

Supply Chain 4.0: The Digital Era of Supply Chain

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ABSTRACT: Supply chain 4.0 is the future of the industry. To deal with the varying demand and supply, it is important to digitize the various levels of supply chain. Supply chain 4.0 is an efficient, flexible and faster mechanism that empowers organizations to handle the requirements of the clients and also the challenges on the supply side. Major challenge in implementing supply chain 4.0 is the requirement of huge amount of technical advancement but the benefits of supply chain 4.0 over powers the cost involve.

KEYWORDS: Supply chain 4.0, industry, artificial intelligence, internet of things, big data, analytics, machine learning, cloud computing.

1 INTRODUCTION

Every day the world is moving toward the digital era. The pace of which has increased since the world was hit covid-19. Industries have to quickly respond to this and have to make changes in their way of working. With the introduction of Industry 4.0 things have become more digitized and automated.

Digitalization leads to this groundbreaking innovation in the field of Artificial Intelligence (AI), Internet of Things (IoT), Big Data & Analytics, Automation and Robotics, Machine Learning, Cloud Computing, Blockchain, and many more.

Intensive growth in smart device features and their ability to outperform humans in every field and providing every possible way to make things simpler for everyone with any hustle. These things have created a hustle-free environment for everyone with the least interference from humans and more productivity in every kind.

The world is moving quicker than we think with industry 4.0 which emphasizes more on end-to-end digitization and data integration of all industry activities. Industry 4.0 helps the company generating, analysing and communicating data effortlessly to the companies which provides a high value of competitive advantage over other companies and outcasts them in every possible way.

We can say that industry 4.0 and covid 19 has made the companies rethink the way their supply chain has worked till now and will it be able to survive this new era of supply chain 4.0 and will they be able to make changes as quickly as possible. This explosion of covid 19 has made things worse for these companies as if they don't quickly respond to these changes, they won't be able to survive in the market and may lead to the closure of their company. Traditional ways have become outdated in this situation as humans are not allowed to interact with each other and working from home. And in case if they are available the company has to make them work in a different shift as restriction by the governments all around the world.

Supply chain 4.0 is the answer to every possible question currently which these companies are looking for. Over the years logistics have gone through many huge changes and this one of them. From going all human functioned process to all machine functioned processed. This process is more accurate and more productive with the least amount of wastage which further leads to improvement of the companies in terms of market shared and a better understanding of the supply chain.

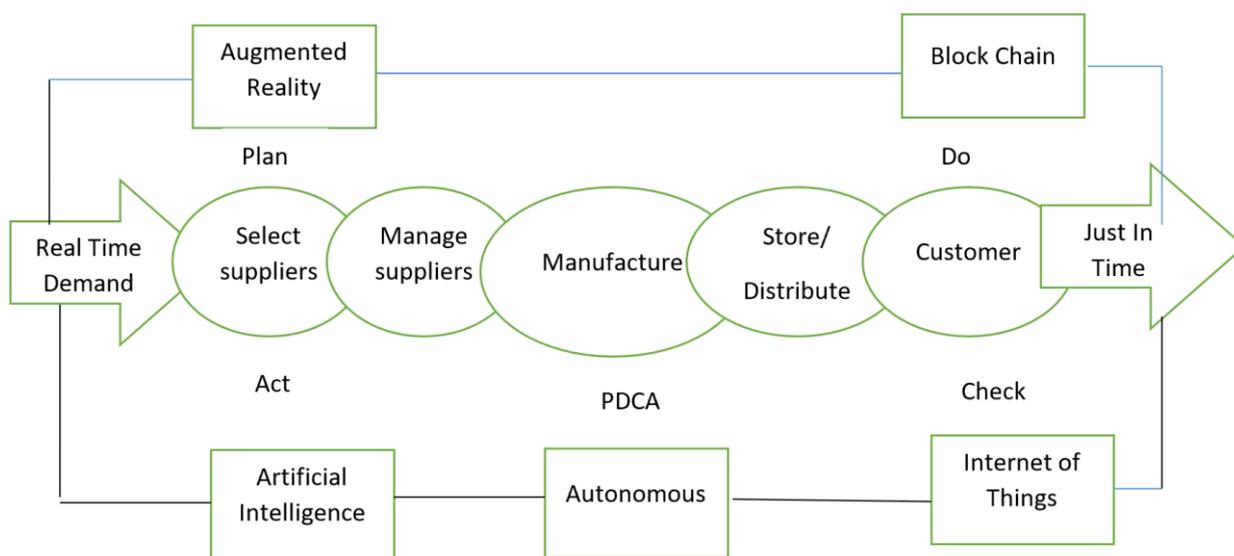
2 SUPPLY CHAIN 4.0

“Supply chain 4.0 is simply the application of the IoT (Internet of Things), the use of AI and robotic, and the application of advanced analytics of huge data in the supply chain. Placing sensors in everything possible, creation of networks everywhere, automate anything and analyse everything to enhance the performance and customer satisfaction”

Supply chain 4.0 has made the work easy for management and CSO (chief supply chain officer). Now the process is more focused on advanced planning processes which include analytical demand planning or integrated sales and operations planning. This has become the process of many companies nowadays. Companies have started outsourcing third-party logistic service providers. The supply chain ensures the smooth functioning between customer and supplier.

The expectations of the customer are increasing day by day in this online trend which has been growing rapidly for the past few years. There is a very definite trend towards individualization and customization that more a strong connection with the customer. The online-enabled transparency and easy access to a customer regarding where the shop is and what to buy drives the competition of the supply chain. With these trends, the supply chain needs to become much faster, more powered, and much more precise.

PROCEDURE OF SUPPLY CHAIN 4.0



3 TECHNOLOGIES REQUIRED FOR SMOOTH RUN OF SUPPLY CHAIN 4.0

3.1 ARTIFICIAL INTELLIGENCE (AI) AND MACHINE LEARNING (ML)

Logistics and transport operations generate a large amount of data to analysis such data and get full benefit from them we need to apply some analytic tools to get better insights.

Through AI and ML techniques we can monitor such data in no time and get a better vision of the situation. This can be applied in two ways:

- a. Making all the process and action automated so they can be operated with any human intervention.
- b. Helping the human decision-making process in operations of the company by reducing errors and identifying bias, especially in data analysis.

AI and ML can provide handful advantages to supply chain like cost saving savings through reduced redundancies and risk mitigation, improved forecasting, faster deliveries through more optimized routes and improved customer service.

3.2 INTERNET OF THINGS (IOT)

Internet of thing has been one of the revolutionary technologies for the industrial world. It has helped the managers to improve operational efficiency of distribution and added transparency to decision making process. Tracking of goods and monitoring their live status has been one of the major objectives of supply chain. With help of IoT technology it has become easy of managers to keep track of inventories. IoT has made few things easy for a manager to monitor:

- Real time location tracking

IoT has provided managers to monitor the real time location of product and their condition. It can alert the manager if the product is shipped wrong and when the product will be delivered.

- Monitoring warehouse condition

Environmental sensors have made easy to track shipment conditions and proactively respond to changes. Such sensors helps us to get temperature inside vehicles, pressure, humidity, and other factors that could compromise the product's integrity and triggers automatic condition adjustment.

- Product arrival

IoT devices have made managers to improve the quality of decision making and increase the precision of delivery. Monitoring of goods in real time has made us to predict the delivery of the product.

3.3 AUTOMATION

Robotic process automation (RPA) has enable many companies to improve operational efficiency, cut down operational costs and also prevent shortages. Automation is one of the top priority of companies now days in supply chain operations. In simple terms supply chain automation is griping digital technologies such as AI, ML, RPA, OCR, and robotics to lower the operational cost of delivering product and services. With the help of automation in supply chain following activities can be monitored better:

- a. Backend office automation
- b. Warehouse automation
- c. Transportation automation

3.4 CLOUD COMPUTING

Cloud computing is something which companies have been using for bring innovation to the management of their supply chain. SaaS (software as a service) model which most used by the companies. CC has provided with optimization in infrastructure, platform and software solutions for the supply chain network and operational benefits to the companies. CC is mostly used in supply chain activities like forecasting and planning, logistics, spare part management, and sourcing and procurement. Cloud computing in supply chain has provide enormous benefits one of the major being intelligence and automation. Other benefits have also help companies to make supply chain better such as real time visibility, improved scalability, speed and cost efficiency

3.5 BLOCKCHAIN

Blockchain technology stores and shares information across a network of users in an open virtual space, and it allows users to view all the transactions simultaneously and in real-time. Each block contains the data of all the transactions in the system within a period of time, and it creates a digital footprint which can be used to verify the validity of the information and connect with the next block. There can be numbers of such blocks in the blockchain, and the blocks are linked to each other (like a chain) in a proper linear, chronological order with every block containing a hash of the previous block. The changes to the information that is stored in the ledger needs approval by consensus from each node of the network. This is possible because in a blockchain, the data infrastructure is visible to all the entities, and no single entity controls the data. Thus, a blockchain provides better visibility in procurement, accurate and reliable data for analytics, and increased trust among all participants in a supply chain network. Blockchain technology also helps to reduce the human interaction in non-value-added activities. A

selection of smart contracts can be included in the blockchain platform to facilitate secure communication between the users and machines.

4 THE ENORMOUS BENEFIT OF SUPPLY CHAIN 4.0

4.1 GREAT LUCIDITY AND PRECISENESS

A supply chain can involve hundreds and thousands of complicities operating within the supply chain ecosystem of a company. So a company needs end-to-end lucidity and real-time product tracking for smooth conduct of the supply chain. Any kind of misleading in supply chain risk management can lead to malfunctioning of the supply chain, lost sales, and undue costs that occur in the company.

Supply chain 4.0 has enabled the companies to rack the entire supply chain in real-time, such as finding out the exact location of goods (on order, in transit, or a warehouse). Advanced solutions easily track inventory by combing updates from supply chain partners with IoT data. This improves order accuracy and ETAs (minimizing out-of-stock situations), enhances lot and batch control, optimizes inventory, and lowers associated costs.

4.2 COST-SAVING THROUGH THE BETTER ANALYSIS DECISION MAKING

Machine learning system has helped to predict the demand for a particular product more precisely by analysing data. They can also give us a probability of required demand volume in future. This helps the company to occure less loses and get a competitive advantage over others. Use of such predictive analytics methods has reduced forecasting errors by almost 50 percent. This helps a company to optimize their inventory.

4.3 AMELIORATE WAREHOUSE MANAGEMENT

Supply chain 4.0 has significantly ameliorate warehouse management capabilities – especially with regard to supply chain inventory and logistics.

Sensors can help to track the product in no time and give accurate location.

RFID technology can predict the exact location of a product, even its exact position inside a truck. Such preciseness helps managers provide location-based instructions to workers, saving time. Labor hours consumed per order are also reduced. Thanks to tracking devices, companies can avoid last-minute shocks such as inadequate quantity or non-compliance. Machine-to-machine communication also optimizes the number of carriers per shipment, reducing transportation costs. Inventory storage per square foot is also optimized through accurate demand prediction. This way, plant managers can easily control the flow of inventory globally.

5 COMPARISON BETWEEN TRADITION SUPPLY CHAIN AND SUPPLY CHAIN 4.0

TRADITIONAL SUPPLY CHAIN	SUPPLY CHAIN 4.0
Plan and controlled model	Plan, do, check, act model
Ineffective on feedback loop overall	Feedback loop of individual and overall
Partial view of supply chain	360 degree view of supply chain
Lack of collaboration	Collaboration in designed manner
Huge stock of inventory	Optimal inventory
More costs and resources required	Less costs and resources required
Lack of communication	Simultaneous communication
Imbalanced supply vs actual demand	Balanced supply vs actual demand

6 CONCLUSION

Supply chain 4.0 is the future of the industry. To deal with the varying demand and supply, it is important to digitize the various levels of supply chain. Supply chain 4.0 is an efficient, flexible and faster mechanism that empowers organizations to handle the requirements of the clients and also the challenges on the supply side. Major challenge in implementing supply

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