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Omnichannel Supply Chain - OMS to WMS

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Abstract:- The omnichannel supply chain strategy is an emerging trend in the retail sector that coordinates the process and digital technologies across sales and supply channels. The operation of the omnichannel supply chain strategy has been improved greatly by the outbreak of the pandemic. The research project explains the importance of omnichannel strategy during times of pandemic. The OMS model's adoption as an omnichannel supply chain strategy eases the distribution of essential services during the COVID-19 period. As we discussed the importance of omnichannel strategy, key omnichannel strategies were identified, discussed in detail. The retailers and the companies should ensure that they adhered to the key omnichannel strategies to improve customer experience and loyalty. The key strategies discussed in the research include; boosting customer loyalty using different touchpoints, scaling on customers' demands to meet their habits and preference, and maintaining sales by operating front stores. The capabilities require to be implemented as the omnichannel supply chain strategies are discussed. A firm with dynamic capabilities from production through client delivery can exploit performance despite changes in demand. The proposed capabilities to make omnichannel are discussed broadly in their logical groups. The following are proposed capabilities discussed in the research project; information system (IS), inventory management system (IMS), order management system (OMS), enterprise data management (EDI), and warehouse management system (WMS). Also, a cloud-based microservice technology framework that needs to implement omnichannel supply chain capabilities is discussed. A technical architecture framework diagram of microservice is covered. The research ends with precise conclusions and closing statements about the future of omnichannel supply chain strategy.

Keywords:- *Omnichannel supply chain, capabilities, microservices, enterprise data management, warehouse management system, order management system, pandemic times, and supply channels.*

I. INTRODUCTION

The omnichannel supply chain is a famous strategic plan in a new retailing century that is enhanced by rapid advancement in technology and the high rate of technology systems in supply and production industries. Also, the popularity of the Omni-channel supply chain has been enhanced by frequent use of social media, digitalization, and the emerging efficient technologies such as Virtual reality (VR), artificial intelligence (AI), use of bitcoins and blockchain, and augmented reality (AR); they have help in transforming supply chain business model globally. E-commerce was utilized as a strategic approach for the supply chain in the 1990s; the omnichannel supply chain is the best supply strategy in the current world dominated by technology (Armstrong, 2016). Adopting the Omni-channel supply chain strategy, which has evolved from OMS to WMS, has made the marketplace more fragmented and competitive niche-oriented; thus, this rapid change in the market sector has a significant influence on the supply chain and the business. In this age of uncertainty and rapid advancement in technology, a thoughtful and robust shipment forecast will help anchor the business and enhance the impacts the supply has on the business. Therefore, in modern business, the Omni-channel supply chain reflects the current culture or norm where customers buy goods in stores, phones, and the web using apps such as Amazon to order goods (Vaidyanathan, 2020). The access to an effective and efficient Omni-channel supply chain is a strong Order Management Software (OMS), which can create inventory locations accessible to offline and online clients and identify which inventory location to accomplish an order from its more reliable. The research will address the importance of the Omni-channel supply chain during the coronavirus pandemic period. Omni-channel capabilities, microservice cloud-centric technology models present a diagram of micro-services and finalize with a conclusion.

II. IMPORTANCE OF OMNI-CHANNEL SUPPLY CHAIN DURING THE TIME OF PANDEMIC

The omnichannel supply chain has played a significant role during COVID 19 pandemic period since it helps deliver goods and services to clients into their doorsteps hence helps curb the spread of the virus (Ivanov, 2020). Through omnichannel strategy, customer-focused shopping approaches were developed, which enhances customer's experience demands. Thus, the omnichannel supply chain approach emphasizes industries' importance to enhance clients' experience during pandemics. Thus, to curb the spread of COVID-19, the omnichannel supply chain strategy enables clients to shop through any pick-up store and channels. The strategy ensures that the products are delivered on time to other location-based to the customer's specifications. Omnichannel supply chain strategy plays a key role during the pandemic time since the shipper customizes the shopping experience to fit person-specific prospects (Vaidyanathan, 2020). The adoption of order management software (OMS) has enabled the industries to meet the client's demands and deliver goods and services at the appropriate time. Thus, warehouse managers' best strategy to approach inventory management relies on understanding the appropriate time customers will order the product, how faster they need to be delivered, and the type of products they will order. Therefore, defining these

parameters in inventory forecasting shapes personalized capabilities, meeting customer's basic demands.

During the pandemic period, the economy had declined, and money circulation in the economy was relatively low; thus, omnichannel supply chain strategy plays an important role by enabling the shoppers to consider better pricing of products with high quality and added savings since the Delivery Cost was relatively lowered due to the outbreak of coronavirus. Notably, the Omni-channel supply chain approach relies on efficiency throughout all supply chain agents; price points should reduce (Ivanov, 2020). This leads to more purchases despite the pandemic's impacts on the economy and enhanced competition and higher savings supply chain management, thus improving business operation. Long queues were witnessed outside essential services when the COVID-19 outbreak was announced to be a global crisis and possible lockdowns across countries to curb the virus's spread. The pandemic strained existing supply chains and shifted customer purchase patterns; thus, it disconnects demand-supply requirements, but the OMS model's adoption as an Omni-channel supply chain strategy ease the distribution of essential services during the COVID-19 period (Vaidyanathan, 2020). The importance of omnichannel supply strategies had not been felt before like, during the pandemic time, since the current situation has genuinely brought to priority the interdependency and interconnectivity in each aspect of lives as we face the novel coronavirus. The impacts of coronavirus pandemic had not been experienced before in the omnichannel supply chain strategy. Omni-channel strategy in the COVID-19 era creates an efficient and dependent global supply chain that meets consumers' demands in the current business environment. It has led to a skewed focus on the cost mitigation and just-in-time deliverables of goods and services to clients and meeting customers' demands during the pandemic period.

Coronavirus pandemic has positioned to bear the weaknesses in such omnichannel supply chains and underscored how important supply chain strategies are to people and the worldwide economy in curbing the spread of COVID-19 (Ivanov, 2020). At the commencement of lockdown in most countries such as Italy, Germany, Spain, India, and the US, demand surged for essential services and products. Some organizations scrambled for raw materials and suppliers while others were utterly stagnated, but omnichannel strategy should have helped correct this mess globally. Shipping patterns and consumer behavior during pandemics undergo some transformation to fit new requirements such as WHO coronavirus protocol like social distance and sanitizing to mitigate the pandemic's spread. Omni-channel changes clients' purchasing patterns during the pandemic period, where customers' perspectives replaced in-person shopping online activities using online platforms (Vaidyanathan, 2020). Omni-channel has a significant role in-home delivery of products, such as new fulfillment techniques like contactless pick up from stores after making an order using OMS, which has become the new norm due to the pandemic. Thus, enhancing consumer-driven shift due to advances in technologies enables retailers to optimize online privileges in the most effective, efficient, and cost-effective manner at the pandemic era, thus allowing them to get their products and services at the appropriate time and fair prices.

Also, understand well the enterprise data interface (EDI) is of great significance during the pandemic time since it enables the organization and customers to know the capacities under several operating scenarios and the conforming ability to manage downstream and upstream supply chain operations as a key element in ensuring the survivability of an organization in the COVID-19 world. The importance of Omni-channel supply chain strategies has successfully ensured they accomplish the order placed by clients with the use of advancements in robotics and automation, which has enhanced product delivery during the coronavirus pandemic period (Cai, and Lo, 2020). This has led to the adoption of an individual unit processing at distribution center, integral section of warehouse management systems (WMS). As lockdown restrictions get eased globally, social distancing rule was already in place in retail stores. Thus, effective Omni-channel supply chain strategies and hybrid fulfillment techniques will help propel the retail business industry and help retailers and clients adopt any emerging health crisis in the future.

Notably, the impacts of the novel coronavirus globally have made most retail entrepreneurs, lagged in venturing into a long-term Omni-channel strategy despite its significant importance in this pandemic time, the fact that omnichannel strategy experiences drive fundamental high customer retention. These unprecedented times of COVID-19 have set substantial stress on business retail. As e-commerce emerges essentially within the supply chain, this has led to the rapid adoption of omnichannel strategies. People are advised to adhere to the social distancing protocol of curbing the spread of coronavirus globally and restricted travel. Omnichannel supply chain strategy has become a survival device during pandemic times for handling unexpected spikes and pivots in demand for goods and services by the clients. Therefore, the successful implementation of omnichannel strategies during the COVID-19 pandemic era has helped retailers be prepared for a post-COVID-19 world and the "current new normal" in the supply chain sector. Thus to mitigate the impacts of coronavirus in the supply chain, three key omnichannel strategies should be adopted by the retailers, which are discussed below;

- *Boosting Clients loyalty through several Touchpoints*

During the pandemic periods, there is an alarming desire for exceptional client service in approaches that are easily accessible to all clients globally. Thus, utilizing omnichannel supply chain strategies as customer care solutions, industry retailers must attain the individual they support for those channels to feel more comfortable using social media (Sean, 2020). Giving clients more privileges to connect with the brand enables more convenient solutions in approaches that the consumer prefers to connect, leading to a positive client experienced and enhanced loyalty.

Omnichannel supply chain strategy is an essential initiative for the clients and retailers during a pandemic. Retailers should prepare for unforeseen health issues and evolving client habits in the COVID-19 era. Therefore, the most effective omnichannel strategy will enable clients to enjoy improved customer service and diversity in delivery options. The business retailers will be able to upheld sales and drive ROI through exclusive delivery strategies at the pandemic time. Coronavirus times establish opportunities for business retailers in the supply chain sector that are forward-thinking, and omnichannel strategy and e-commerce will penetrate significantly at the post-COVID time as clients become more confident and comfortable in the purchasing experience.

- *Scaling on Customer's Demand to meet Varying Buying Habits*

In the pandemic times, consumers' purchasing habits have changed, and omnichannel strategies have been customized to fit their habits in this COVID-19 era. Therefore, to prepare for unpredicted spikes in demand, business retailers rely on omnichannel supply chain technology for better inventory management and order routing. The adoption of the order management system (OMS) has in the delivery of products since it can help retailers stay flexible, turning off and on fulfillment area to drive products where demand is greater to effectively and efficiently attain client's expectations. Therefore, it's key for business retailers who seek to scale up their omnichannel capabilities to adopt a multi-node distribution approach. The multi-node distribution approach in the supply chain ensures that inventory can be more easily accessible and closer to the client to decrease shipping times while enhancing contingency planning (Cai, and Lo, 2020). The multi-customer fulfillment center can help retailers scale up omnichannel operations faster than before the COVID-19 outbreak. Thus, the business retailers who invest in multi-node centers and omnichannel supply chain technology to help with inventory management will successfully handle sudden variation to e-commerce orders and flourish during the turbulent times of coronavirus pandemic.

- *Maintaining Sales of Products by Running Storefronts Shops such as Fulfillment Centers*

Since the outbreak of COVID-19 as a global crisis, the number of orders made online and picked-up at brick-and-mortar stores by clients increased by 208% from March 2020 as compared to the previous year (Sean, 2020). Thus, when business retailers invest in omnichannel supply chain strategies such as Buy-online-pick-in-store (BOPIS) and BOPAC (buy-online-pick-at-curb), they ensure a safe transaction during pandemic times and giving shoppers instant gratification and products/services in-hand immediately. This leads to a positive client experience and enhanced customer loyalty, which will last well beyond the coronavirus pandemic impacts. Engaging storefront employees in an omnichannel supply chain strategy adds a significant new layer of responsibility to the associate functions and adds new value to the retail business workplace. It continues to maintain sales of products. Hence, the retailer should create a space within the store to accomplish orders while adhering to proper social distancing protocols of curbing the spread of COVID 19.

III. KEY COMPONENTS TO MAKE THEM OMNICHANNEL

Omnichannel capabilities is a cross-channel gratified strategy that firms use to enhance their customer's experience and drive better rapport with their clients across contact points in the supply chain process. The omnichannel supply chain is client acquisition, revenue growth, and retention tool if the organization is optimized to drive clients' service levels, experience, and convenience (Vaidyanathan, 2020). Thus, firms that have treated their supply chain strategies as innovation centers and make significant investments will enhance service levels and mitigate production costs (Cai, and Lo, 2020). Therefore, the notion of establishing a supply chain strategy to meet peak demand in the COVID-19 era and control it down at the off-peak season is not a sustainable strategy; hence the organization should implement effective omnichannel capabilities. An organization with dynamic capabilities from the production sector through client delivery has the nimbleness to maximize performance despite demand. The COVID-19 pandemic has interfered with the omnichannel supply chain strategy for several retailers, and their ability to effectively connect with clients and execute orders successfully was greatly influenced. Hence there is a need to implement effective and competent capabilities such as inventory management system (IMS), order management system (OMS), enterprise data interface (EDI), and warehouse management system (WMS). Organizations with competent and effective IMS and OMS capabilities will utilize statistical modeling and AI (artificial intelligence) to forecast sourcing and inventory desires. More so, dynamic WMS and EDI enabled retailers to address faster distribution center carrier and closure interruptions by seamlessly moving customers' orders within their delivery network. Thus, the following capabilities are proposed to be implemented to make them omnichannel, which enhances customers experience and loyalty;

- *Information System (IS)*

Information system (IS) for omnichannel capabilities relates to the company's resource-based view (RBV). Thus, the firms possess resources allowing them to establish competitive advantage and long-term product delivery performance. Information system capability helps reconfigure and adapt competencies such as operational capabilities during times of pandemic. The adoption of the IS capabilities domain of omnichannel retail is defined as retailers' ability to integrate, assemble and deploy information system resources to meet clients' desires and give a seamless experience across all supply chain channels (Hosseini et al., 2017). The capability framework for an information system (IS) allows business process change by separating seizing, sensing, and transformational capabilities.

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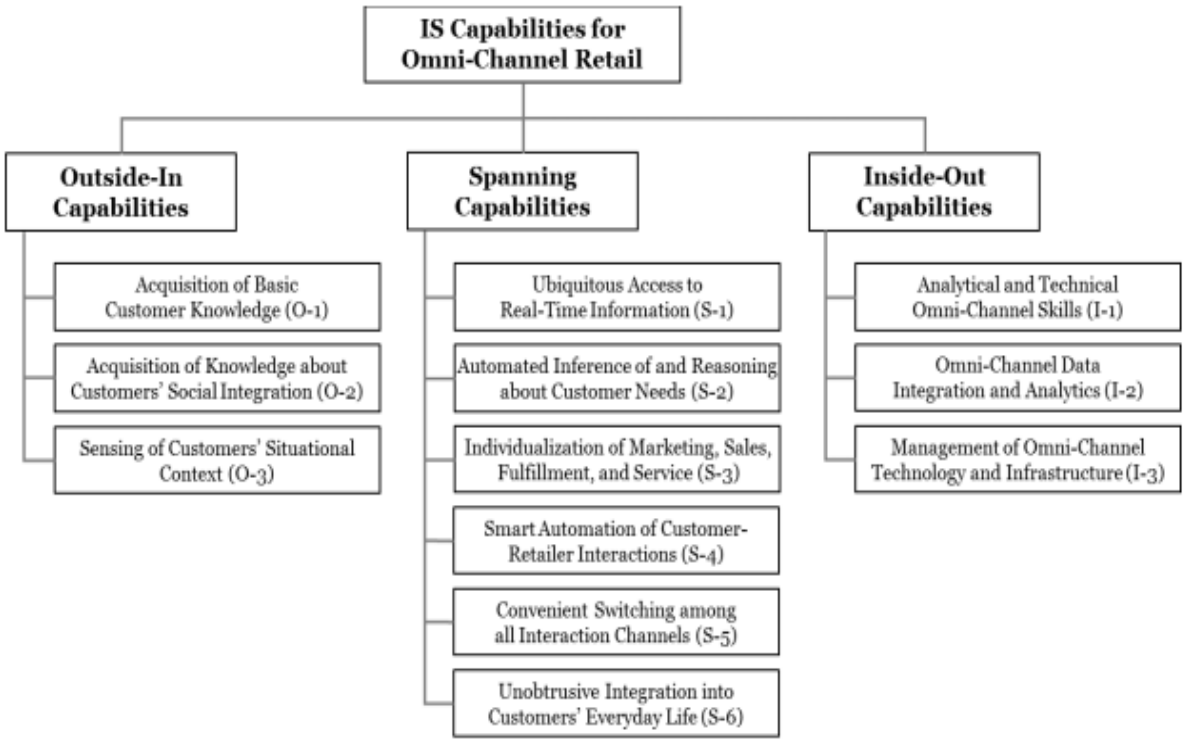

Fig 1:- information system (IS) capabilities for omnichannel (Hosseini et al., 2017).

An information system capability is categorized as outside-in, inside-out, and spanning capabilities. Inside-out capabilities are internally concentrated and established in response to market necessities like information system technical skills. On the other hand, outside-in capabilities are externally focused and oriented on market requirements and understanding competitors like external relationships management (Hosseini et al., 2017). Also, spanning capabilities that entail information system partnerships are essential when combined with outside-in and inside-out capabilities to ensure that effective electronic marketplaces are developed.

➢ *Inventory Management System (IMS)*

The omnichannel inventory management system (IMS) manages the entire inventory across all supply chain channels used to sell products, such as brick and mortar stores, social media, and online store channels. An IMS is an essential tool that enables retailers and firms to track products across their supply chain. It optimizes the whole spectrum spanning from clients order placement with vendors to order fulfillment through delivery to clients; thus, it maps the entire product journey. The inventory management system is a competent omnichannel capability that facilitates taking inventory of products in stocks since it has a software platform. The systems make inventory for products' movement among diverse stocks, outflows, and inflows of materials (Yosan et al., 2018). The system is flexible in terms of information capture technology enabling the use of optical collectors. With a successfully implemented IMS, the inventory process is faster and intuitive due to its implementation with web and mobile access. The system is entirely housed in the electronic cloud framework, enabling inventory tasks offline or online with succeeding synchronization when the internet is accessible. The inventory management system is made up of three modules that enhance operations in the supply chain, which includes;

- IMS Capture
- IMS Portal
- IMS Middleware

We live in a nation driven by the omnichannel business model; thus, investing in the right software to control an omnichannel strategy is critical. IMS plays a vital role in omnichannel supply chain strategy since it gives inventory wherever retailers' clients are, but most of the task is executed on the backend. The multichannel system shifts require effective omnichannel IMS to assign inventory for a new buying avenue and enhance inventory visibility for its customers. The following are barriers to omnichannel inventory management system;

1. Segmented supply chain processes
2. Lack of inventory visibility
3. Order accuracy
4. Massive inventory storage cost
5. Order tracking
6. Technology

➢ *Order Management System (OMS)*

Order management systems (OMS) help firms and retailers organize and streamline the order fulfillment procedure across the omnichannel supply chain strategy (Ratica, 2019). OMS integration brings all disparate systems together and develops flexible, progressive systems that help companies and retailers compete with the industry's Big Box giants. An OMS is more than an emailed order form. When a client shops, during checkout and shipping, information is

gathered when they use in-store or online apps and critically analyzed. The information will enable the retailers to identify the goods clients preferred and how they like to be served. For instance, a customer utilizing online sites or apps for shopping may activate notifications in the order management system when they place an item in the online shopping cart. This is the beginning of the entire process of OMS since it demonstrates to the retailers that clients are interested in specific products. When the customer place an order, a corresponding set of activities happens within the OMS system, triggering a pick ticket, carrier choice, and payment mode.

Order management system (OMS) is very important to omnichannel supply chain strategy. The data gathered using OMS system capability is mainly used for marketing purposes. Omnichannel supply chain strategy helps retailers to ensure that they have every product, anytime is available across all supply chain channels. Warehouse managers and retailers require an effective OMS system that can track the entire information needed and maintain the most crucial details such as price points, abandoned carts, and inventory demand relevant to the business and clients. If the customers abandoned the cart, it might imply that the clients do not like the available shipping options (Druehl et al., 2018). An order management system (OMS) provides significant benefits to retailers and companies, which are very important to omnichannel supply chain strategy, which includes the following;

- Complete entire essential compliance paperwork and preserve documentation
- The ability to control, execute and allocate orders across all assets
- Track and report services and product cycles and variations in demand
- Use real-time reporting of order-influencing factors such as unfavorable weather to ensure clients get the products they want at the appropriate time.
- Accomplish logistics processes such as carrier selections: freight auditing and payment completion.

Supply chain channels such as brick and mortar and online apps in-stores should give the same brand and customer experience. Omnichannel order management system capability helps retailers make sure that client purchases are effectively and efficiently handled with care, prepared for pick-up, and delivered on time. OMS assists retailers in making their business boom in the omnichannel space. An omnichannel OMS has a significant influence on the business operation if it is not the right solution to its existing challenges. Also, OMS can have negative or positive impacts based on the resolution the retailers and the organization selected. Therefore a solid omnichannel OMS solution must have an intelligent and flexible order routing. The organizational capabilities that are to be implemented to omnichannel should not limit the company's and retailers' supply chain options.

➢ *Enterprise Data Interface (EDI)*

An enterprise data interface (EDI) ensures a successful omnichannel retailing that thrives on the integration of entire processes and seamless connection at the clients' contact points and in the backend systems, hence enhancing customer loyalty. Thus, retailer and business entrepreneurs should eradicate their offline and online silos for data storage and synchronize disseminated information across the entire supply chain channels, devices, and systems. At the pandemic period, the retailers should connect existing, complex information technology landscapes in an approach that similar information in real-time for entire touchpoints and systems, improving the operation of omnichannel in the supply chain sector. EDI assists in synchronizing products, customers, inventory, and sales data in real-time, irrespective of their points in smart stores, in the web shop, warehouse, and on e-commerce platforms. EDI ensures that there are a maximized process and a seamless client journey in the omnichannel supply chain.

➢ *Warehouse Management System (WMS)*

Warehouse management system (WMS) facilitates recording inventory and effectively locate products for onward assembly or shipping. WMS implementation for omnichannel supply chain strategies enhances retailers and companies' warehouse efficiency and enables a smoother operation from inbound to outbound operations. WMS is a software solution that provides visibility into a business's entire inventory and controls supply chain, orders fulfillment operations from the distribution center to the in-store shelf. In the current dynamic capabilities, omnichannel supply chain strategy, and order fulfillment, retailers must respond faster with WMS software, which maximizes fulfillment capabilities.

➢ *Benefits of Cloud-based Warehouse management system (WMS)*

The modernization of the internet of things (IoT) and technology have transformed how customers make purchases of their products and enhance omnichannel strategy, hence interfering with supply markets, add complexity to the supply chain channel and alter customer purchasing patterns. Moving WMS capabilities to the cloud enable the retailers to meet the connected consumer with linked fulfillment solutions that provide real-time scalability, visibility, and market reactivity. The following are benefits gained by the retailers when WMS capability is moved to cloud-centric technology;

Rapid implementation: Thus, to stay competitive in the new order fulfillment economy, retailers should adapt quickly to WMS's omnichannel capabilities. With a cloud-based WMS system, retailers and companies will ramp up their supply chain systems quickly.

Lower upfront costs: cloud-based solutions capabilities have an almost instant return on investment and a relatively lower total cost of ownership. An organization with on-premises warehouse management could easily have paid for many customizations and adjustments over a five-year time.

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Flexibility and scalability: In modern days, global market demands have rapidly increased; thus, a cloud-based WMS solution provides the retailers with the scalability to faster expand their supply chain operations to attain varying market conditions. Hence, business agility is for the retailer without paying an on-premises price.

Seamless integration: cloud-based WMS is established for integration. These integration points are easily leveraged by measurable handling of product vendors to establish integrations for automates warehouses, which help improve the supply chain (Calatayud et al., 2019).

➢ *Impacts of WMS in Omnichannel Supply Chain Strategy*

Without a well-designed warehouse management system, a company might suffer and experience failure in several areas with inefficient procedures influencing business operations and supply chain down the line. Therefore, to fully maximize supply chain and successfully attain client's expectations regarding product quality, delivery, consistency, and organization require implementing an intelligent WMS dashboard system that pulls information into set KPIs to access business health and help make the key decision that aid in business operations. The following are impacts of WMS in supply chain operations;

- Decreased warehouse labor price due to the efficient allocation of labor
- Ensure that there is real-time access to quality information, providing the retailers with enhanced visibility throughout their supply chain
- Maximized warehouse layout
- Enhanced inventory and pick-up store accuracy with minimal time between picks
- It ensures that the warehouse process is streamlined
- Enhance warehouse security and safety
- Ensures that warehouse responsiveness and flexibility is improved

➢ *Reporting and Visibility*

Reporting and visibility are key components that should be implemented in the omnichannel strategy since it enhances its operations. The success of omnichannel inventory initiative commences with reporting and visibility. Reporting and visibility components ensure that appropriate steps are followed such as enhancing store inventory accuracy, furnishing store teams effectively and efficiently controlling fulfillment, and maximizing when and how stores are utilized to optimize client's value and omnichannel profitability. Thus, retailers are no longer dependent on the optimized IMS and order fulfillment operations from minor strategically located warehouses with the omnichannel supply chain strategy. Still, the retail stores are currently in the fulfillment mix.

IV. THE KEY CAPABILITIES COVERED BY EACH COMPONENT

Information System: In omnichannel strategy, IS plays a critical capability in organizing ad collecting data requires by retailers and business owners when making efficient decisions to enhance stock, staff, and retain more clients, enhances customers purchasing behavior, and helps in guiding the company or retailer to financial success. In retail supply, information system helps retailers attain success in a dynamic environment.

Inventory Management System: In omnichannel supply chain strategy, IMS maintains suitable stock levels for the retailers and business; desires, minimize wasted inventory, lost revenue, and funds tied up in stock through stocks dropping very low. It is mainly utilized by retailers to attain slightly diverse goals and objectives in the retail sector.

Order Management System: The capabilities of OMS in omnichannel strategy is to enhance sales reporting and visibility, improves customer loyalty and service, ensures there is efficient and cost-friendly order routing for clients, and competent inventory visibility, which helps in improving marketing strategies and promotional initiatives of their products. Thus, it provides efficient solutions that benefit from more effective backed operations, thus assisting in achieving the omnichannel promise. Also, OMS helps in improving omnichannel's customer service, transaction processing, and inventory management.

Enterprise Data Interface: The system ensures a successful omnichannel retailing strategy by thriving to attain a seamless connection and integration of the entire supply chain process at the clients' contact points and in the backend systems. EDI plays a critical role in the advancement of an omnichannel strategy. It gas drives its evolution for changing inventory and procurement policies and innovation in product distribution and order returns management.

Warehouse Management System: The key capabilities of WMS in retail is to improve the efficiency of omnichannel operation by standardizing inventory movements, delivery options, picking methods, and locations of order inventory and also reduce the error rates and mitigate the training costs.

Reporting and Visibility: The capabilities covered by these components ensure that businesses and retailers give a critical inventory data level, which is the foundation of omnichannel retail strategy. Thus, consistent inventory reporting and visibility is fundamental since business and retailer require when the retailers commence enlarging the number of fulfillment nodes accessible in their network. Thus, to allow accurate online ordering, business and retailer's e-commerce solutions require a view of global reporting and visibility inventory, constrained by the configurable business desires.

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V. A SYSTEM WHICH INTERLINKS OMNICHANNEL COMPONENTS TOGETHER

➢ *Logistic Management System*

Logistic management systems (LMSs) can interlink the IS, OMS, IMS, EDI, and WMS in the omnichannel strategy. It has a pivotal function in the current retail operations for several businesses and retailers. Digitalization of LMSs will improve the capabilities of key components of omnichannel, thus leading to the most effective and efficient supply chain in the world and establish an efficient ecosystem of the supply chain (Hristov, 2019). A logistic management system interlinks the omnichannel strategy's key components since it works in both reverse and forward directions. Reverse directions imply an omnichannel operation with managing damaged shipments and recycling of goods. In forward directions, an omnichannel supply chain entails processing and receiving an order, preparing an inventory, dispatching it, and choosing an appropriate transportation route that will deliver order [products to clients as efficiently and faster as possible. Therefore, in the modern world dominated by advancements in technology, omnichannel logistics management systems are the best system to be adopted by firms and retailers to manage supply chain processes in both forward and reverse directions (Hristov, 2019). The framework is designed to make the IT system more autonomous constituent and become easily manageable in addressing various supply chain tasks. The microservice application will make the omnichannel supply chain system easy to manage, understand, and scale-up customers' demands, unlike a monolithic architecture, which is applied mainly in a multichannel system (Kousiouris et al., 2019). Today's supply chain is very complex, and managing all the operations, starting with the production side to the consumption side, cannot be perfected without using a microservice cloud-centric technology framework to implement the omnichannel capabilities that have been stated. In retail, a microservices technology framework is a solution to the supply chain challenges faced by different organizations as it helps develop essential ideas concerning service-oriented architectures.

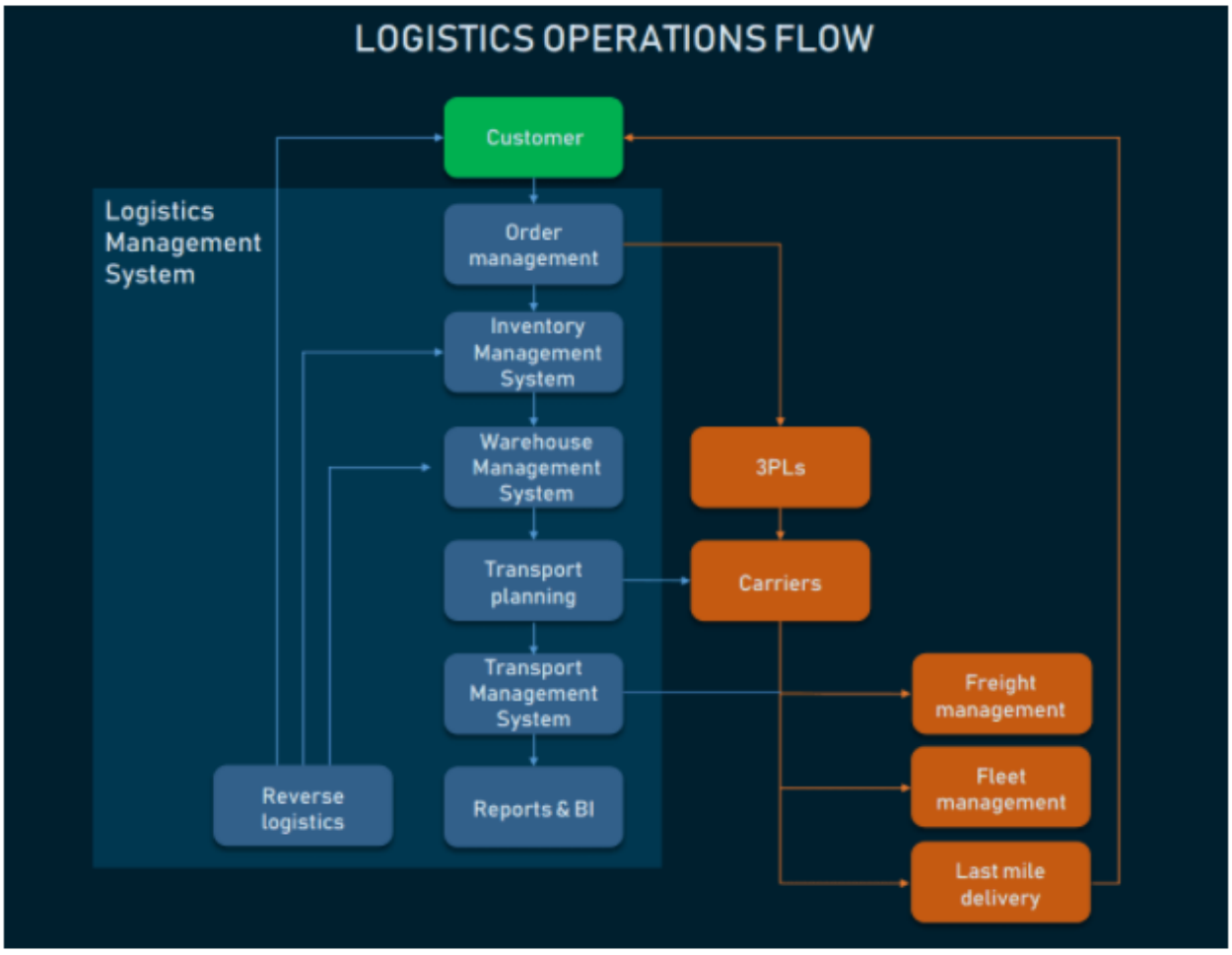

Fig 2:- Logistics Management System (Hristov, 2019).

The logistic management system improves OMS capabilities since processing and receiving an order via an omnichannel strategy entails operations of establishing and editing inventory, accepting payments, controlling customer service, inspection for fraud, and handling documentations between clients, warehousing, and retailing. Thus, to manage orders efficiently and avoid double entry errors in an omnichannel strategy, customer data should be synchronized in the logistic management system. OMS receives orders from several sales channels and manages them from the moment the client placed an order until the client confirms the product's delivery. In LMS, an integrated order management system is interlinked with company CRM and inventory database to complement the supply chain funnel and give information for marketing and accounting departments.

Using the LMS system to interlink IMS with other omnichannel components will improve its operations. IMS is a key section in the omnichannel supply chain which is accountable for managing and documenting the quantity of product for sale. Storing, tracking, and receiving inventory and dealing with rapid and persistent changes needs highly accurate systems such as LMS. Hence, automating from classic supply chain spreadsheets to IMS delivers the required clarity to centralize entire data in a single location through the logistic management system.

In retail, a microservices framework is a crucial component of the digital shift in the sector. Most retail companies have recognized that information technology is not currently taken as a cost factor. Retailers understand that technologies are essential enablers for their supply chain operations. Implementation of a microservices framework creates a technological infrastructure that secures such companies' competitiveness in the long term. The framework is enabled by the emergence of the Internet of Things, new capabilities, and opportunities that have arisen with relation to optimization and management of supply chains and goods distribution and real-time monitoring (Kousiouris et al., 2019). Some of the new capabilities that assist in implementing the framework are cloud-based services, smart sensing, and centralized communications, which have been designed to tackle monitoring and distribution issues. The microservices framework targets integrating and deploying several essential elements of a supply chain system in an integrated fashion. It incorporates supply chain tracking and the internet of things principles through data from the field to fill data stores to assist in information gathering and processing to recognize the need for relevant alerts to various stakeholders.

The microservices framework to be proposed is made up of some key aspects such as predictive analytics, event intelligence, and manually inserted rules for object automation and supply chain. The framework prescripts a distributed nature, and it considers Electronic Product Code Information Services to assist in sharing critical information among different participants of the supply chain.

Warehouse management systems are interlinked with other components such as EDI and OMS by the logistic management system. Warehouse management system maintains, control, and automate warehouse operations, thus improving the omnichannel supply chain strategy. Warehouse management comprises devices that streamline the workflow of controlling products from arrival at the warehouse through tracking and storage within the location to order management and further dispatching of products. Logistic management systems interlink WMS with other omnichannel capabilities, thus making WMS be responsible for the following operation in supply chain channels;

- Warehouse design
- Picking
- Packing
- Labor management

VI. THE TECHNICAL FRAMEWORK OR ARCHITECTURE

➢ *Software-as-a-service (SAAS)*

Software-as-s-service (SAAS) is likely the most well-known application framework for cloud computing. SAAS products disseminate data online and are available from a browser on any device such as mobile phones and desktop; hence it enables retailers and business companies to continue to host the software. The ease of use, subscription-based pricing, upfront, and reduced cost make SAAS one of the most attractive sectors in omnichannel supply chain and tech (Mandal et al., 2014). SAAS can effectively and efficiently interlink omnichannel components such as OMS, EDI, IMS, and WMS since most of its data is distributed online. Therefore, to enhance the effectiveness of omnichannel supply chain strategy, retailers and business firms should adopt SAAS cloud products to develop their applications to achieve great success in the supply sector and higher scalability, flexibility, and reliability in their business operations.

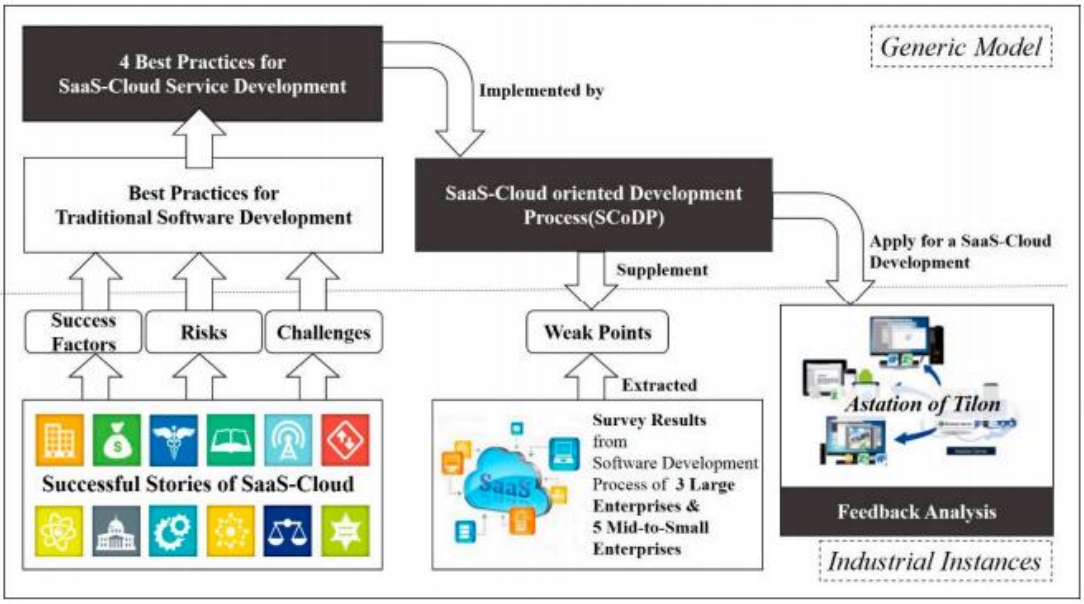

Fig 3:- SAAS Framework

A well-known SaaS provider is Salesforce, a CRM device that assists businesses and retailers in managing client relations and generating large sales volumes. When deployed to the cloud, it combines customer and AI data to assist retailers and sales teams in determining potential leads and closing the sales faster. Thus, it will help in improving the services of OMS, WMS, EDI, and IMS when applied in the omnichannel supply chain strategy. SaaS framework is also available in cloud platforms like AWS, Azure, and GCP. Software-as-a-service is a software distribution model that can do well in the omnichannel supply chain since a third-party provider hosts application and makes them accessible to clients over the internet. Omnichannel strategy is evolving from OMS to WMS; thus, to attain this, it must adopt modern technology such as SaaS cloud-oriented development framework to improve its services and business operations. IaaS and PaaS are part of the SaaS software platforms which offer their services through the internet; thus, when grouped together in an omnichannel strategy to interlinks components such as OMS, EDI, and WMS, it will be more beneficial for the operations of a supply chain as it makes the deployment process to be completed through only one click because of the presence of a Docker compose file. The compose file describes various aspects such as the virtual networks, startup installations and commands, virtual IPs, number of desired outcomes, and services ports. Implementing the framework's user interfaces that link the entire system with the external platforms and selecting incorporated products should take place in the SaaS framework. The essential aspect for the microservices framework is its capability to renovate the user-friendly declarations, which are the logic behind the UI that enables retrieval of information from the user of the supply chain data, which are then linked to recovering the features of products from enabling internally creates all triples which declare several features. However, establishing a semantic communication between UI generated and captured together with semantic web service for insertion of triples.

A well-designed and successfully implemented SaaS cloud-oriented framework has the following benefits to omnichannel supply chain strategy.

- Ensure that there is more effective and efficient debugging
- Improves software delivery systems since several programming languages can be used, leading to wider access to the market and more clients.
- Enables the retailers and clients to understand the codebase easily, thus improving productivity since each service represents a single supply chain
- Reduce business fault tolerance since there are more resilient services

VII. THE DEPLOYMENT ARCHITECTURE

A SaaS provider commonly initiates SaaS deployment through a user provisioning process that is automated. The SaaS framework can be deployed to the cloud by use of containerized CI/CD deployment architecture. When we apply Continuous Integration (CI) to deploy SaaS to the cloud, it will enable us to test, build and deploy the firm's code in several environments. The early step in a containerized CI/CD assist to determines issues faster, and thus, it should be the first step each SaaS startup should adopt. The SaaS development framework should be deployed in the cloud with effective services and a high level of accuracy. When the retailer or the company hosts a digital experience platform in the cloud, it should enable its components to integrate and scale at suitable levels without compromising performance, availability, and security. The SaaS framework's deployment model was pioneered by Salesforce as "on-demand" and has led to the development of the modern software landscape (Mandal et al., 2014).

VIII. CONCLUSION

Due to the advancement in technology and the outbreak of COVID-19 globally, the demand for products using online platforms, in-store apps increased drastically. This has made the retailers and companies adopt an omnichannel supply chain strategy to meet changing market demands and improve order fulfillment and delivery of products on time. The increasing trends of clients to purchase products online have made the logistics and retail providers rethink their supply chain channels that offer faster deliveries to gain a competitive advantage and improve customer loyalty. The research project evaluates the importance of the omnichannel supply chain during pandemic times and outlines the key strategies that should be adopted to improve customer experience and loyalty. Omnichannel strategy plays a significant role during coronavirus time, which reduces long queues in essential goods shops; hence, it has helped curb the pandemic's spread. The strategy ensured that clients observed social distancing protocol during the order and delivery period of the products. The companies and retailers should implement appropriate omnichannel capabilities such as order management system, inventory management system, enterprise data interface, and warehouse management system as the key supply chain strategies.

The inefficiency of using a multichannel system has led to the transformation of the supply chain to an omnichannel strategy, which is the most efficient and resilient. The key gateway to efficient omnichannel strategy is a strong IMS and OMS, making inventory locations easily accessible in offline and online clients and determining which inventory locations where an order should be fulfilled. However, retailers have not been fully successful in onboarding new customers effectively due to an inadequate realization of the IMS and OMS requirements; hence they have implemented EDI and WMS as the omnichannel strategies to improve supply chain, serving customers.

An omnichannel supply chain strategy pursues to provide the clients with a seamless shopping experience for those who are purchasing their products in-store or online. The omnichannel strategy has been fully integrated and enabled with advanced technology and the most efficient microservice architecture framework. The retailers for in-store-based, brick and mortar, and online supplies are integrated. Therefore, the robust growth in the omnichannel retail strategy, which is combined with an alarming effort to mitigate delivery times, has led to a fundamental uplift in demand for clients' products.

Finally, OMS, EDI, and WMS have evolved tremendously due to the rapid advancement in technology and rise in the internet. Therefore, combining these system capabilities frameworks into a single cohesive system has weighty benefits across the alarming adoption of omnichannel supply chain strategy. The flexible system capabilities are important in managing and establishing omnichannel supply chains since the client demands an omnichannel solution with combined supply chain channels that will warrants an integrated system. Thus, supply chain systems must share data to develop a seamless customer experience and loyalty. They must have the capability to handle possible problems that might arise during the order fulfillment process.

The advancement of technology goes hand-in-hand with the advancement in the omnichannel supply chain in the future. In the next five years, omnichannel supply chain strategy will be the best channel since the approach enables Flipkart to decrease its delivery cost, and the local retailers will gain access to the wider variety of products and services provided by the centralized storage; hence it will meet the demand of unprecedented times like those of coronavirus in future. The omnichannel strategy will soon become the new gold standard in business and retail due to its rapids growth.

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