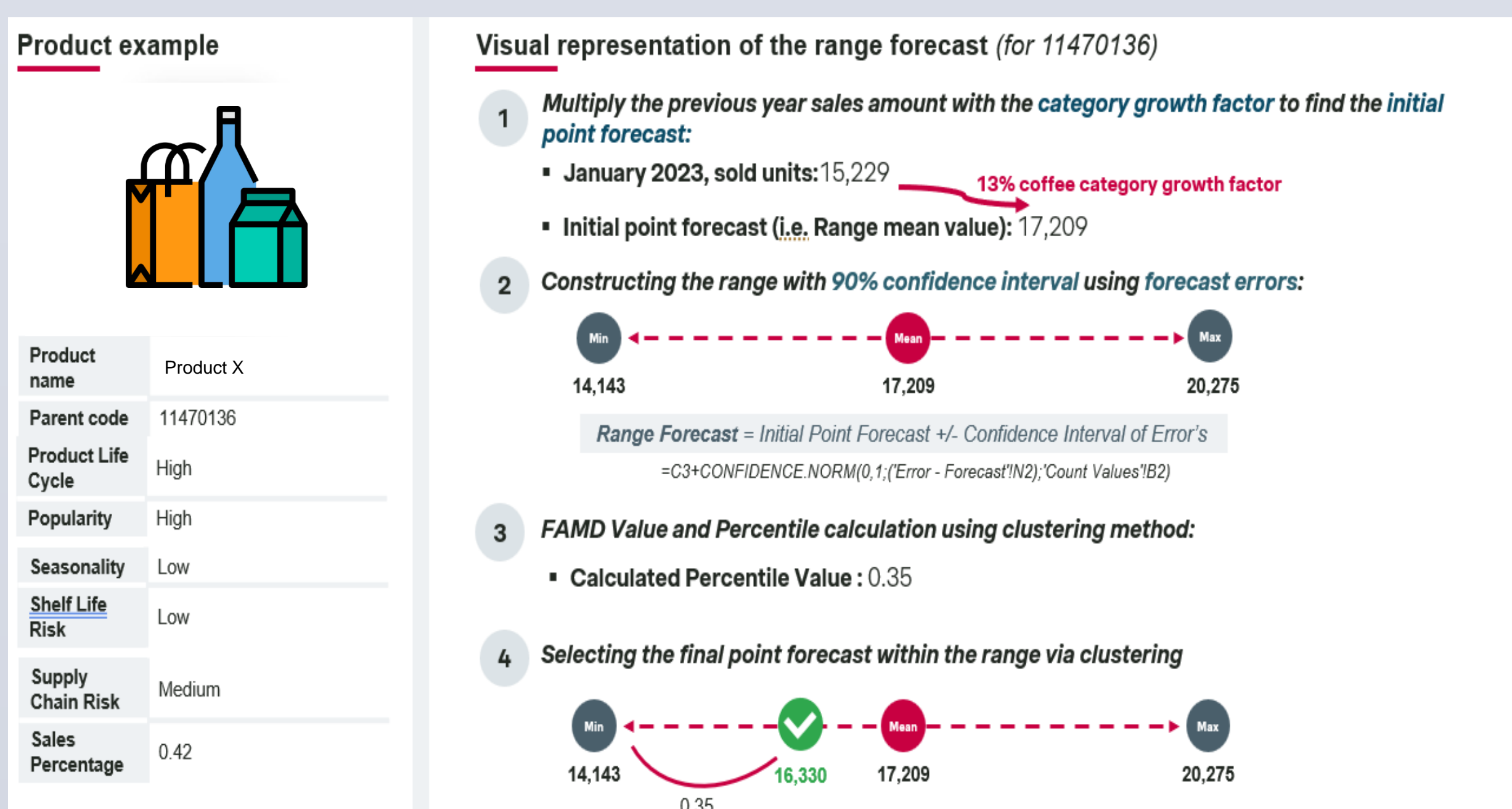


- The project addressed opportunities for an FMCG company to enhance forecasting for instant and Ready-To-Drink coffee products, successfully reducing stockouts and optimizing costs.
- The project refined forecasting methods tailored to coffee SKUs, incorporating range-based forecasting with confidence intervals from historical errors.
- K-Means clustering and FAMD grouped products by attributes like popularity, shelf-life, and supply chain risks for better segmentation.
- The approach reduced forecast errors, aligned inventory with demand, and improved management of high-demand or high-risk products.
- Improved efficiency and reduced stock imbalances created a scalable, data-driven forecasting framework.
- Future steps include refining segmentation and incorporating dynamic growth rates for further optimization.

### OBJECTIVES

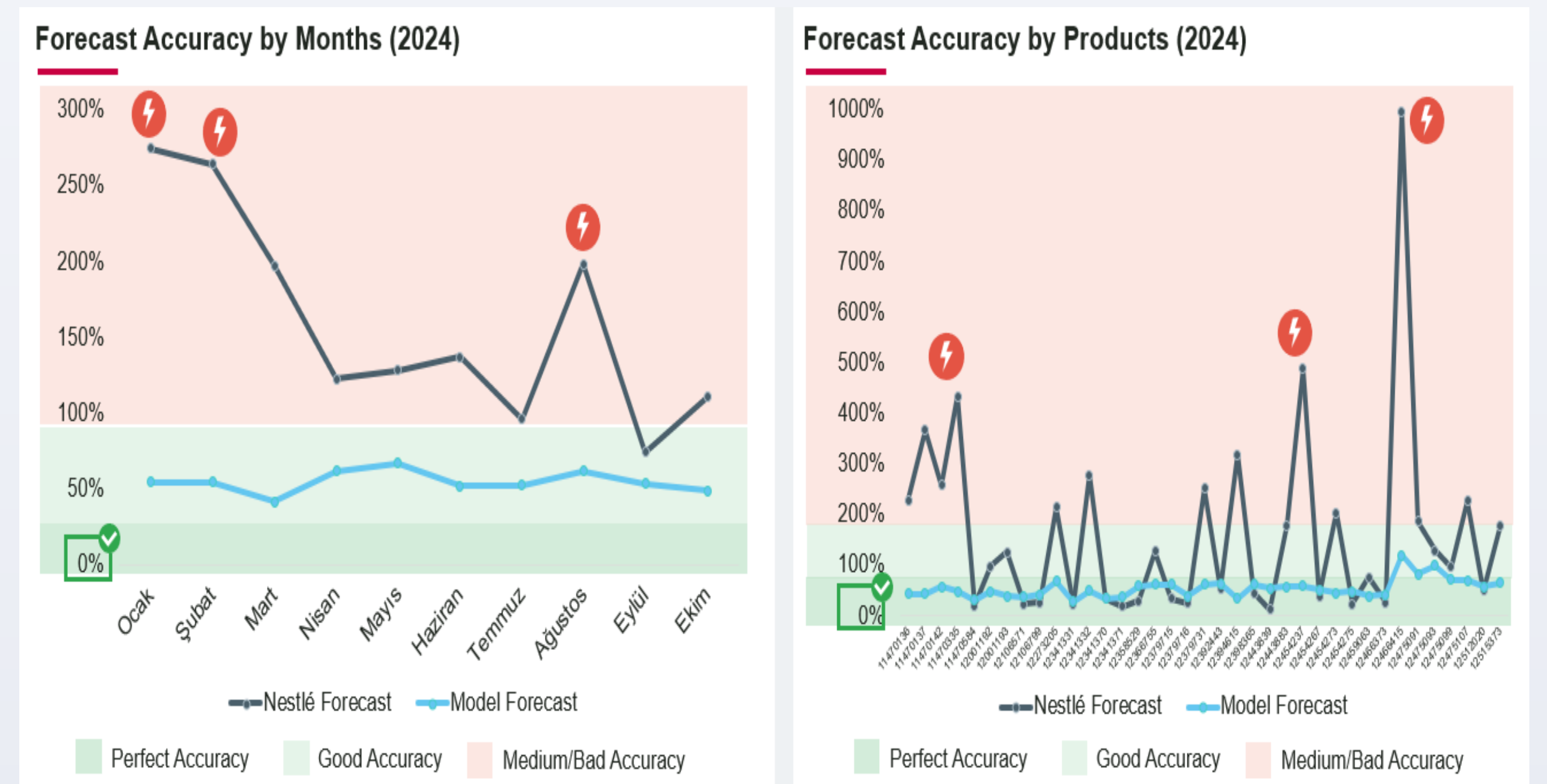
- Develop alternative forecasting models tailored to FMCG company's coffee inventory.
- Use Python and K-Means for FGroup segmentation, clustering products by lifecycle, popularity, seasonality, and risks.
- Compare the current forecasting model with the proposed one to identify improvements.

### PROJECT DETAILS



- The project identified opportunities to improve forecasting in the coffee category, aiming to minimize stockouts and overstocking.
- Range-based forecasting improved accuracy using historical errors and confidence intervals.
- Clustering techniques grouped products by lifecycle, popularity, and supply chain risk.
- Tailored strategies improved inventory alignment and reduced forecast errors.
- The project enhanced inventory management and created a scalable framework for future improvements.

### PROJECT DETAILS II



To address these issues, this project developed advanced forecasting techniques, combining range-based forecasting with clustering analysis for more precise demand predictions:

- Range Forecasting:** Historical forecast errors were used to create confidence intervals around point predictions, ensuring flexibility and accuracy. 2024 forecasts were calculated from 2023 sales data and category growth factors, refining upper and lower bounds for variability.
- Clustering and Segmentation:** K-Means clustering and FAMD segmented products into three functional groups (FGroups) based on lifecycle, seasonality, and popularity. Tailored strategies were applied for high-risk, moderate-demand, and high-demand products.
- Validation and Results:** Integration of clustering with range forecasting significantly reduced forecast deviations. Validation against 2024 sales data showed improved accuracy, minimizing stockouts, reducing waste, and enhancing operational efficiency.

### CONCLUSIONS

- The project identified and addressed opportunities to enhance the FMCG company's forecasting for instant and RTD coffee products.
- Range-based forecasting with confidence intervals improved accuracy and flexibility.
- Clustering enabled tailored forecasting for products with varying demand patterns and risks.
- Validation showed reduced deviations, minimizing stockouts and excess inventory in 2024.
- Data analytics and machine learning created a scalable framework for future applications.
- Future steps include expanding segmentation, incorporating real-time data, and exploring advanced machine learning techniques.

### REFERENCES

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