CAPSTONE
PRESENTATION

Data Analysis for Business Forecasting

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OUR

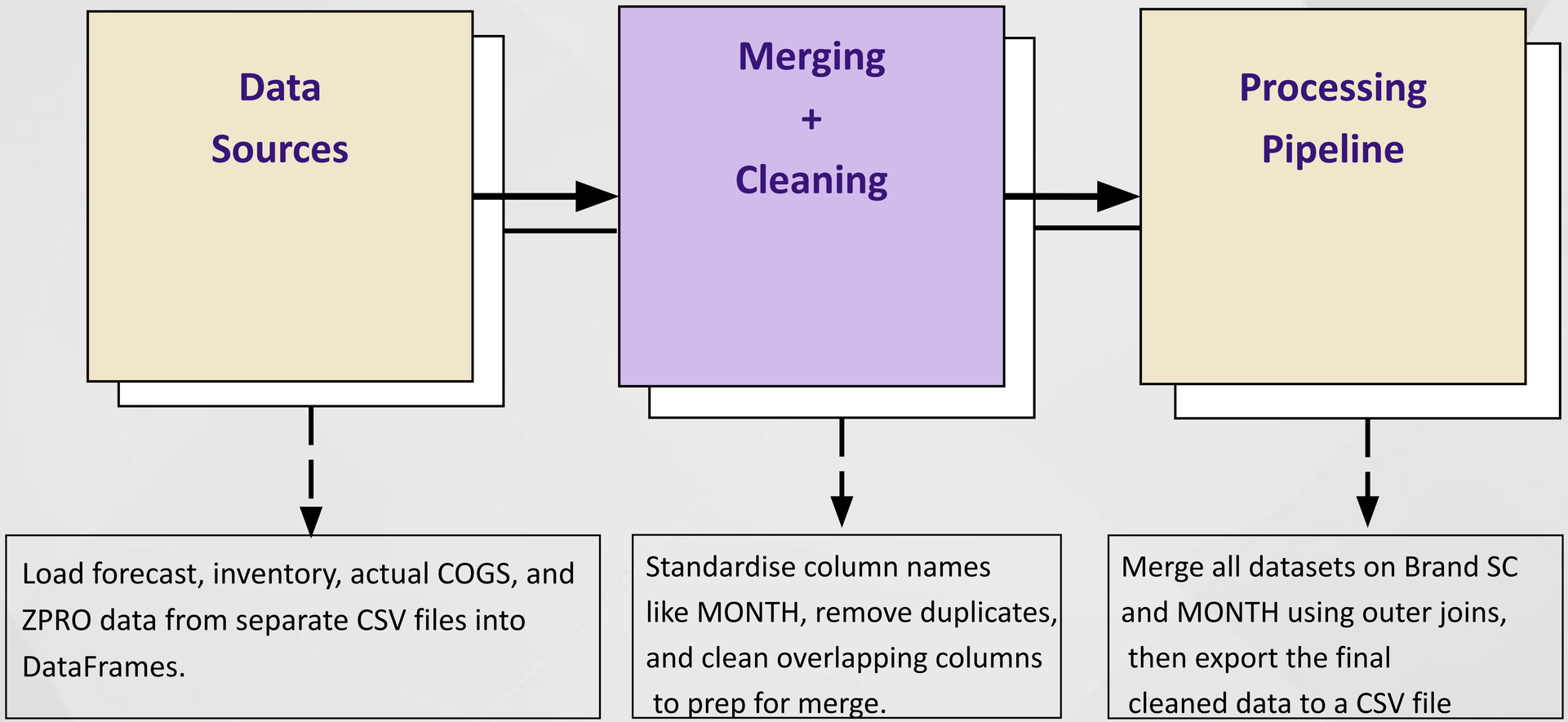
OBJECTIVE

Preseason forecasts are critical for planning inventory and supply chain flows. However, in-season deviations can highlight gaps in assumptions, supplier issues, or demand shifts.

This project consolidates various data sources—forecasted values, actual costs, inventory positions, and trend-based estimates—to enable cross-functional visibility and realignment of strategy.

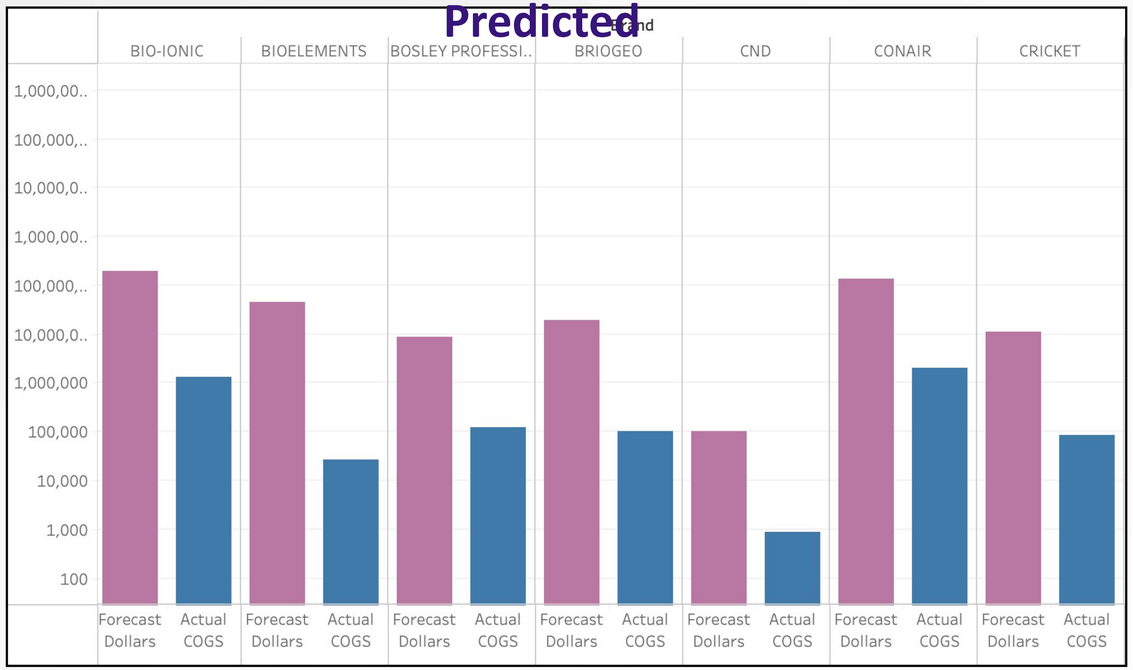
METHODOLOGIES

Performing EDA



DATA ANALYSIS

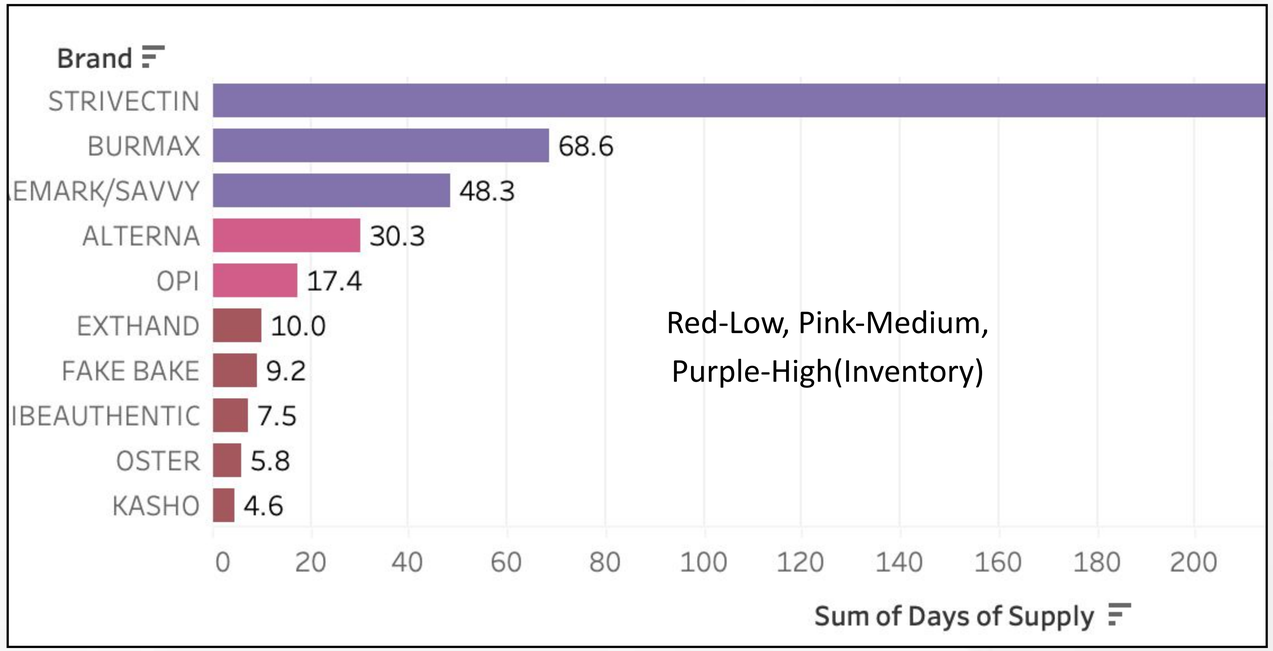
Actual VS Predicted



- Tracks the alignment between forecasted demand and actual units sold by Brand and Month
- Highlights variances in unit performance, enabling early identification of overperformance or underperformance.
- Useful for adjusting future forecasts and understanding brand specific patterns.

- A low DOS (<15 days) suggests a risk of stockout, which can lead to lost sales, customer dissatisfaction, and repetitional damage.
- A high DOS (>30 days) represents a healthy inventory buffer, enabling timely fulfilment without overstocking.

- Despite high forecasted units, inventory isn't aligning — indicating either procurement delays or inventory planning mismatches.
- Missing DOS data for some brands implies data integrity issues in inventory tracking systems — blind spots in supply chain visibility.

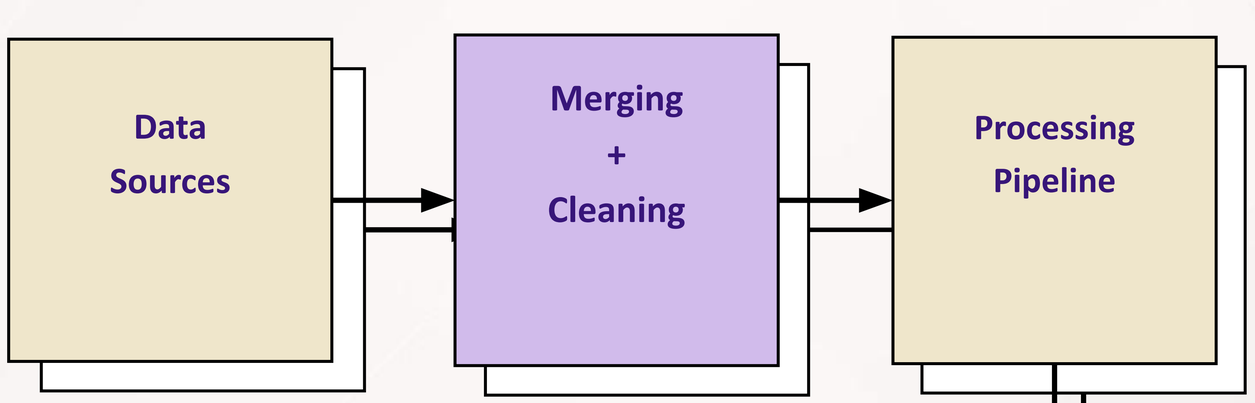


DOS VS Inventory

GAP ANALYSIS

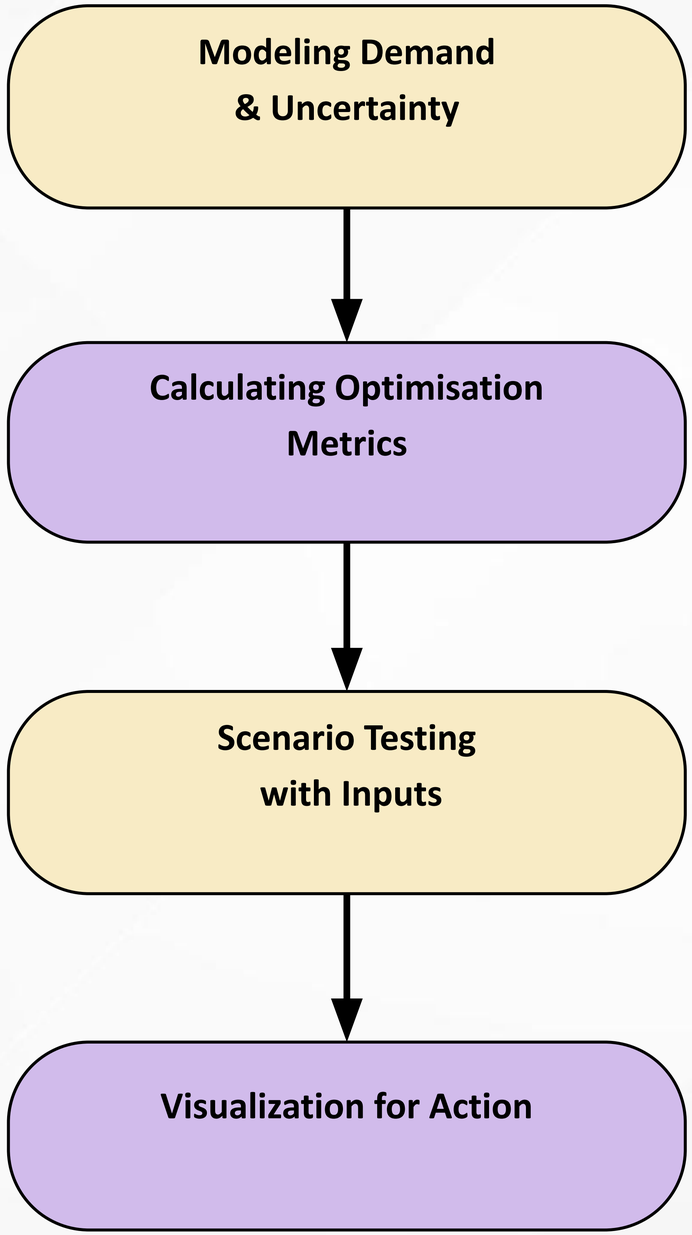
The current setup consolidates raw inventory and forecast data but lacks actionable insights for decision-making.

By layering analytics and interactivity, the system evolves into a dynamic tool for smarter, data-driven inventory planning.



- Calculate EOQ, ROP, and Safety Stock using demand, cost, lead time, and variability inputs.
- Enable scenario testing with interactive sliders for key parameters (Order Cost, Lead Time, MAD, Service Level).
- Visualize top brands by EOQ, overlaying Safety Stock and ROP for quick decision-making.

APPROACH



- Use MAD (Mean Absolute Deviation) and Z-score to model demand variability and service level expectations

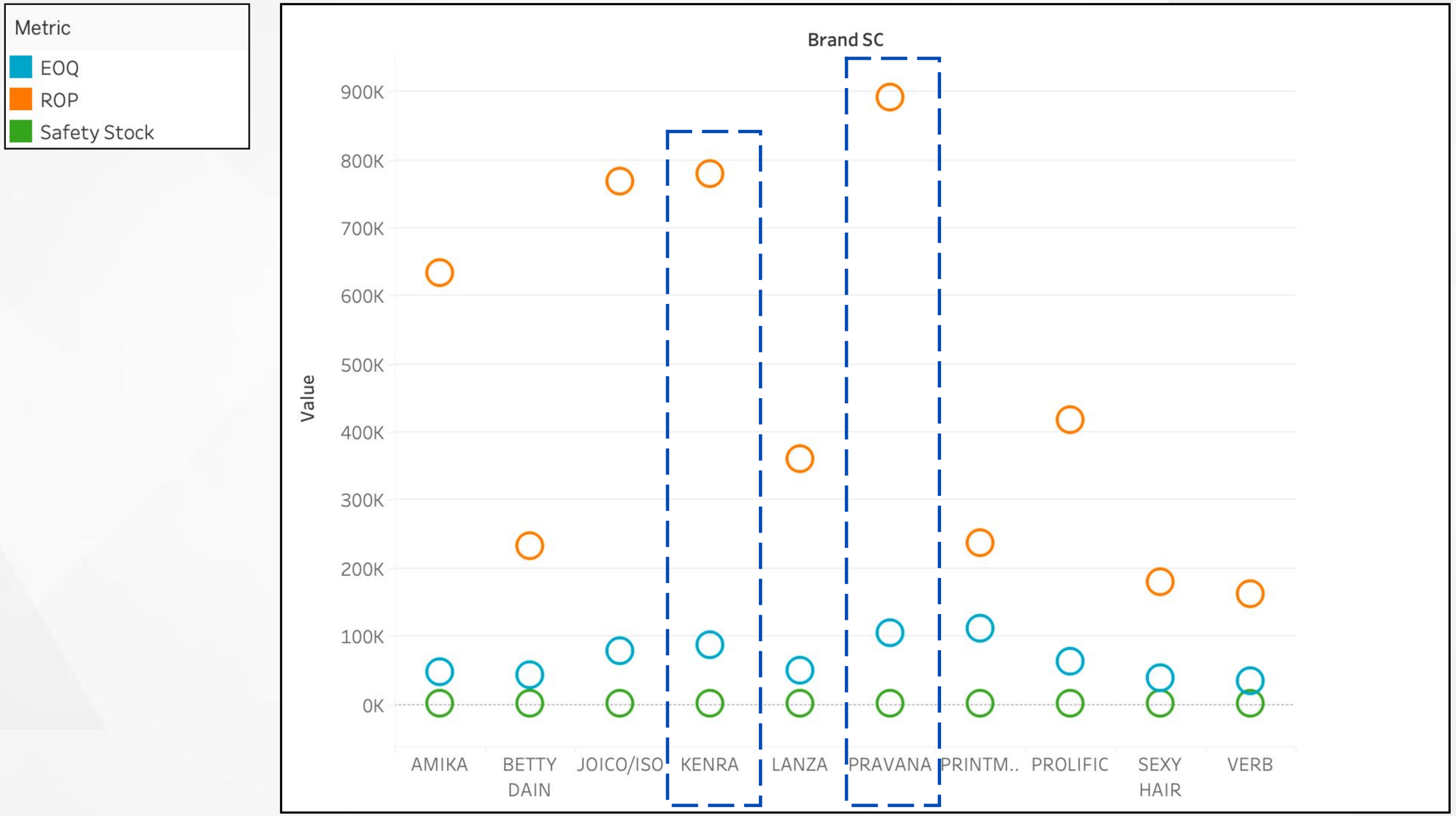
- EOQ: Minimises the total cost of ordering and holding inventory.
- ROP: Ensures replenishment happens before stockout during lead time.
- Safety Stock: Buffers against demand variability and delays

- Allow dynamic tuning of ordering cost, lead time,
- MAD, service level through interactive sliders.
- This helps simulate what-if scenarios and refine planning.

- Identify top 10 brands by EOQ and plot EOQ,
- ROP, and Safety Stock for visual clarity.
- Supports data-driven prioritization and smarter decision-making

ANALYSIS

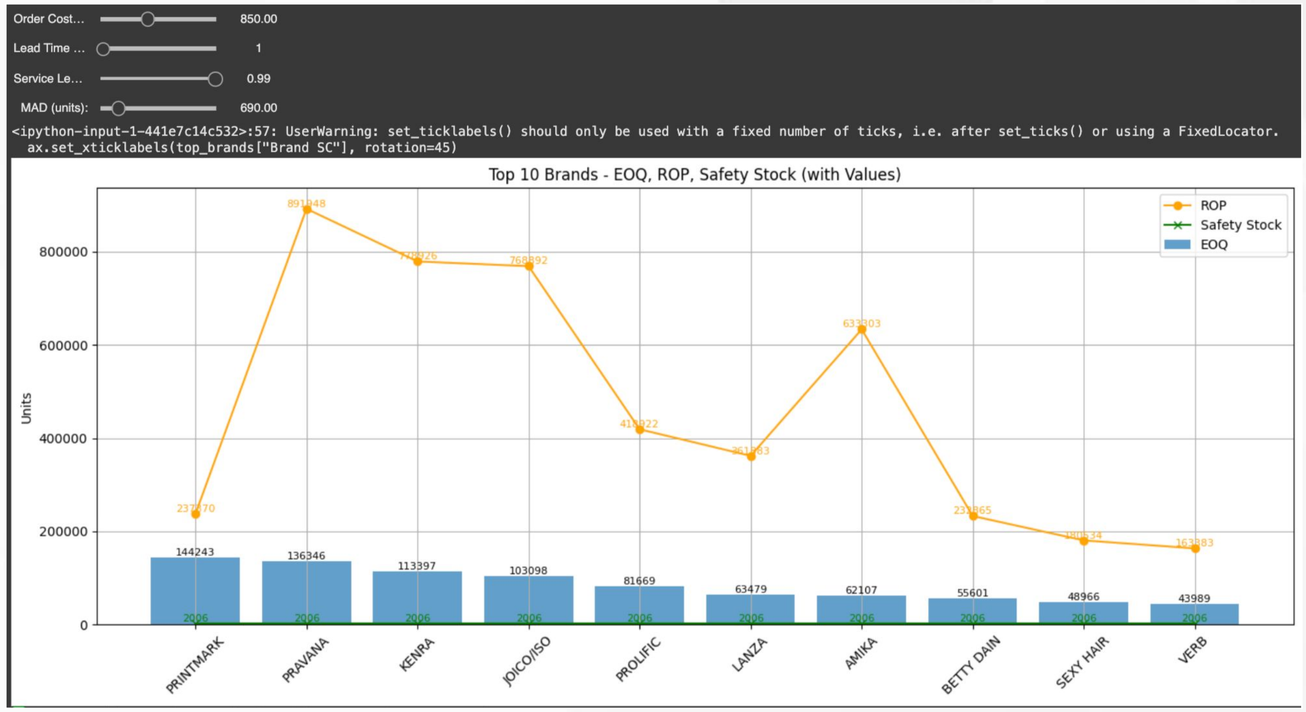
EOQ > ROP > SAFETY STOCK



OUTCOMES

This model is a scenario-based inventory optimization tool that uses forecasted demand along with inputs like order cost, lead time, service level, and MAD to calculate key planning metrics — EOQ, ROP, and Safety Stock. It helps refine decisions once forecasts are available.

Brand SC	EOQ	ROP	Safety Stock
PRAVANA	104,573	891,396	1,454
KENRA	86,972	778,374	1,454
JOICO/ISO	79,073	768,340	1,454
AMIKA	47,634	632,751	1,454
PROLIFIC	62,637	418,370	1,454
LANZA	48,686	361,331	1,454
PRINTMARK	110,630	236,818	1,454
BETTY DAIN	42,645	232,313	1,454
SEXY HAIR	37,556	179,982	1,454
VERB	33,739	162,831	1,454



https://colab.research.google.com/drive/1ZjaWdWtrA07rmbYuPfM8hG789U4JeiJZ

This model assumes uses the following parameters:

1. order_cost → to calculate EOQ (optimal order quantity)
2. lead_time → to calculate ROP (when to reorder)
3. service_level + MAD → to estimate Safety Stock (protection against variability)

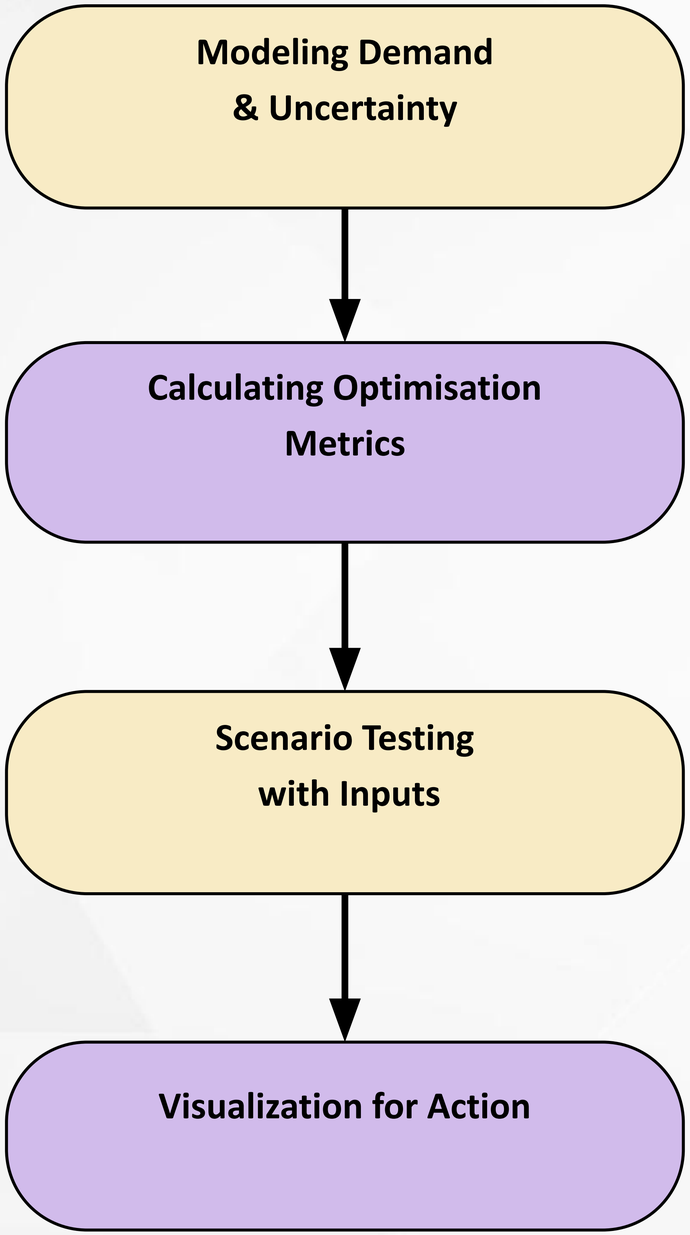
CONCLUSION

Over-forecasting → Excess stock	**Match EOQ with demand to reduce holding costs**
Under-forecasting → Stockouts	**Adjust ROP and safety stock for reliable supply**
High inventory + low DOS	**Indicates inefficiency — revisit replenishment**
Static safety stock for all brands	**Use dynamic safety stock to reflect brand behavior**
Unaligned EOQ with demand patterns	**Tie EOQ to seasonality and lead time**

By combining forecast, inventory, and actuals, we identified planning gaps and supply risks. Analysing DOS, EOQ, and ROP helped uncover optimisation opportunities, enabling smarter, more agile, and cost-efficient decisions.

FUTURE SCOPE OF PROGRESS

Past Approach

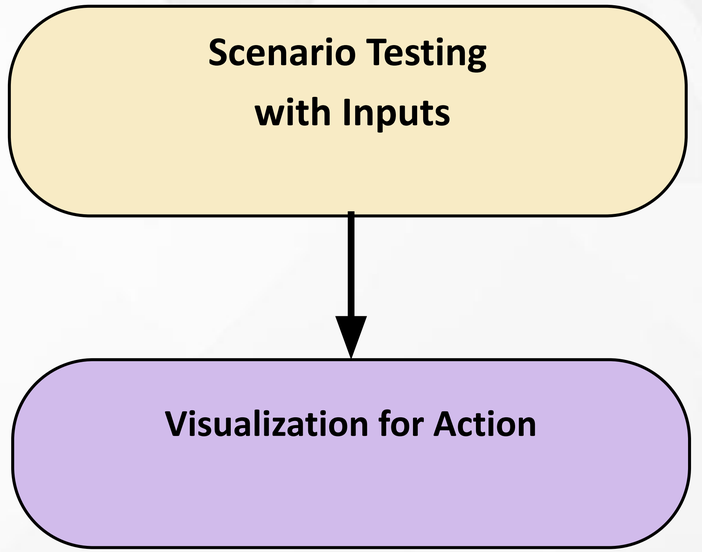


Feedback

- ✓ • SKU Level
- ✓ • Custom lead times per brand/SKU

SKU Level Analysis done in the code

Csutomer Lead times are given in the code but need more data to built the same per brand/SKU



THANK YOU

Tools Used