INVENTORY REORDER POLICY ASSESSMENT UNDER DEMAND & LEAD TIME VARIABILITY

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Business Context

Why Current Replenishment Policies Fail Under Uncertainty ?

Inventory replenishment decisions are typically made using:

- Historical average demand
- Fixed lead times
- Static Min–Max rules

These policies assume:

Demand and supply conditions remain stable over time

However, in practice:

- Weekly demand fluctuates
- Supplier lead times vary
- Order fulfillment timelines shift

Business Context

This creates a mismatch between:
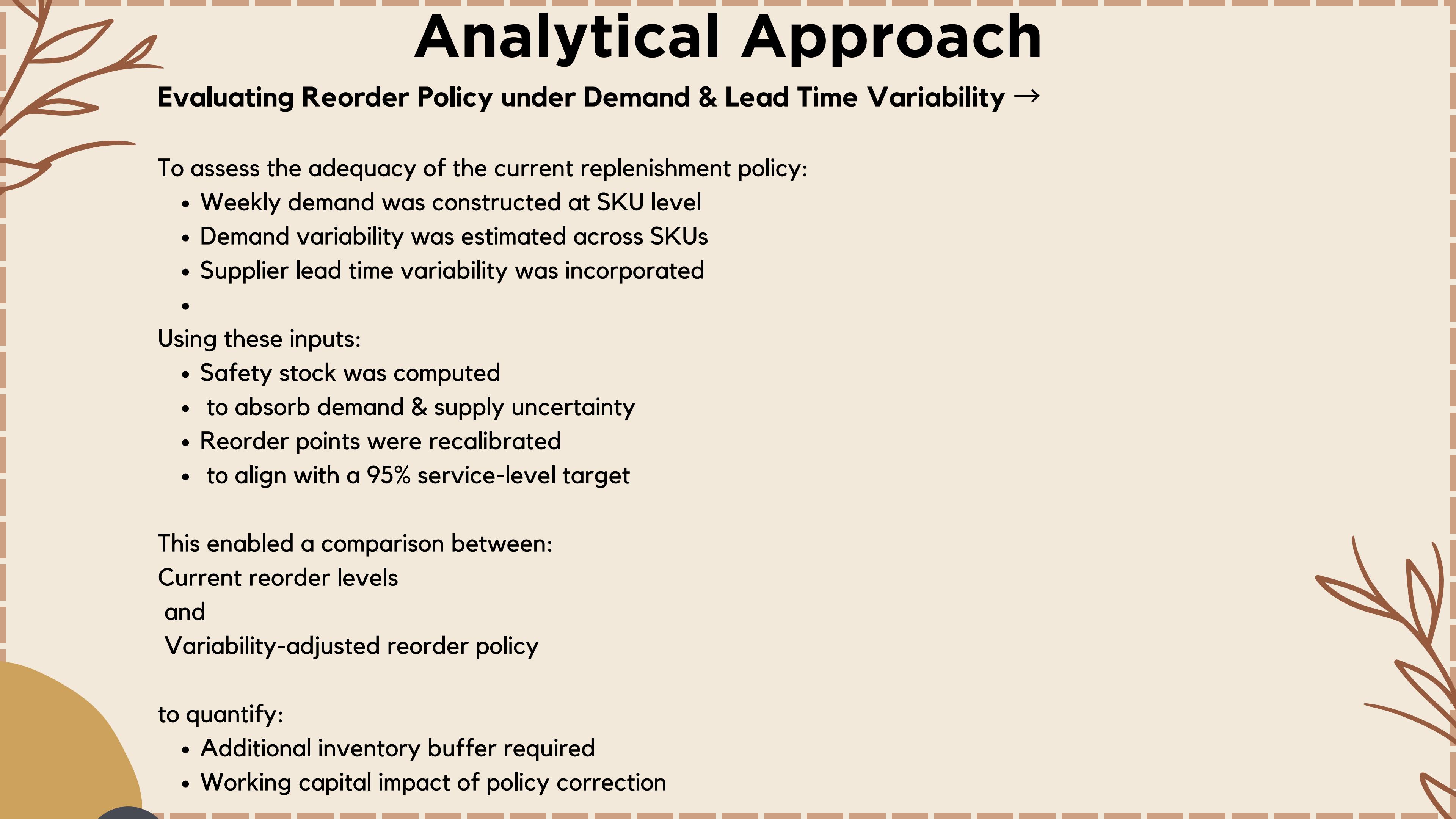
Inventory planning assumptions
 and
 Actual operational variability

As a result:
- Reorder levels may be triggered too late
- Safety buffers remain insufficient
- Stockout risk increases
- even when inventory is available

Business Question:
Can the current replenishment policy
 maintain a 95% service level
 under uncertain demand and lead time
without significantly increasing inventory cost?

Analytical Approach

Evaluating Reorder Policy under Demand & Lead Time Variability →

To assess the adequacy of the current replenishment policy:
- Weekly demand was constructed at SKU level
- Demand variability was estimated across SKUs
- Supplier lead time variability was incorporated
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Using these inputs:
- Safety stock was computed
- to absorb demand & supply uncertainty
- Reorder points were recalibrated
- to align with a 95% service-level target

This enabled a comparison between:
Current reorder levels
 and
 Variability-adjusted reorder policy

to quantify:
- Additional inventory buffer required
- Working capital impact of policy correction

Policy Adequacy Assessment

Current Reorder Policy vs Variability-Adjusted Requirement ->

Comparison between:
- Current reorder levels
- Variability-adjusted reorder policy

indicates that:

Existing replenishment triggers
underestimate uncertainty-adjusted
demand during lead time

Across SKUs:
- Average reorder level gap
- observed under current policy

suggests that:
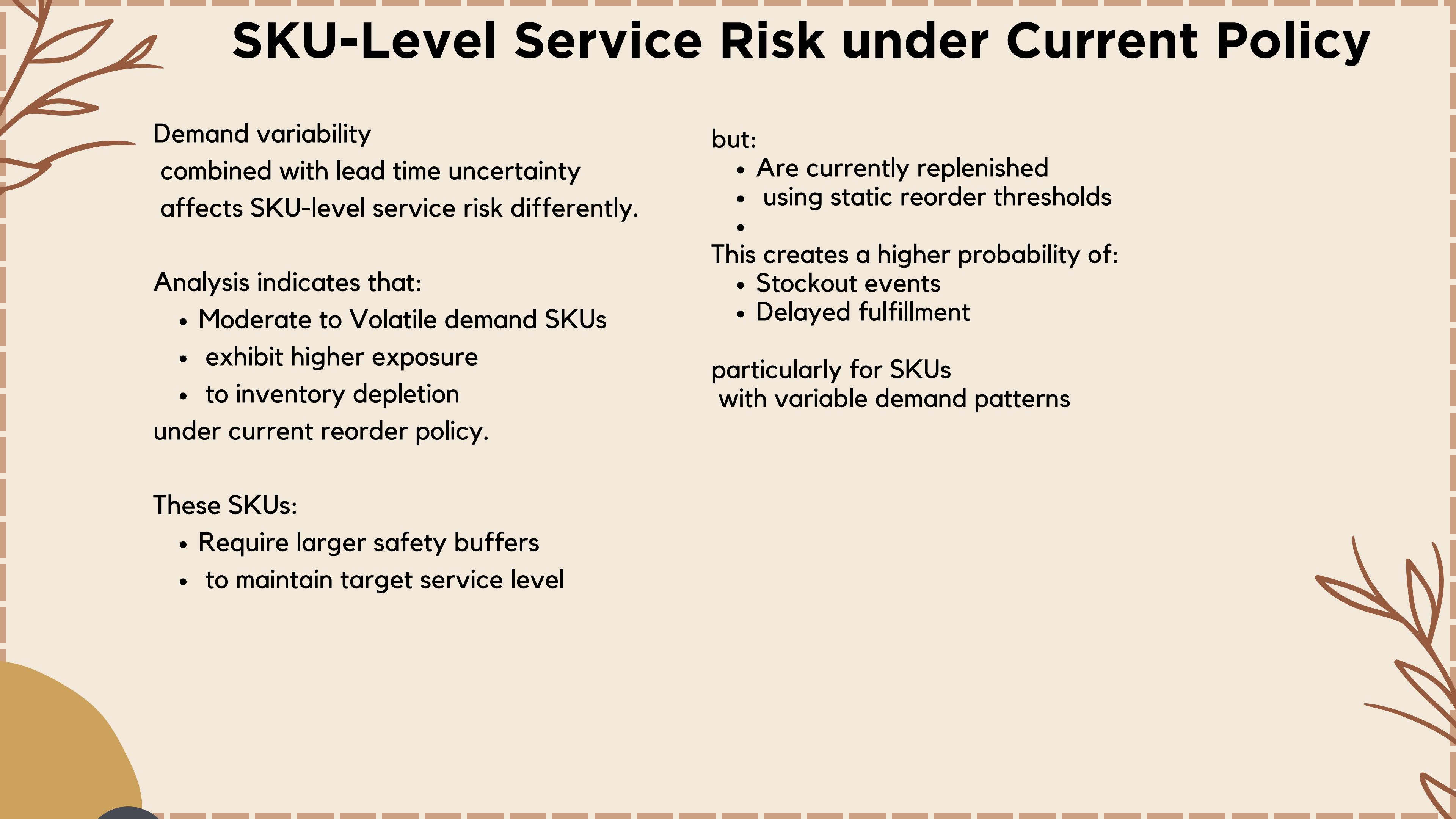
Reorder points are triggered
before sufficient inventory
is available to absorb
demand & lead time variability.

This increases the likelihood of:
- Inventory depletion
- Delayed replenishment
- Service-level failure

particularly for SKUs
with moderate to volatile demand patterns

SKU-Level Service Risk under Current Policy

Demand variability
 combined with lead time uncertainty
affects SKU-level service risk differently.

Analysis indicates that:
- Moderate to Volatile demand SKUs
- exhibit higher exposure
- to inventory depletion

under current reorder policy.

These SKUs:
- Require larger safety buffers
- to maintain target service level

but:
- Are currently replenished
- using static reorder thresholds
-

This creates a higher probability of:
- Stockout events
- Delayed fulfillment

particularly for SKUs
 with variable demand patterns

Working Capital Impact

Inventory Investment Required for Policy Correction

Adjusting reorder levels
 to absorb demand & lead time variability

 requires:
Additional safety buffer
 across under-buffered SKUs

This policy correction results in:
- Increased reorder thresholds
- Higher inventory investment
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SKU-level analysis indicates:
- Capital required
- varies significantly
- across demand profiles

Some SKUs:
- Require limited buffer
- But tie up
- higher working capital
due to:
- Higher unit inventory cost

This highlights:
Financial impact
 of enforcing service-level
  compliant replenishment policy

Inventory Policy Implications

Implications for Replenishment Policy Design :

Uniform replenishment rules
may not adequately account for:
- Demand variability
- Lead time uncertainty

SKU-level analysis indicates:
- Reorder policy adequacy
- varies across demand profiles

Moderate to Volatile demand SKUs:
- Require higher safety buffers
- to maintain service level

Stable SKUs:
- Require larger reorder levels
- due to higher baseline demand

Applying:
A uniform Min—Max policy
across all SKUs
may result in:
- Service risk
- for demand-volatile SKUs

or:
- Excess inventory investment
- for stable SKUs
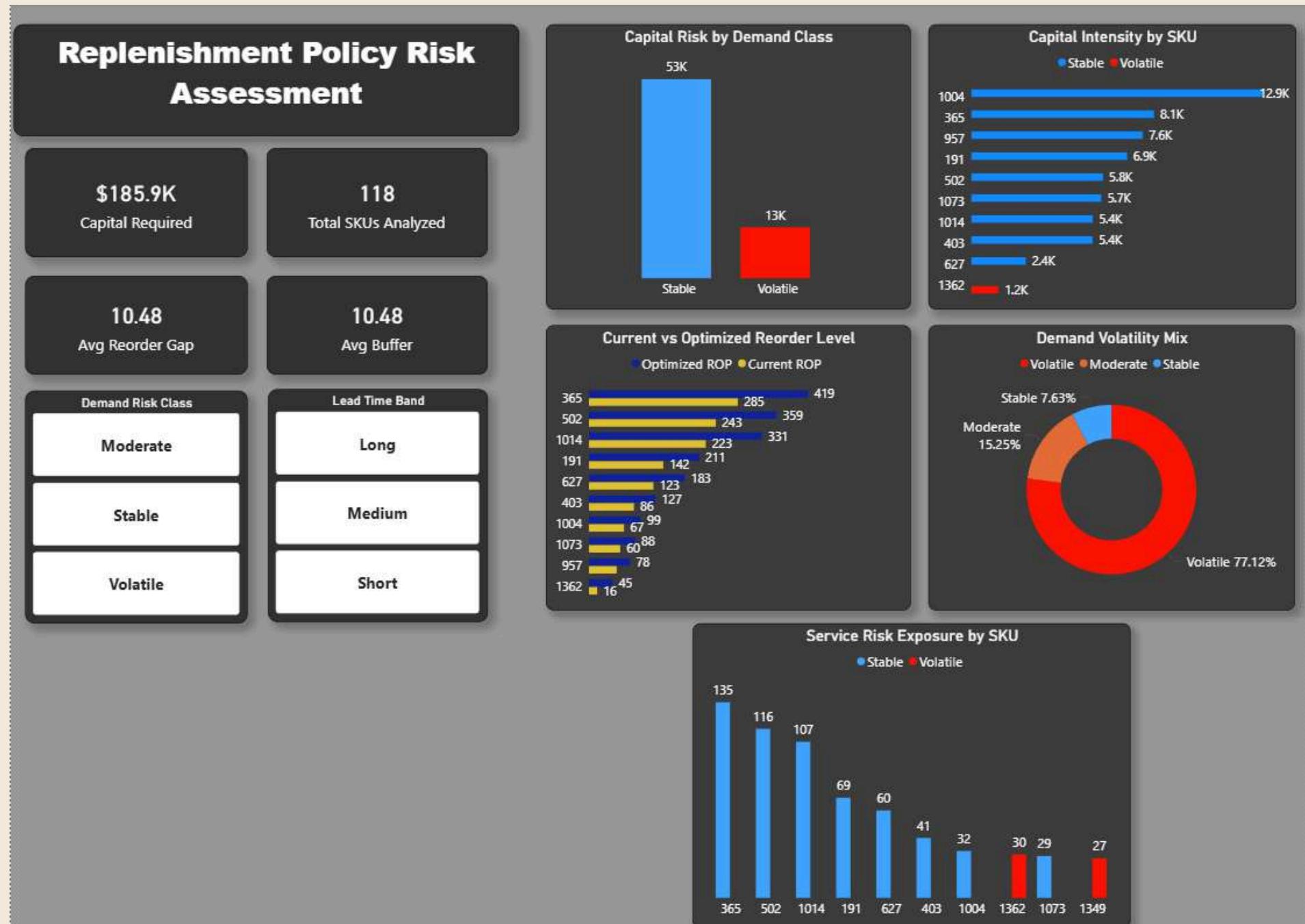
This suggests the need for:
Differentiated
inventory replenishment policy
based on SKU-level variability

Dashboard Overview

The dashboard provides a
SKU-level assessment of
current replenishment policy
under demand and lead time variability.

It highlights:

- The dashboard provides an SKU-level evaluation of
  the current replenishment policy under demand and
  lead time variability.

- It highlights the reorder gap between current
  reorder levels and variability-adjusted reorder
  requirements, along with the additional safety
  buffer needed to absorb operational uncertainty.

Dashboard Overview

- The dashboard also identifies SKU-level exposure to inventory depletion under the existing policy by visualizing demand volatility across the SKU portfolio and incorporating lead time variability that may influence replenishment risk.

- Additionally, it quantifies the working capital required to align reorder thresholds with service-level targets, enabling assessment of inventory investment needed for policy correction.

- Overall, the dashboard supports identification of under-buffered SKUs and evaluation of replenishment policy adequacy across different demand segments for variability-aware inventory planning.

Business Recommendations

Key Insights & Replenishment Policy Recommendations :

Insight 1:
Current reorder levels underestimate demand variability during replenishment lead time across several SKUs.

Recommendation:
Review reorder thresholds for SKUs exhibiting significant reorder gaps between current and variability-adjusted levels.
Recalibrating reorder points to account for demand variability may help ensure inventory availability during fluctuating demand periods, particularly for SKUs operating under moderate to volatile demand conditions.

Business Recommendations

Insight 2:

Moderate to volatile demand SKUs demonstrate higher exposure to inventory depletion under the current replenishment policy.

Recommendation:
Introduce variability-adjusted safety buffering for demand-volatile SKUs to mitigate potential stockout events caused by unpredictable weekly demand fluctuations.
Selective safety stock allocation may improve inventory resilience without requiring uniform buffer increases across the portfolio.

Business Recommendations

Insight 3:

A uniform Min–Max replenishment policy does not sufficiently reflect SKU-level variability in demand and lead time.

Recommendation:
Adopt differentiated reorder policies for SKUs based on demand variability classification to ensure buffering strategies are aligned with underlying uncertainty.
This may reduce the likelihood of service-level degradation for volatile SKUs while maintaining inventory efficiency for more stable demand items.

Business Recommendations

Insight 4:

Stable demand SKUs contribute disproportionately to working capital requirements when reorder levels are adjusted for uncertainty.

Recommendation:
Evaluate reorder policy adjustments for high-demand stable SKUs with consideration for capital impact to balance service protection with inventory holding cost.
Policy revisions for such SKUs may require careful capital planning due to their relatively higher reorder thresholds.

Business Recommendations

Insight 5:

Inventory investment required to align reorder levels with service-level targets varies significantly across SKUs.

Recommendation:

Prioritize policy correction for SKUs with relatively high reorder gaps and manageable capital investment requirements.
 This may enable incremental improvements in service reliability without necessitating large-scale inventory expansion across the entire SKU base.

Business Recommendations

Insight 6:

Reorder gap magnitude varies across demand-risk segments, indicating differing policy adequacy across the SKU portfolio.

Recommendation:
Apply reorder level revisions progressively across SKU segments beginning with those demonstrating higher reorder gaps under moderate demand variability to manage implementation impact.
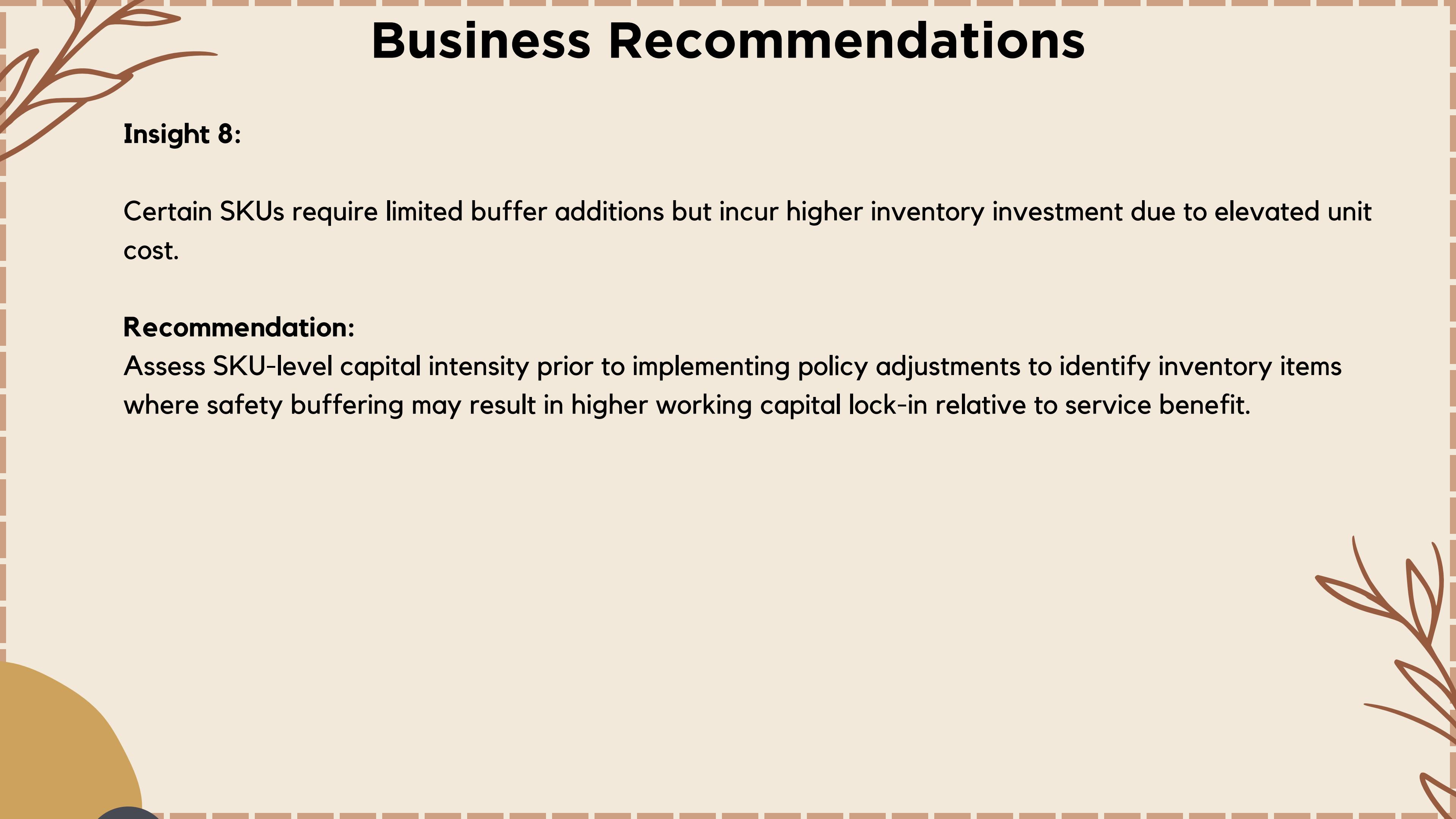
Business Recommendations

Insight 7:

Lead time variability contributes to differences in required safety buffering across SKUs.

Recommendation:

Incorporate supplier lead time variability into replenishment parameter settings for SKUs with longer or less predictable replenishment cycles to reduce the risk of delayed inventory availability.

Business Recommendations

Insight 8:

Certain SKUs require limited buffer additions but incur higher inventory investment due to elevated unit cost.

Recommendation:
Assess SKU-level capital intensity prior to implementing policy adjustments to identify inventory items where safety buffering may result in higher working capital lock-in relative to service benefit.

Expected Outcome

Expected Business Impact :

Revising reorder thresholds
 to account for demand
 and lead time variability
 may help:

- Improve inventory availability
- during demand fluctuations
- Reduce the likelihood
- of stockout events
- for demand-volatile SKUs
- Align replenishment policy
- with SKU-level uncertainty

Applying variability-adjusted
 reorder levels selectively
 across identified SKUs

may enable:

- Service-level compliance
- without uniform
- inventory expansion
- More targeted
- inventory investment
- across the SKU portfolio

This supports:
Risk-aware replenishment planning
 under operational variability