TATA CONSULTANCY SERVICES

Building on belief

Real time inventory visibility and reporting - An architectural view

Abstract

The increasing shift in consumer behavior and high standards of service expectations have challenged retail brands to reinvent themselves in order to differentiate their label and stay competitive. As per IDC Retail Market Research 2020 reports, inventory visibility and accuracy is one of the top five priorities of global retailers[1]. About 40% of the retailers interviewed were willing to increase their investment in applications for real-time inventory tracking and reporting within the next 12 to 18 months. Many retailers have already invested in modernizing their retail inventory management to access real-time data across all sales channels.

An omnichannel customer experience with real-time visibility into inventory will help drive seamless customer experience and service delivery across sales channels, thus building consumer confidence in the brand. However, for this to happen, visibility into real-time inventory data from point-of-distribution to point-of-sales is a critical parameter, helping brands achieve optimal stocking, maximize operational output and drive superior financial outcomes. This paper explores some of the challenges impacting seamless omnichannel experiences and provides a modern real-time inventory visibility framework with an overarching architecture that can provide a single pane view of inventory across the supply chain.

The rise of the omnichannel experience and the need for an integrated data network

For online retailers, inventory management is an integral part of customer experience. According to UPS Pulse of the online shopper survey, over 28% of online shoppers abandon their cart if one or more items are not in stock.[2] Real-time inventory data could significantly reduce cart abandonment rate to retain a loyal and happy customer base. Transparency in real-time stock positions often motivates reluctant customers to make the purchase when they find that there is limited stock of the item left with the retailer.

The success of the omnichannel business model depends on implementation of an effective real time inventory management system with reliable models to predict supply-demand accurately. Real-time inventory management consolidates stock positions across multiple channels and provides a single-pane-view of the total inventory at any given time. This critical insight enables retailers to

[1] Increasing Investment to Deliver Supply Chain Visibility an Imperative for Manufacturers in Asia/Pacific*, IDC Reports; (July 23, 2020), accessed May 18, 2021 https://www.idc.com/getdoc.jsp?containerId=prAP46727220;

[2] UPS Pulse of the Online Shopper™ Report (July 2019), accessed July 2021, https://solutions.ups.com/UPS-pulse-of-the-online-shopper-2019-LP.html?WT.mc_id=PRESSRELEASE_PRESSROOM_POTOS_STUDY_073019

identify bottlenecks and limitations and optimize their supply chain network accordingly. The rich data from inventory monitoring applications also empowers retailers with deep insights on critical aspects impacting business. This includes visibility into products that are in high demand, seasonal sales spikes of specific items and also slow-moving items, helping retailers plan their pricing and promotional strategies.

For a seamless omnichannel service experience, retailers must establish a well-connected network of suppliers and partners with complete data transparency across the value-chain as illustrated in Figure 1. By building a connected data network with manufacturers and the wider partner ecosystem and working through a reliable e2e exchange, retailers can effectively plan stock replenishment frequency, distribution, and logistics based on supply and demand of items. Further, retailers must also implement a framework to monitor, alert and provide visibility to internal stakeholders on inventory movement. Implementing real-time data integration and consolidation across various internal sources is critical for a holistic transformation of the brand that is driven by reliable data-led decisions.

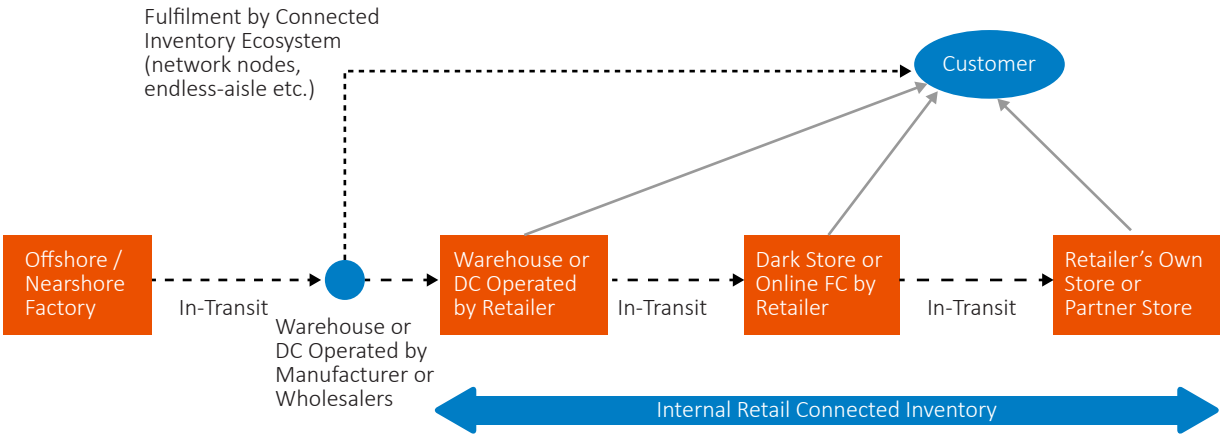

Figure 1: A Well-Connected Inventory Ecosystem

Common challenges and limitations in inventory management

For retailers, synchronizing data on real-time inventory positions across multiple digital and physical channels for a consolidated view can be challenging as stakeholders in the supply chain use disparate platforms that caters to their specific needs. Typical enterprise resource planning (ERP) platforms have limited scope for integration of inventory across multiple points in real-time, for a unified view. Although other platforms such as order management systems (OMS) are used to incorporate live feeds across multiple systems including ERPs, point-of-sale (POS) systems, warehouse management systems and other e-commerce platforms, they are not built to simultaneously relate data across the network, providing a single-pane-view of the inventory positions across locations in real-time. Commonly, revamping legacy ERPs or OMS would be a time consuming and costly affair for both business and IT. Also, there are many micro inventory lifecycle events (add online cart, removed from the cart, reserved, in-transit) that impact the architecture.

Another key challenge for retailers is product data harmonization across the value chain to build a connected inventory framework within the retail industry ecosystem that includes the

manufacturers, wholesalers, partners and retailers. All the stakeholders in the value chain must develop and maintain a normalized item master data to fulfil customers' orders at anytime from anywhere.

To enable real-time visibility of inventory positions and data transparency to drive meaningful insights, it is crucial to develop a separate application that tracks inventory transactions across different channels and service points. A modern real-time inventory visibility framework with an overarching architecture (see Figure 2) considers both OMS and other similar sources with capacity for big batch processing.

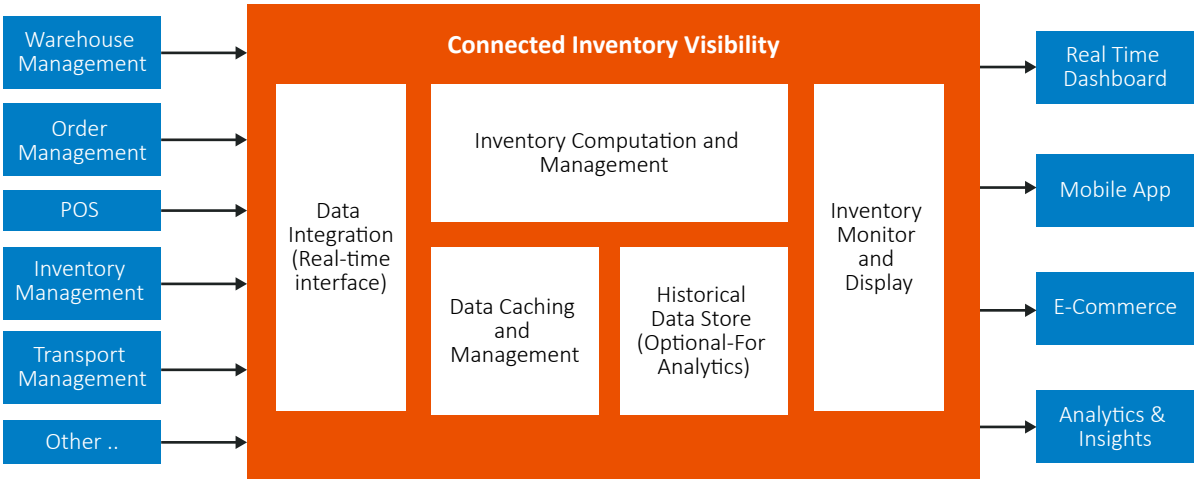

Figure 2: Logical Architectural view

An integrated inventory management framework - An architectural view

The proposed solution with an overarching architecture (as shown in Figure 2) considers not only OMS but other requisite sources with the ability to support both big batch processing to deliver a modern, real-time inventory visibility framework. The architecture can leverage public cloud infrastructure with modern digital technologies including microservices/API, low latency/in-memory database and a real-time dashboarding framework to support the desired flexibility.

The robust architectural design will ideally comprise a data integration hub that uses event streaming tools to ingest data from a wide range of systems and convert into a canonical inventory data structure. This inventory structure consists of limited set of input elements such as item quantity, nodes per store, and type of event with in-memory database that can be used to ensure that inventory information is up to date, readily accessible, and actionable. The microservice layer can be leveraged to take the inventory availability request through an API management layer from the internal planners, floor personnel, and customers through a mobile app or e-commerce site and look cache for inventory and response back.

For real-time insights and alerts on inventory positions, we recommend implementing a front-end portal with data visualization tools that is accessible via smartphones and tablets. This well-designed architecture will also enable retailers to effectively manage granular level data in real-time, for faster, efficient and cost-effective processing.

The application can provide an integrated view and data-driven insights for greater analytics based on the master and transactional data elements captured from multiple sources. Near real-time inventory visibility will enable effective supply and demand planning to manage stock with-in and across organizations. Insights on inventory will help the team take proactive measures to avoid over or under stocking in stores, distribution centers and fulfilment centers. It will also provide an accurate view of stock valuation against sales projections.

Omnichannel is not just better CX - It is a new mindset

The present situation caused by the pandemic has brought about a paradigm shift in the consumers' buying behavior. However, the right architecture and applications will help retailers not just survive but thrive even in these unreal and vastly different times. A connected inventory database with complete real-time visibility on inventory positions can be a game-changer for retailers who want to stay competitive and offer superior customer experiences. Leveraging modern architecture with digital technologies in a public cloud environment is key to delivering inventory at high speed with higher efficiency and scalability at competitive prices.

About the author

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Abhijit has more than 20 years of experience in TCS and of which 19 years is in the data and analytics space. He is engaged in multiple architecture consulting roles across geographies, implementing large end-to-end BI solutions, complex architecture in retail digital transformations including real-time data integration and analytics.

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