Inventory Optimization
(Furniture Manufacturer & Retailer)

Developed an **inventory optimization** model to evaluate current inventory situation and **estimate optimal inventory level for each SKU to meet sales forecasts**, reduce the stock outs and service level targets for its new channels

INVENTORY MODELING

ABOUT THE CLIENT

Company was a PE-owned **furniture retailer**

SITUATION

- Recently faced **high percentage of order cancellations due to stock outs**
- Merilytics partnered with the company to develop an inventory optimization model to **evaluate current inventory situation and estimate optimal inventory level** required for each SKU to meet sales forecasts and service level targets for its new channels

VALUE ADDITION

- Analyzed the sales forecasts, procurement and inventory data to **estimate optimal inventory levels** for all its SKUs
- Customized the calculations of inventory metrics to **consider client specific constraints** related to ordering frequency and minimum order quantity (MOQ) of suppliers
- Analyzed the current inventory situation and recommended the changes needed to **minimize inventory level** while meeting service level targets for next eight quarters
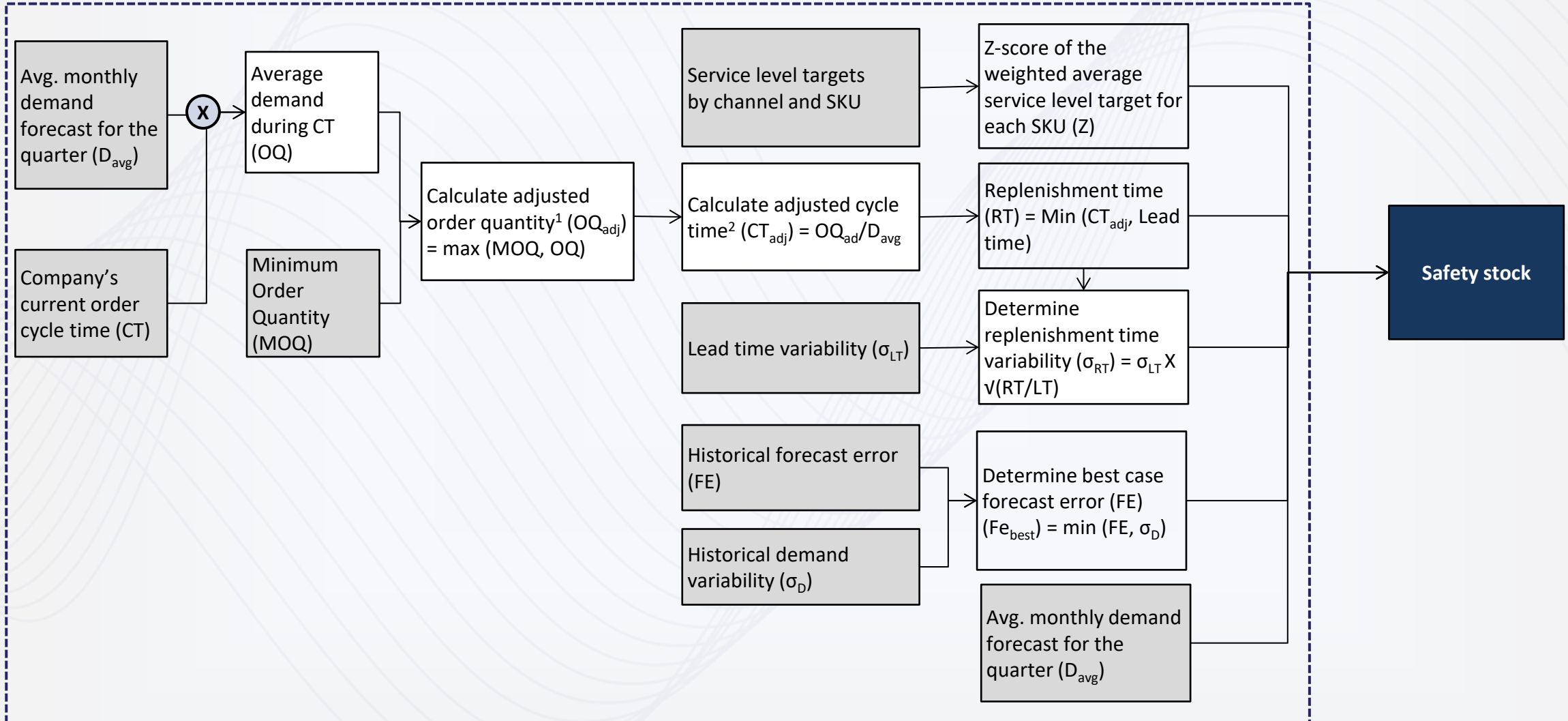
IMPACT

- Our in-depth analysis and customized inventory optimization model helped the company significantly **reduce their inventory levels on a net basis** and allow them to **reduce the stock outs**

METHODOLOGY USED TO ESTIMATE SAFETY STOCK

Inputs to the inventory model

Avg. monthly demand forecast for the quarter (D_{avg})

Company's current order cycle time (CT)

Average demand during CT (OQ)

Minimum Order Quantity (MOQ)

Calculate adjusted order quantity[1] (OQ_{adj}) = max (MOQ, OQ)

Service level targets by channel and SKU

Calculate adjusted cycle time[2] (CT_{adj}) = OQ_{ad}/D_{avg}

Lead time variability (σ_{LT})

Historical forecast error (FE)

Historical demand variability (σ_D)

Z-score of the weighted average service level target for each SKU (Z)

Replenishment time (RT) = Min (CT_{adj}, Lead time)

Determine replenishment time variability (σ_{RT}) = $\sigma_{LT} \times \sqrt{(RT/LT)}$

Determine best case forecast error (FE) (Fe_{best}) = min (FE, σ_D)

Avg. monthly demand forecast for the quarter (D_{avg})

Safety stock

1 Order quantity is adjusted so that it cannot fall below MOQ for any SKU
2 Calculated as the time during which demand for the SKU equals OQ_{adj}

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METHODOLOGY USED TO ESTIMATE RECOMMENDED INVENTORY LEVELS

Safety Stock

Average demand during RT $(D_{RT}) = D_{avg} \times RT$

$+$

Re-order point (ROP)

Adjusted order quantity (OQ_{adj})

$+$

Minimum demand over RT $= (D_{avg} - Fe_{best}) \times (RT - \sigma_{RT})$

$-$

Maximum inventory level

Half of average demand during CT (OQ)

Safety Stock

$+$

Recommended average inventory level