Inventory Management for Automated Convenience Stores in Brazil

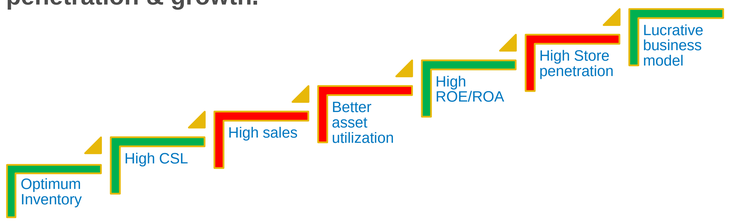
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Sponsor: Onii

MIT GLOBAL SCALE NETWORK

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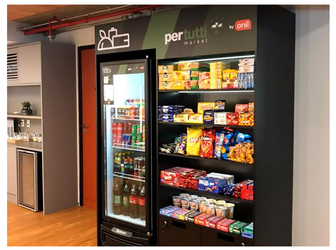
Motivation / Background

Onii is Brazilian start up and have launched over 200 autonomous stores across the country. Success of this business will depend on how these stores can meet customer service level with the optimum inventory. Capital requirement is one of the key parameter for business growth. Optimum inventory level will reduce the capital invested in inventory and improve service level. This will help faster store penetration & growth.









Key Question / Hypothesis

1. How consumer demand varies from store type
2. How the relationship between stakeholders drive inventory
3. How Inventory policy will vary with the store type

Relevant Literature

- **Fransoo, Jan C., Blanco, Edgar E., Mejia-Argueta, Christopher. Reaching 50 million Nanostores: Retail Distribution in Emerging Megacities**
- **Lin, Feng-Cheng, Yu, Hsin-Wen, Hsu, Chih-Hao, Weng, Tzu-Chun. Recommendation system for localized products in vending machines. Expert Systems with Applications 38 (2011) 9129–9138**

Methodology

Process & Stakeholder mapping	Data Collection	Data processing & Cleaning	Data Analysis	Inventory strategies & policy	Sensitivity analysis
• Process Mapping • Stakeholder relationship	• Interviews • Historical Sales data	• Join and filter datafiles • Identify and remove outlier • Stores representing sales for 12 months	• Descriptive Analysis • Cluster Analysis • PCA analysis • Interview survey analysis	• Inventory policy design for store & product cluster • Best Model selection for least total cost	• Model sensitivity • Holding cost • Ordering cost • Review Period • Gross Margin

Results

- Store clustering (5 clusters) and Item clustering (10 clusters)
- Base Stock, Continuous Review and Periodic Review policies simulated for each combination of store cluster and item cluster
- Best results from Periodic Review, with the following table as best R for each combination of store cluster and item cluster
- Sensitivity analysis showed Periodic Review is best option.

	I1	I2	I3	I4	I5	I6	I7	I8	I9	I10
S1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
S2	3.8	N/A	2.9	2.5	3.7	1.8	4.0	4.0	3.8	3.6
S3	4.0	4.0	2.3	4.0	3.8	1.3	3.6	3.9	3.5	3.1
S4	N/A	N/A	2.9	N/A	3.8	2.5	3.5	N/A	3.8	3.0
S5	4.0	N/A	2.3	N/A	4.0	1.4	3.8	4.0	3.6	3.3

Contributions

- Stakeholders' relationship mapping
- Identified patterns which classify stores and items by different parameters
- Designed Inventory strategies and policies for each store type
- Model development that Onii can use for current and new stores
- Ordering cost ratio to define between periodic and continuous policy

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