

The Next Generation Digital Supply Chain

L. PADMA

Associate Professor, Sai-Sudhir PG College, Hyderabad, Telangana, India.

Abstract - This article review the state of the art of DSC with augment & change with the massive injection of new technologies.

Companies, partners, dealers & suppliers in supply chains do use, generate and share information with each other. These associations lead to a multitude of challenges and opportunities with the supply chains. The Digital Supply Chain (DSC) is a value-driven, smart, efficient process to generate new forms of revenue and business value for organizations and to leverage new methods with novel technological and analytical methods DSC is not about whether goods and services are digital or physical, it is about the way how supply chain processes are managed with a wide variety of innovative technologies, e.g. from robotics to Artificial intelligences, to Big data, cloud computing, and internet of things, among others. Recent literature have highlighted the importance of DSC and many industrial researchers discuss about its applications.

Keywords - Digital supply chain (DSC), robotics, artificial intelligences, big data, and cloud computing

I. INTRODUCTION

A Supply chain processes can be enhanced through the use of digital technologies in order to ensure customer responsiveness. This is due to the ability of smart products (smart phones, tablet computer, handheld devices) to convert any electronic message required by existing systems and allow for electronic data communication between firm and supply chain members

Some of the digitalized processes and tools these companies are investing in include digital mobility lab, e-freight, e-payment, and robotics for handling goods, drones for deliveries and new apps for own-asset-light delivery services. Digitization brings about a Supply Chain, which will be faster, more granular, more flexible, and more efficient.

The difference between DSC and traditional supply chain is that, DSC offers swift shift from manual transactions to digitalised information flows in both intra-firm and inter-firm operations by offering companies to reduce internal management cost & increasing efficiency through the digitalisation. Through which the traditional way of working, trough meetings and insufficient decisional support from a traditional methods are no more sufficient in front of so large and complex problems of global management of international large companies Supply Chain. Supply Chain will be at least exploited not only like an efficiency generator, but also like a new portfolio of business & services for the firm strategy. The research conclusions are here presented have the following objectives;-

- Understanding the supply chain process with novel technology.

- Identifying the contribution of Artificial Intelligences on planning & control in supply chain.
- Material Handling are done through Robots application.
- Usage of wide variety of innovative technologies

Big data analytics: This refers to the application of advanced statistics to any kind of stored

II. DIGITAL SUPPLY CHAIN & BLOCK CHAIN

Supply chain has taken a new wave of productivity by digitalizing a key financial & business processes & enabling collaboration across the organisation. Supply chain trend are becoming globalised & more complex. Raw materials & products travel across many geographical locations & pass through multiple suppliers, manufacturing, distribution & services providers. Often, the organisation is unaware of how many trading partners are really involved in their supply chain process till it reaches the final consumer. In theory, organisation should know all parties in their supply chain network (within the broader business ecosystem) & trust them but this is far from today's reality. Block chain technologies, as an example, could be an answer to address this problem across the area –counterfeiting, visibility/traceability & efficiency play.

III. SUPPLY CHAIN & ARTIFICIAL INTELLIGENCES

Supply chain management (SCM) is imperative to business. The utopian scenario is one in which planning, order management, procurement, manufacturing, warehousing, inventory and delivery all seamlessly work together to

deliver unmatched customer services. The usage of AI solution has rapidly increased in last few years, forecasting & the demand management is the witness for the improved results. The SCM chain leaders expect that AI/Machines learning are going to impact on SCM strategies as in future the SCM is going to work on driverless trucks, smart warehouse, drones doing last-miles delivery, Advances robotics are few of the latest innovation.

Kinds of transformation we looking on:-

- Fully automated supply chain:-The AI usage would be full automated right from Demand to work order, production & delivery, the complete process of supply chain will takes places without human intervention & supervision.
- Fully automated Warehouse: - Traditionally human-driven forklifts are used to transport materials from one place to other place within the unit/plant. Robots would help in grasp objects and move them around the plant more efficiently. With disruptive technology and upgrade in robotics year-by-year, one can expect a fully automated warehouse in the future.
- AI as improved experience and supplier's management:-An AI-based voice response system would be knowledgeable enough to answer typical customer queries, both for suppliers & customers.
- Risk management:- Socio-political risk, project organisation risk, natural disasters can cause immense disruption to logistics. If we could forecast this threat, we can postpone our delivery.AI solution can help raise red flags in produce warning and help the SCM.

IV. SUPPLY CHAIN AND BIG DATA

This refers to the application of advanced statistics to any kind of stored electronics communication, which may include messages, updates, GPS signals from cell phone, readings from the sensors, images posted in social networks. This application will help in reducing order to delivery cycle time, improve the customers relationship, improve supply chain efficiency, big data allow the firms to gather large amount of data from videos, tweets and other sources.

According to Gartner (2012), big data is defined as: Information processing that enable enhanced insight, decision making and process automation. In addition to this, Big data has been defined with the '3V's' Concept by Laney (2001)

Data Volume: - In earlier days, all data were generated internally by the employees. Currently, the data generated by employees, partners & customers and for a group of companies' data is generated by the machine. The size of available data has been growing at an increasing rate. For example, millions of smart phone send a variety of information to the network infrastructure and if we take

social media space for example, volume refers to the amount of data generated through websites, portals and online application. Especially for B2C companies. If we consider the Facebook users are some 2billion, YouTube user around 1 billion, twitter around 350 million users etc. Just image the volume of data that is generated every minute and every hour.

Velocity: - With Velocity we refer to the speed with which data are being generated. Initially, companies analysed data using a batch process. One takes a chunk of data, submits a job to the server and waits for delivery of the result. That scheme works when the incoming data rate is slower than the batch processing rate and when the result is useful despite the delay. With the new sources of data such as social and mobile applications, the batch process breaks down. The data is now streaming into the server in real time, in a continuous fashion and the result is only useful if the delay is very short.

VARIETY: - Variety in big data refers to all the structured & unstructured data that has the possibility of getting generated either by human or by machine. The most commonly added data are structured -texts, tweets, pictures & videos. However, unstructured data like emails, voicemails, hand-written text, ECG reading, audio recordings etc, are also important elements under Variety. Variety is all about the ability to classify the incoming data into various categories.

V. SUPPLY CHAIN AND CLOUD COMPUTING

Cloud computing: This refers to both the applications delivered as services over the internet and hardware and systems software in the data centre that provide those services. The cloud-based platform provides synchronisation of supply chain management with IT system of an organisation. This help in cost reduction, scalability, accessibility & efficiency in supply chain operation.

Customers can access cloud based application through a web browser while the software and data were stored either in house servers or on servers at a remote location. Cloud computing is classified in general into four types: - public cloud, private cloud, hybrid cloud & community cloud.

However, the company should first identify the technical requirement for migrating the supply chain activity to the cloud, before shifting from a traditional supply chain to cloud supply chain. This transformation process can be executed by using the cloud life cycle, which is an improvement lifecycle with multiple steps that allows the process of transformation to be evaluated and improved recurrently(Lindner,2011).However, prior to that, the companies should weigh all the factors to assess the implementation of cloud technology in their supply chain.

Cloud computing is also useful for inventory, warehouse and transportation management as it offers logistics tracking operations to multiple supply chain partners. Processes such

as replenishment planning, order processing, fleet management, transportation route planning as well as global trade compliance can migrate cloud platform provides the advantage of streamlined transportation, as well it also reduce on hand & pipeline inventory that can lead to annual freight cost saving for companies. Especially in the logistics sector, cloud services appear to be essential for 3PL companies' necessity and warehousing management for different customers in one single system.

VI. SUPPLY CHAIN AND INTERNET OF THINGS (IoT)

The Internet of Things (IoT) is a collection of interconnected physical devices that can monitor, report on and send and exchange data. They can also monitor the storage conditions of products which enhance quality management throughout the supply chain.

According to D.Singh,G.Tripathi,A.J.Jara,"IoT is the expansion of the current Internet services so as to accommodate each and every object which exists in this world or likely to exist in the coming future.

According to Brian Ray,the applications of IoT in supply chain management into 3 broad categories namely Location Tracking, Fleet Management & Environment Sensing.

The IoT is set to revolutionize the supply chain with both operational efficiencies & revenue opportunities made possible with just this type of transparency. In today's market, supply chain isn't just a way to keep track of your product. It's a way to gain an edge on your competitors and build your own brand. The following are a few areas where we'll be seeing the most advancement and change with ever advancing Industrial IoT.

The following are the operational efficiency, IoT offers:-

- **Assets Tracking;**-New RFID & GPS sensors can track the product "from floor to store" and I'd venture, even beyond. At any point in time in time, manufactures can use these sensors to gain granular data like the item stored at what temperature, how long it spent in cargo, and even how long it spent in cargo, and even how long it took to fly off the shelves. The data gained from the LoT can help the companies in get a tighter grip on quality control, on-time deliveries, and product forecasting.
- **Vendor Relations;**-The data obtained through asset tracking is also important because it allows companies to tweak their own production schedules, and it will help to know how your vendors are handling the supplies they are sending you, and how they are handling your product once its produced. Higher quality goods means better relationship with customers -and better customer retention overall.
- **Forecasting & Inventory;**-IoT sensor provide far more accurate inventories than human can manage alone. By

using Wi-Fi robots to scan QR codes on its products to track and triage its orders. Its able to track your inventory including the supplies you have in stock future manufacturing by this you will not miss a deadline again and its will help in manufacturing schedules even more efficient.

- **Connected Fleets;**-As the supply chain continues to grow upward & downward its even more imperative to ensure that all your suppliers delivery truck, carriers, shipping containers, van out for delivery are connected.
- **Scheduled Maintenance;**-The LoT can also use smart sensor on its manufacturing floors to manage planned and predictive maintenance and prevent down-time that can cost so much.

1. Direct Digital Manufacturing (DDM)

DDM is a process that produces parts directly from a CAD file. Companies can adopt DDM to: Eliminate the investment in tooling. Remove time lag between design and production.

2. Drone:

These are unmanned aircraft that are presenting potential use in supply chain. For example Organizations are beginning to adopt drones in the first phase of supply chain management in obtaining raw materials. Drones are also used in mining, prospecting, and land surveying applications. In farming and agriculture, UAVs are used to inspect plant health, photo-log plant growth, and map crop yields. Drones are also testing soil to help optimize water content and fertilizers usage, with the intent of improving crop yields.

3. Mobile applications:

Mobile supply chain apps can lead to improvements at every step, often in similar ways across segments. For example, inventory management apps allow suppliers to track their raw, material, whether to increase or decrease at the time of manufacturing and ship and retailers to more effectively to track their stock. The benefits of mobile app are increasing customer Loyalty, accurate sourcing, simplified logistics, inventory control, faster production times, Recall the damages control. Improved warehouse management, smarter communication, faster shipments, and accurate order tracking, less shrinkage.

5. Driving Forces behind Robotics in Logistics;-

As society experience more demand for rapid order fulfilment and accuracy in the supply chain processes, manufacturers and supply chain management providers must come up with a way to meet consumer demands. Meanwhile the number of drivers has dwindled over the past few years, labour unions have demanded higher wages and few hours & other companies simply do not have the money to spend on hiring additional workers. Many companies think of alternative ways to get the same amount, if not substantially more, of work completed in a short period of time. Robotics holds solution for the problem. The driving force behind the

expansion of robotics in logistics and manufacturing processes, from the manufacturing to delivery, will encourage repeat purchases, & therefore, company growth and success. Without the consumer demand, the demand for robotics would not exist.

Robots have the potential to create a limitless workforce that does not have additional expenses on a company for e.g.:- overtime pay, adherence to daily work schedules, retirement benefits

PF, provident fund & other aspects of typical workers is completely eliminated when robotics are employed in supply chain processes.

Robotics also impacts the efficiency and analysis of supply chain processes. Robotics can sort through incoming & outgoing package faster, place them on the appropriate shelves or shipping containers and ensure the package do not have any defects, which would cause unnecessary returns or delays in the order fulfilment process. Robots are capable of in human feats, such as lifting heavy objects or reaching tiny areas, this impact how items may be manufactured.

Benefits Digital supply chain

Digital supply chain is important has it improve in decision making capabilities & in improving the automating the process, further the automated operation can streamline the work of supply chain management and allow them to focus on the more valuable task, the following few benefits has been identified from the above data.

- Enable the demand-driven supply chain.
- Optimize the supply chain lead time.
- Utilizing the 'just-in-time' techniques.
- DSC reduce the stock outs.
- Improve cash flow and cost management

VII. CONCLUSION

The aim of this paper was to present some key factors related to the process of transition from traditional to Digital Supply Chain, DSC is not about whether goods and services are digital or physical, and it is about the way how supply chain processes are managed with a wide variety of innovative technologies. The future of supply chain is all about coping with digital transformation. New information technologies & operational technologies are exploding around us and bring rapid change to what is possible in the end-to-end supply chain, No one should expect business as usual for much longer

The aim focus was on the innovative technology used in the digital supply chain which would help in the process of the supply chain.

- Usage of wide variety of innovative technologies can approach and solve definitely many problems of distributor, suppliers, manufacture & help better

the present & future technology impact on SCM processes.

- The supply chain process with novel technology will improve to meet the customers need on time.
- Identifying the contribution of Artificial Intelligences on planning & control in supply chain.
- Robotics is already transforming all the operational area in material handling, giving new role as supply chain providers to distrusting companies as Amazon,

Rapidity of future technological development is dependent on technology adoption has been until now the human one, because the gap between technology & human resources culture has grown, not reduced. Poor program of change management in the firms not helped in filling the gap between the technology & human. A lot of work have to be done by conducted awareness or benefits of using innovative technologies.

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