

The Omnichannel Inventory Puzzle

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Abstract - In the dynamic landscape of modern retail, any business focusing on providing seamless and integrated shopping experience across various channels to its customers cannot overlook implementing omnichannel strategies. This article explores the imperative role of effective inventory management in achieving success and providing a positive customer experience within the omnichannel paradigm. The article walks you through the ordering approach, the flow of inventory from node to node, the challenges faced and effective strategies for resolution as well as proactive risk mitigation. The article provides insights on identifying customer preferences and planning inventory at the right network node to support the best possible customer experience. Inbounding inventory in the right levels at the appropriate nodes the first time (instead of executing inventory transfers to balance the network), managing capacity and labor to cope up with the fluctuating inventory levels, building strong partnerships with suppliers to enable reliability, managing shrink and finally unlocking a mechanism to effectively track and monitor in-network and in-transit inventory levels will form the strong foundational pillars for managing omnichannel inventory.

Index Terms- Omnichannel Retail, Inventory Optimization, Retail Inventory Planning, Changing Retail customer preferences, safety stock, multi-echelon network, Retail Inventory Management, Inventory Inbound challenges, Inventory Allocation, Web Analytics tools, Customer Experience, Supplier Partnership, Supplier Reliability, VMI, Vendor Managed Inventory, Just In time, JIT, Replenishment Planning, Warehouse Space Constraints, Warehouse Planning, Continuous Improvement, S&OP, Sales and Operations Planning, Labor Planning, Inventory Visibility, ASN, Advance Shipment Notice, Real-time Inventory visibility, POS, Point of Sale, Customer impressions, OTIF, On Time In Full, Retail shopping experience, dynamic safety stock, Push Vs. Pull

I. INTRODUCTION

Omnichannel retail, the seamless integration of multiple sales channels, has revolutionized the way consumers shop. While it offers numerous benefits, such as increased flexibility and options for customers and expanded market reach, it also presents significant challenges in inventory management. In this article, we'll explore the key challenges faced by retailers in omnichannel inventory management and discuss strategies to overcome them. There have been several articles published on different strategies used by organizations in managing their inventory including tech solutions, processes and models for demand planning, replenishment planning, inventory optimization and warehouse management. This article focuses on customer perspective and building targeted action plans to equip the organizations to manage customer expectations.

In its simplest form, the goal for a retail business is to ensure the availability of the product at the right time and right place. With Omnichannel, the added layer to this would be predicting the customer buying preferences. It could be order online and pick up from store or order online and get it delivered or even could be walk into a store for purchase.

Approach

One of the pivotal components of our puzzle is management of inbound inventory, which refers to the movement of raw materials and goods from suppliers to manufacturers or distributors. Despite the technological advancements that have enhanced supply chain processes, inbound inventory management continues to pose significant challenges. The approach taken in this article to follow the path of inventory as it moves from the initiation point of ordering to the final destination or warehouse, review the pitfalls, potential opportunities and how it ties back to the plan of incorporating

customer preferences. The methods used include real life experiences with inventory planning and theories on retail inventory management and optimization principles.

II. INVENTORY ALLOCATION

Allocating inventory effectively among various channels, including physical stores, e-commerce, and mobile, can be a juggling act. An organization could invest in developing allocation strategies based on historical data, channel-specific demand patterns, and dynamic market conditions. This arguably could be one of the top challenges because inventory at the wrong place could result in out of stock or shrink (i.e. wastage). In a multi-echelon network, the question is where do you want to park your inventory and how much buffer to be added there, what is the trade-off between inventory holding cost at a specific location vs. bringing it from another location on a need basis and how it impacts the end customer. Easier said, but determining customer preferences for their shopping experience involves understanding how customer like to shop and what factors influence their choices. This changes over time and we have seen a tremendous change in customer behavior and patterns post COVID-19. Some of the strategies and methods for this goal includes customer insights data from providers, surveys and questionnaires, customer interviews, focus groups and social media monitoring. This provides a more in-depth understanding of their preferences and allows for open-ended discussions. For example, Nielsen data could be a good reference to compliment other research findings. Say you are a player in pet food category, you could obtain data around how much of pet parents are shopping online vs. in store and what sub categories, flavors etc. are found more in online shopping carts Vs. in-store shopping carts. Additionally, implementing pilot programs to test new retail channels or features and utilizing customer feedback platforms to collect real-time comments and ratings, demographic and psychographic analysis could help in this direction.

The next step would to analyze the data from the above sources or channels and transaction data to identify patterns and trends. Leveraging web analytics tools such as Google Analytics to understand online customer behavior such as page views, time spent on site and conversion rates would be a great asset for any organization looking to quickly adapt to trends. Continuous monitoring of trends from internal data as well as competitor offerings and innovations will help the organization in adapting itself to continuously provide an elevated shopping experience to its customers.

Although identifying customer preferences is highly critical, this is only one of the inputs to inventory allocation. The next phase involves deeper planning and implementation of optimization models for various factors such as holding cost, transportation costs, reliability of inventory movement, lead times, inventory levels and most importantly service level

requirement to meet the customer experience. Several mathematical models are available in the market to guide with this process. Companies such as Blue Yonder, Kinaxis, Oracle, Manhattan Associates etc. have developed optimization modules that can be leveraged if standard out of the box implementations are preferred instead of a custom solution. The service level agreements for each echelon to determine the desired level of customer service should be established and inventory allocated based on the priority of customer orders and adherence to SLAs. The factors such as demand variability, lead time variability, and supply variability help determine how much safety stock you want to carry. Based on the targeted service levels at each node and trade of between out of stock risk, inventory holding cost and customer experience impact, your model would recommend how much inventory you want to carry and at what node in the network. A standard formula is shown below.

where

σ_{LT} = standard deviation of lead time

D_{avg} = average demand

PC = total lead time

T1 = time increment used for calculating standard deviation of demand
 σ_D = standard deviation of demand

This model could be further enhanced to utilize dynamic safety stock strategies based on real time demand and supply conditions. In real world, this means the model identifies the amount of inventory you want to carry at a particular location and anything above that quantity is not worth to invest on because you could mitigate that risk of out of stock by some other means such as inventory transfers or buying from distributors and still sit with minimal negative customer experience.

Similar to external collaborative practices, a buttoned-up process for internal collaboration and information sharing among the different echelons of the network is critical. Allocate more inventory to critical and high-value items, while optimizing the allocation for lower-priority products. To support this cause, advanced inventory management systems that integrate with other supply chain technologies that provide additional data points such as POS data, impressions, buying frequency / pattern etc. play an important role. Organizations could evaluate implementing the right inventory management systems or enhance their existing ones and utilize real-time data and analytics to make informed decisions about inventory allocation. Effective inventory allocation in a multi-echelon network requires a combination of strategic planning, technology utilization, and collaboration among supply chain partners.

By employing these strategies, organizations can enhance their ability to meet customer demand efficiently while minimizing excess inventory and associated costs.

III. SUPPLIER RELIABILITY

Dependence on external suppliers introduces risks related to reliability. Delays, quality issues, or sudden changes in supplier capabilities can disrupt the entire supply chain. Establishing strong relationships with reliable suppliers and implementing contingency plans are crucial to mitigating these risks. Negotiating the terms to deliver product at the right channel and keeping up with performance metrics such as OTIF (On time and in Full) is critical for omnichannel supply chain. Partner with Supplier to own shrink and explore possibilities of Vendor-Managed Inventory (VMI) to give more control and responsibility for the Suppliers in contributing towards your organization's In-stock. Additionally, ensure the right level of data sharing with the Suppliers, and maintain regular touch points to set expectations and communicate their past performance against goals. There should be ample focus on reducing lead times and increasing delivery frequency as applicable, to implement strategies such as JIT (Just in time) and streamline processes. For example, the organization could consider investing in vendor holding safety stock for them with a contractual commitment to buy out after a set period of time. Over years, organizations have tried and tested various such mechanisms depending on products, industry, volume etc. to minimize fluctuations in supply and enhance reliability.

IV TRANSPORTATION BOTTLENECKS

Efficient transportation is critical for timely inbound inventory management. Transportation bottlenecks, whether due to infrastructure limitations or geopolitical factors, can result in delays and increased costs. Organizations need to devise flexible transportation strategies and diversify their transport modes to address these challenges. Limited contracted routes or lack of frequent route can cause hindrance moving inventory to the right place. Running cost benefit analysis on where to invest on routes Vs. where to leverage Distributors or vendors to deliver directly to your warehouse based on the volume serviced, could help minimize costs. This can be continuously evaluated to eventually move to lower cost model without compromising customer experience. Pre-negotiated rates and volumes may not always help to have shipments on time. For example, ocean freight traffic right after Chinese New Year or post COVID in general, demands the organization to be proactive and plan and secure their containers much ahead of time. Implementation of Transportation Management Systems (TMS) could help with standardizing processes, streamline data and coordinating with carrier and suppliers. Creating an open channel of communication and the ability to adapt to changes is the key here and the right tool or TMS systems could help there. For example, if the carrier could not deliver on the scheduled appointment time due to an unforeseen issue, there should be a mechanism for the organization to prioritize the rescheduling process and coordinate with the carrier to bring in

the load at the next available slot, depending on the urgency levels for the products in that load.

V. WAREHOUSE SPACE CONSTRAINTS

Managing warehouse capacity effectively is crucial for the smooth operation of supply chains and fulfillment processes. Inefficient use of available space can lead to wasted resources. Identifying and maximizing storage capacity is crucial. Similarly, over-utilization or packing warehouses too densely can lead to operational inefficiencies, making it difficult to locate and retrieve items. Limited warehouse space can impede efficient inbound inventory management. As businesses expand, the need for additional storage space becomes critical. Below are some of the strategies in the right direction to improve warehouse efficiencies and there by tighten up inbounding.

1. Standardization of processes, implementation of 5s, applying lean principles to eliminate waste in the inbound process, such as unnecessary handling, excess inventory, and over processing, minimizing waste etc.
2. Establish key performance indicators (KPIs) to measure and track the efficiency of inbound processes. The KPIs may be custom depending on the nature of the business and its unique needs. It is paramount to identify what metrics are most critical for the business and establish the goals and track the progress.
3. Build strong relationships with suppliers and communicate regularly to streamline processes. Establish the compliance requirements, set up chargebacks and check-ins with key vendors to improve performance. Conduct quality checks at the receiving dock and implement quality control procedures to identify and address issues early, minimize returns and ensure overall product quality. Identify possibilities to implement Vendor Managed Inventory (VMI) systems to allow suppliers to manage stock levels.
4. Set up a strong S&OP planning process and align with internal stakeholders on the S&OP (Sales and Operations Planning) the plan. Necessary steps can be taken to lock the plan inside of a set period and process stood up to minimize deviation from the locked in plan
5. Utilize right forecasting process to predict the demand, keep the I/O ratio close to 1 and implement advanced planning systems to optimize inbound schedules and minimize delays. Demand Forecasting for slow movers and seasonal products could be challenging and hence the inventory space allocation, ordering and receiving strategies should be unique to this category.
6. Identify the best flow mechanism - push vs. pull (Cross-dock Vs. slotting) for the various products or categories. Cross-

docking help to move goods directly from receiving to shipping without storage, reducing handling and storage costs. Additionally, optimize warehouse layout and slotting to reduce travel time for picking and put-away processes. Place fast-moving items closer to the shipping area for quicker access.

The dock scheduling could be improved with feedback from carriers / vendors to avoid bottlenecks. Cross training of associates to handle various tasks help improve flexibility and manage peak traffic.

7. Identify opportunities for carrier routes and schedule optimization. If the organization hold better negotiated rates and reliable performance on collect (use own carriers to collect from vendor facility), estimate which vendors / routes has a better trade off in owning the inbound shipping. Maximize the efficiencies enhancing the capabilities of TMS (Transportation Management System)

8. Implementing intelligent warehouse management systems and optimizing storage layouts can help address space constraints.

9. Foster a culture of continuous improvement and encourage feedback from employees on process enhancements. Regularly analyze performance data to identify areas for improvement.

By implementing these strategies, a warehouse can enhance its inbound operations, reduce costs, and improve overall efficiency, contributing to a more responsive and customer-focused supply chain.

VI. LABOR PLANNING

This is a critical piece especially during peak season planning. Insufficient labor can result in product not received in (NYR - Not yet received) clogging the dock space and thus making the product not available for outbound shipment to the customers.

As noted in the earlier section, a strong S&OP plan and adherence to the plan is key to plan the labor. For example, you may get product delivered to your dock, but it may not be available to ship out to your customers if they are no received and stowed away. Additionally, if the dock space is clogged, you may end up refusing delivery from vendors due to lack of space at the dock.

This could result in negative vendor experience, hit your sales as well as create bad taste with your customers. The labor planning should be complemented effectively with supplier compliance on delivery performance. Top offending vendors need to be identified and mechanisms should be put in place to improve their performance to adhere to the plan.

VII. INVENTORY VISIBILITY

Lack of real-time visibility into the supply chain can hinder effective decision-making. Organizations may struggle to track the movement of inventory, leading to inefficiencies and increased lead times. This may subsequently lead to holding more safety stock and potential shrink. Partnership with vendors to obtain information on the inbound units at every stage of the purchase order life cycle could be a reasonable first step. Investing in systems and tools and providing incentives for the vendor partners to adopt the same may be required here.

The goal is to receive information with accuracy on how many units can the vendor partnership which is tracked through various stages such as PO confirmation or EDI 855), Advance Shipment Notice (ASN) or EDI 856 and finally at receipt. Implementing advanced tracking technologies and information-sharing platforms can enhance visibility and facilitate better decision-making.

Once the first step above is realized, the organization could focus on how to utilize this information to better plan for inventory inbound, storage and outbound, in other words inventory optimization.

Maintaining real-time visibility into inventory across multiple channels and locations can be complex. Implementing robust inventory tracking systems and invest in technology that provides a unified view of stock levels could help to a certain extend. Utilize tracking and monitoring tools to provide real-time visibility into inbound shipments. Implement alerts and notifications for exceptions or delays in the inbound process.

VIII. REGULATORY COMPLIANCE

Adhering to complex and evolving regulations is a significant challenge in inbound inventory management. Different regions may have diverse compliance requirements, and failure to comply can result in delays and penalties. Organizations must stay informed about relevant regulations and invest in systems that ensure compliance.

V. CONCLUSION

Omnichannel inventory management presents a multitude of challenges for retail businesses, but with strategic planning and the right technology solutions, these challenges can be transformed into opportunities for growth and improved customer satisfaction. Inbound inventory management remains a complex and challenging aspect of supply chain operations. By taking proactive measures and strategies at each node in the inventory flow as outlined in this article, businesses can

enhance their resilience, reduce costs, minimize risks and ensure a smooth and efficient flow of materials through the supply chain, ultimately contributing to overall organizational success

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