Joint Replenishment and Base Stock Policy for the U.S. Beer Industry

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Supply Chain MANAGEMENT

MillerCoors A MOLSON Coors COMPANY

Introduction

- Bio
- Overview of Sponsor Company
- Problem Statement and Motivation
- Methodology
- Results and Analysis
- Conclusion and Managerial Implications
- Q&A

MillerCoors Overview

- US business unit of Molson Coors
- 55 million barrels annual production
- 7 large-scale breweries
- 7 craft breweries
- 50+ brands
- #1 craft beer

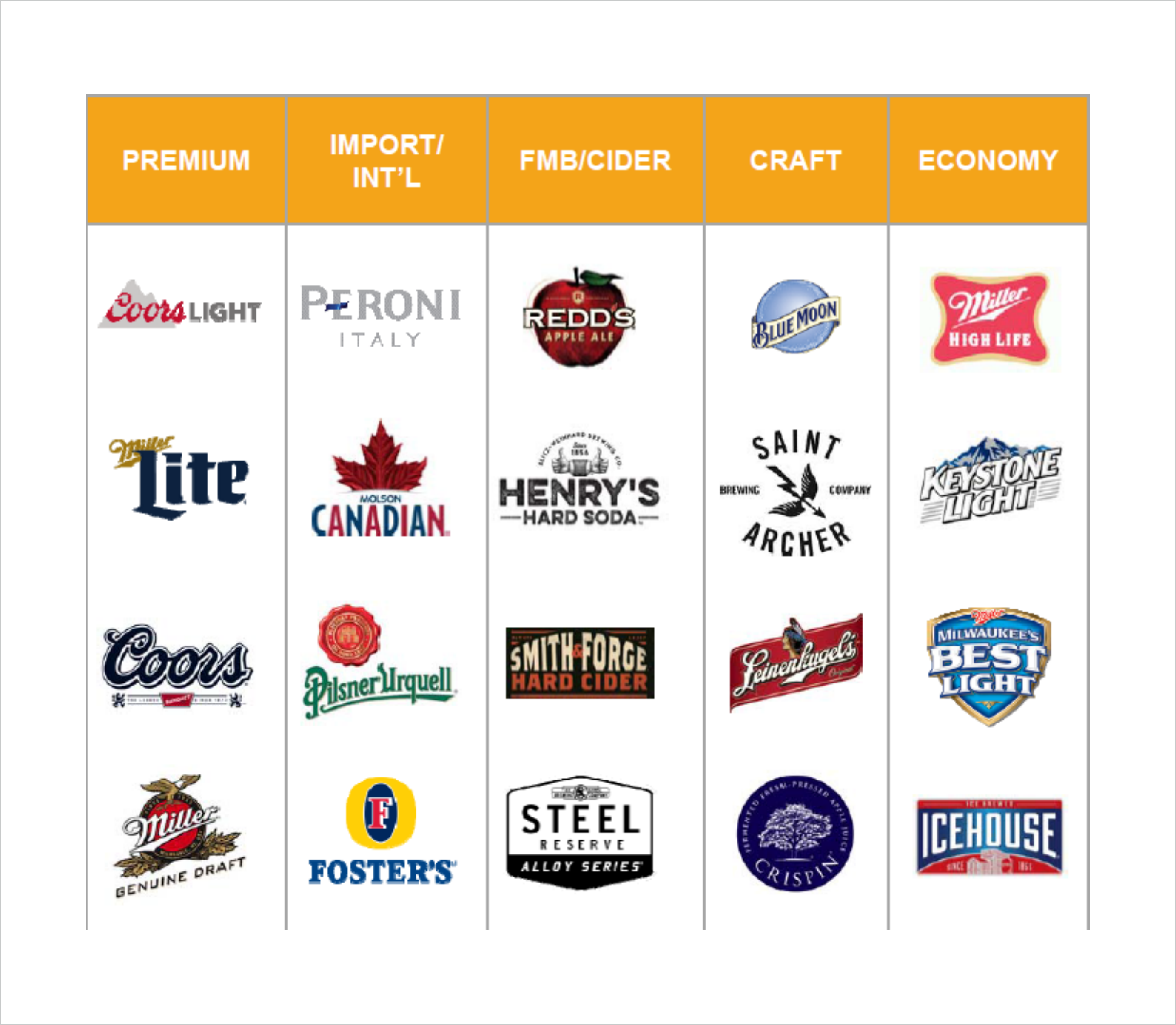
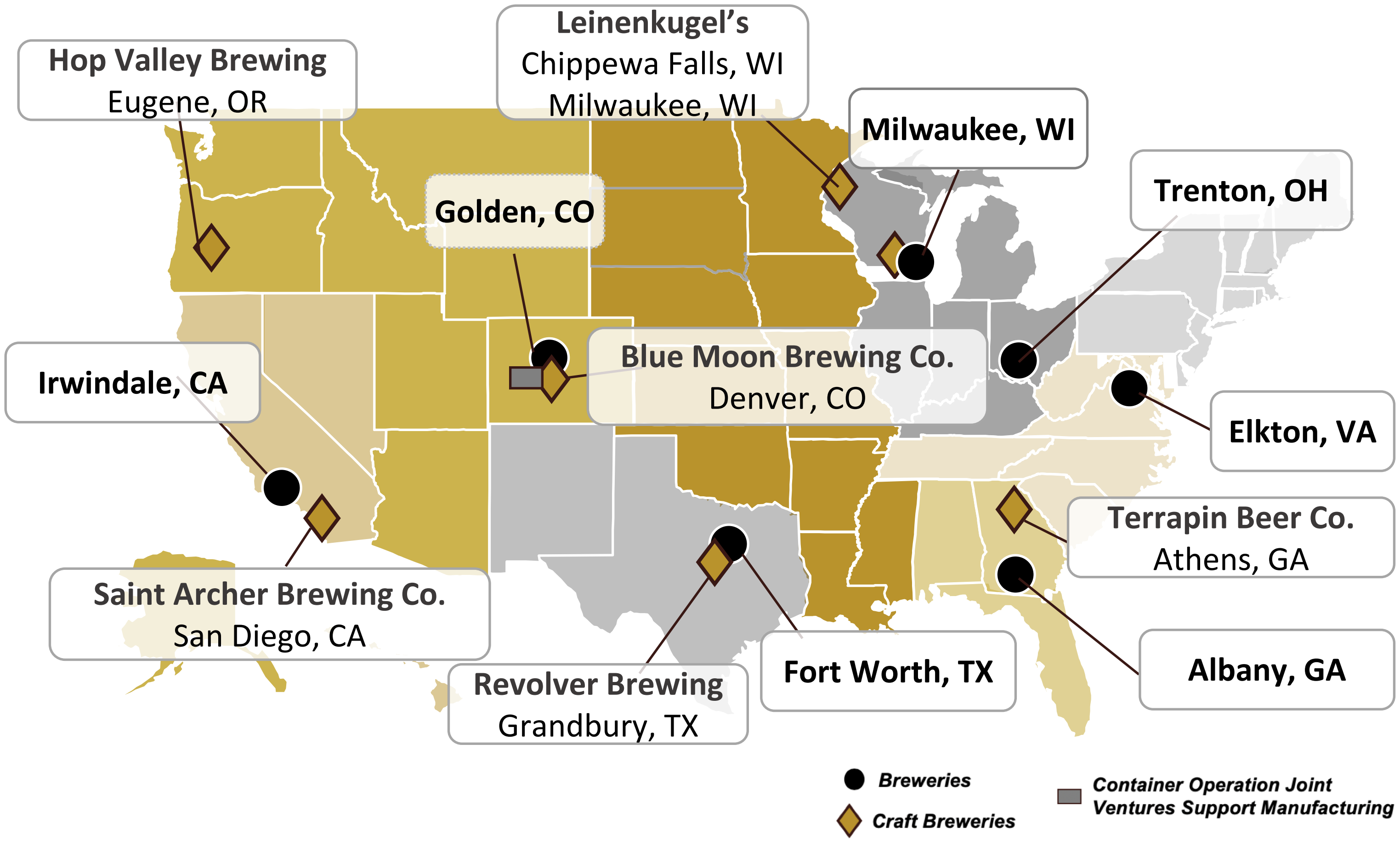


Image: https://seekingalpha.com/article/4182626-value-tap-premium-brands-discount-price-molson-coors

Beer Industry's Three Tier Distribution Network

MillerCoors Brewery Network



Research Question

- *How does a Joint Replenishment approach improve the way we determine inventory policy for multi-echelon supply chains?*

By answering the research question, we should be able to:

- Understand how to link optimal production frequency with inventory policy
- Make better decisions when determining inventory policy for new products

Relevance/Motivation

Increasing Number of SKUs

Difficulty rationalizing portfolios

Increasing complexity of portfolio with low volume SKUs

Full Truckload Requirements

Methodology

Collect and Clean Data → Calculate Run Strategies (JRP) → Calculate Base Stock Policy

Joint Replenishment

- *Focuses on determining the economic production frequency of each SKU*
- *Transformation of the Economic Order Quantity (EOQ) Formula*

1. $\bar{n}_i = \sqrt{\dfrac{hC_iD_i}{2(S+s_i)}}$

2. $\bar{\bar{n}}_i = \sqrt{\dfrac{hC_iD_i}{2s_i}}$

3. $m_i = \left\lceil \dfrac{\bar{n}}{\bar{\bar{n}}_i} \right\rceil$

Variable	Description
h	Inventory holding cost %
C	SKU Unit Cost
D	Annual Demand
S	Setup Cost
s	SKU specific cost
m	Frequency to produce each SKU

Joint Replenishment Process

1. Calculate Economic Production Frequency for All SKUs
2. Determine SKU with highest number of runs and isolate
3. Recalculate Production Frequency for all other remaining SKUs
4. Calculate the ratio of runs for every SKU compared to most frequently produced
5. Map economic frequency to a run strategy

Run Strategies

- Produced weekly (Weeks 1, 2, 3, 4)
- Produced bi-weekly, on odd weeks (Weeks 1 and 3)
- Produced bi-weekly, on even weeks (Weeks 2 and 4)
- Produced one out of four weeks, on first odd (Week 1)
- Produced one out of four weeks, on first even (Week 2)
- Produced one out of four weeks, on second odd (Week 3)
- Produced one out of four weeks, on second even (Week 4)

Base Stock Model

- *Focuses on determining the appropriate inventory level to deliver a chosen level of service.*

- $Target\ Level\ of\ Inventory\ (DC) = \frac{R \cdot \mu_i}{2} + z\sigma_i\sqrt{R+L}$
- $Target\ Level\ of\ Inventory\ (Distributor) = R \cdot \mu_i + z\sigma_i\sqrt{R}$

Variable	Description
R	Review Period
μ_i	Average Weekly Demand
z	Service Level
σ_i	Standard Deviation of Weekly Demand
L	Lead Time

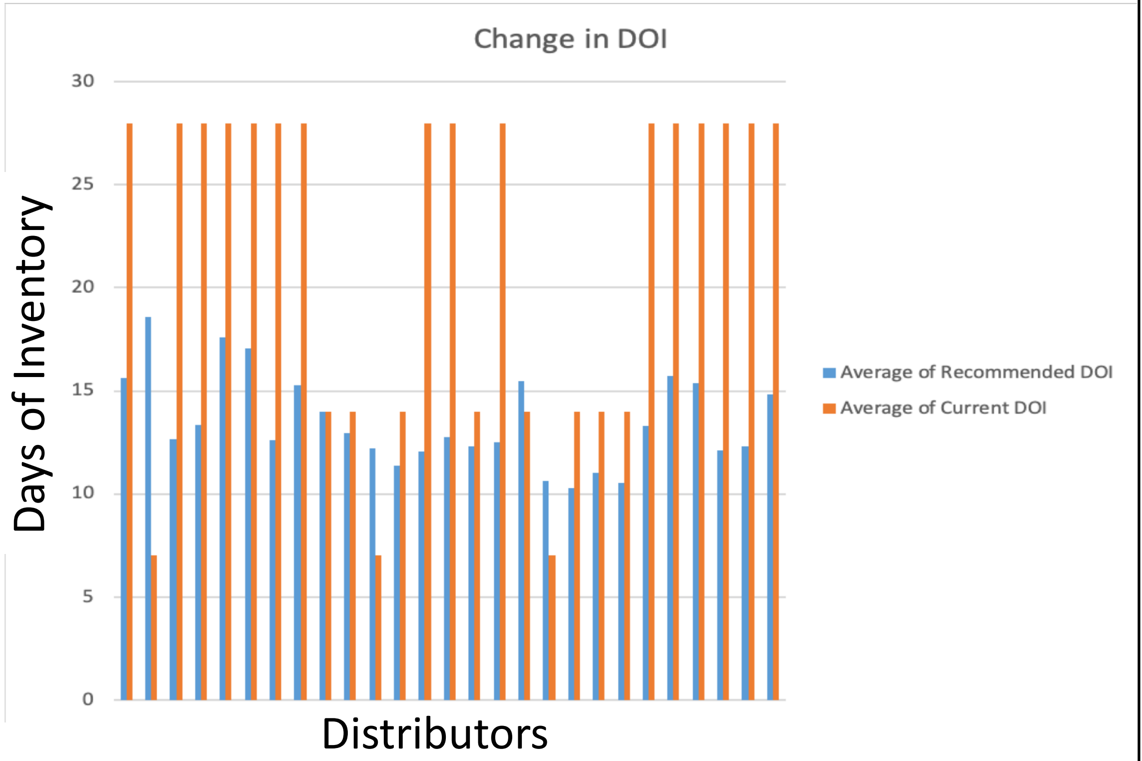
Results

- 52% of SKUs classified with same run strategy
- 39% of SKUS classified in an adjacent run strategy
- 9% of SKUs shifted from weekly to one-in-four or vice versa

Actual Run Strategy (columns); *Recommended Run Strategy* (rows)

	4wk Cycle	Every Other Week	Weekly	Total
4wk Cycle	23	10	2	**35**
Every Other Week	9	2	0	**11**
Weekly	3	2	3	**8**
Total	**35**	**14**	**5**	

- Inventory reduced for 80% of SKUs
- Inventory reduced by 8,600 Barrels



Supply Chain MANAGEMENT

Managerial Implications

Smooths Run Strategy Variability

Brewery

- Run Strategy
  - Weekly
  - Bi-Weekly
  - One-In-Four

Distribution Center

- Base Stock
  - Review Period + Lead Time

Distributor

- Base Stock
  - Review Period

Constant Review Period and Lead Time

Conclusion

Distribution centers can help buffer customers from variations in production frequency

Base Stock Model improves inventory policies in three-tier system

Linking the JRP with Base Stock model helps manage inventory of low-volume high complexity SKUs

Q&A