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Research Report: ZLC-2015-5
Improving Downstream Retail Operations
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Improving Downstream Retail Operations

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Summary: This thesis tackles the question of alleviating stress on the supply chain and retail stores of a fashion retailer that accommodate a "push model" of inventory. The first part is through the design of a user interface model for allocators based on the Analytical Hierarchy Process, and the second part explores a more qualitative format such as cartonization rules of the distribution center to employee management.
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KEY INSIGHTS

1. Allocation process with an analytical hierarchical process approach should drastically reduce backlog of inventory.

2. Taking into account the unit volume (cm^3) instead of just units is key to improving allocation decisions.

3. Visibility and information sharing along the whole allocation process is critical to setting up strategies for better inventory management.

Introduction

Demand in the fashion industry is subject to various kinds of volatility from ever-changing consumer tastes, holidays, sales, or even weather patterns, which make it hard to maintain the right inventory. This can cause backlogs, capacity issues, and drops in consumer service levels. However, instead of looking at the initial buyer decisions and the quantity of inventory to be ordered, we worked with a push model, and with the inventory quantities given, we answer the question of how to help the downstream of a multi-billion dollar clothing retailer supply chain in the format of allocations and store management through its Italian distribution center and European retail stores. The research targets capacity constraints of stores through Back of House (BoH) and analysis of fast and slow movers of inventory in an efficient cost-effective manner. Last but not least, the thesis looks into qualitative aspects such as communication clarity across all nodes of the supply chain to improve visibility.

Current Situation

With Rolo stores all over the world targeting different types of markets from casual outlet stores to high-end fashion stores, Rolo is currently expanding its European region aggressively. Thus, the focus of this study targets three Rolo outlet stores in the United Kingdom (Men, Women, and Children stores) with the goal of being able to replicate the model across other European stores. These three stores are all serviced by the same distribution center which is located in Parma, Italy.

Rolo stores are currently experiencing difficulty with the quantity of cartons they receive every

day. Every store receives a shipment of new products, and most of the time, these shipments contain more cartons than the stores can actually process or receive every day. Each time a store receives more than they can handle, a backlog is created in which the cartons are refused by the BoH and held in another facility such as the carrier. Once a backlog is created, the store loses track of what they are actually receiving because when capacity opens up, the cartons are randomly shipped back to the store.

For example, if there is a backlog of 50 cartons, a shipment of 110 cartons, and store A has a maximum receiving capacity of 100 cartons, this store won't be able to identify which of the 100 cartons they receive (from the 160 in the pipeline) are actually from backlog or from the current shipment. If this particular situation were to happen, even though the store is able to receive 100 cartons, the backlog is increased by 10, and the following day the store will have difficulty identifying the cartons to the original date on which they were supposed to be received.

There are several situations that are causing this problem, which are all interrelated along the supply chain - from allocation amounts to distribution center labeling to receiving inefficiencies in the backroom of stores.

This study is aimed at giving recommendations as to how to help the stores react better to the current fixed allocation process of push modeling, and if possible, increase the carton processing and/or receiving capacity.

Recommendations

After going through literature and reading about what can be done or used in these types of situations, and interacting with company employees in several segments of the supply chain and hearing their issues and suggestions, we came up with 6 different recommendations that we believe should help the company in releasing stress in the later part of the supply chain process, the stores.

Some of these recommendations take a quantitative approach, while other focus more in the qualitative aspect of the process.

AHP Model

The 1st recommendation is for the allocators to use a model that takes into account the actual unit volume (cm3) available for each store and not a fixed number of units.

This model should also be developed according the analytical hierarchical process , which uses pairwise comparisons to help in prioritizing items and determining the optimal quantity to allocate from each item in case of a backlog.

If a model like this is used and respected, backlog in Rolo stores should be dramatically reduced and eventually eliminated.
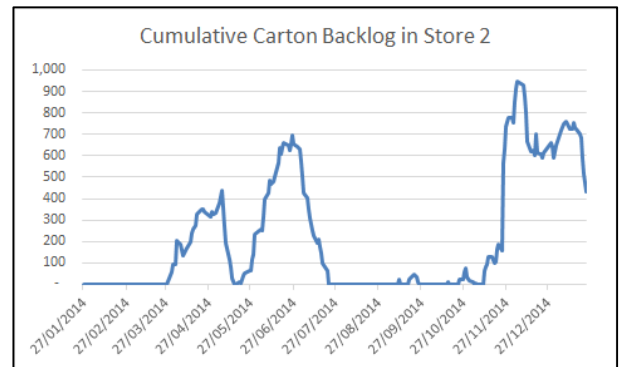

Figure 1: Backlog generated throughout the year in a particular store

The model that we developed, which takes into account the unit volume and the AHP, analyzes 15 different items across 5 different criteria. Once the user inputs the values for the pairwise comparison and quantities to be allocated to the store, the model will give three automatic allocation recommendations (in case the quantity allocated by the user generates a backlog). These recommendations are a simple weighted average, AHP and limited AHP.

The *weighted average* recommendation simply cuts the current quantity allocated in every item by the percentage that is in excess of what the store can actually handle. This recommendation should be used when the user does not have the time to do the AHP and a backlog is being generated.

The *AHP* does not take into account the quantity allocated by the user. If a backlog is generated by the quantities given by the user, the model will suggest the optimal quantity to be allocated from each item, according to the weights determined by the AHP exercise. This output given by the model in this recommendation should only be used if the initial quantity input was done without an accurate forecast.

The last recommendation is the *limited AHP*. In this scenario, the model assumes that the user has some knowledge about the stores and that it has accurate forecasts. The model then determines that the maximum quantity to be allocated to each item, is the one given by the user, even though the AHP recommends a higher quantity of units. When this

happens, the model assigns the "spare" volume allocated to this item to other items that have not reached their maximum, always following the AHP process.

Items	Quantity Allocated	Weighted Average	AHP	Limited AHP
2B SPORTCOATS	50	31	51	50
2B SUITS	250	157	27	50
L/S SOLID SPORTSHIRTS	100	62	285	100
M-COLD WEATHER HATS	150	94	1,114	150
DB SUITS	80	50	31	57
M-CASHMERE VESTS	70	44	215	70
M CASUAL PANTS	100	62	76	100
SLINGBACKS	100	62	70	100
POLARTEC TOPS	125	78	93	125
M-WOOL VESTS	175	110	122	175
W-S/S MESH	250	157	427	250
PAJAMAS	250	157	467	250
SS PATTERNED DRESS SHIRTS	150	94	168	150
FLATS/SKIMMERS	120	75	84	120
SWIMWEAR	200	125	137	200
Volume Required cm³	16,480,366	10,311,921	10,315,314	10,350,725
Volume Available cm³	10,368,000	10,368,000	10,368,000	10,368,000
	Backlog	OK	OK	OK

Figure 2: Recommendations given by the model.

Labeling "Initial" or "Replenishment" Product Carton

The distribution center should label each of the cartons relative to their urgency of replenishment or initial categories on the outside of the box. With clearly readable labels "initial" or "replenishment" employees can figure out which ones have priority in processing and which ones can be delegated towards the end of the shift or when they have availability. There is also a recommendation for the distribution centers to standardize the carton mix and if Rolo DC decides that is optimal, it is suggested to take the labeling another step further and have "initial" + "item description". For example the box would be labeled "Initial - Men Brown Pants".

Modify Backroom Layouts

It is our suggestion that having an effectively laid out back room is very important for Rolo to manage, process, stock and to move inventory to the front of the store. Everything in the retail industry is about space, but not only the utilization of space but considerations about movement within that space. Since Rolo has been trying to implement space saving mechanisms in each store, the next step is to consider how to organize the units within the allotted space. Our recommendation is that they analyze their top selling items in an ABC fashion and place the bestselling items closer to the front of house entry so that not only are they more visible to employees, they are also accessible, so that employees need not spend time going to the very back of store to retrieve items, using time that could be spent servicing customers. This also would prevent lost revenue in items not being replenished at the front of the store, causing customers to miss buying certain units.

Standardize Content of Cartons

The standardization here can be done in two different ways. The most recommended is to ship the same item in the lowest number of cartons possible instead of spreading out the mix over many cartons. This means that if the same red shirt is being shipped 100 times to the same store, these 100 units should be sent in the minimum number of cartons possible in order to reduce setup times in the store.

If for any reason (costs, for example), the distribution center is not able to standardize the content of the cartons as suggested, the second recommendation is to standardize the content of the cartons according to the ABC classification of items. This second type of standardization will not only help the store reduce setup times, it will also help in the sense that all of the items in the same carton have the same classification.If the layouts are modified according to ABC as in the previous recommendation, all the items in the same carton should be near each other in the stockroom so the stockroom person will not have to spend much time sorting these items because all of them will be close to each other.

Employee Hiring/Training

There are a few recommendations given not just to cross-train employees to increase efficiency, but after talking with management, we offer a recommendation to improve training and hiring guidelines. Through cross-training, Rolo will be able to utilize methods that minimize costs by being able to have fewer staff; instead of having reduced efficiency from fewer employees, there are queuing models currently built in that utilize the cross-trained staff to serve the front and put back or bring up staff when needed while minimizing the cost of doing this.

Markdown Management

Rolo should put into practice management of sales whereby they analyze items that are actually slow-movers and discount them early in the season rather than later at the end of the season. This approach should help Rolo to maximize their revenue, as it has been shown that if items were to be marked down at a smaller discount (e.g., 20%) rather than a bigger discount (e.g., 50%) at the end of the season, revenue is increased. At the same time, Rolo will be able to manage and effectively sell slow-moving items at a quicker and revenue-increasing pace.

Conclusion

In conclusion, we believe that there are many strategies that Rolo can employ in order to improve the operation of the stores. Although some of the solutions are easier to implement than others, those with a longer implementation time can generate a greater impact.

We believe that the quick win and easier recommendations to implement are the labeling of cartons according to initial or replenishment products and the establishment of a training program for employees.

The recommendations that could generate the most impact are also the ones that will require more time for implementation. We agree that the two recommendations with the most impact are for the allocation process to take into account an analytical hierarchical process and the implementation of a markdown management strategy.

We believe that if the allocation process improves and starts taking AHP into account as well as store volume (cm3) receiving capacity instead of quantity of products, the backlog will be reduced to 0. This will drastically minimize problems in the backrooms and also help the stores have more visibility and a better control of their inventory and the products in the pipeline.

In addition, if the stores implement a markdown management strategy with more visibility between the stores and the allocation team, the stores could also improve their backroom space and visibility by selling the "unwanted" items more quickly. These sales would also increase the revenue because they would be sold at a higher price than when these items are marked down at the end of the season.