ISSN (Online) 2393-8021
ISSN (Print) 2394-1588

IARJSET

International Advanced Research Journal in Science, Engineering and Technology

National Conference on Design, Manufacturing, Energy & Thermal Engineering (NCDMETE-2017)

AGTI's Dr. Daulatrao Aher College Engineering, Vidyanagar Extension, Karad

Vol. 4, Special Issue 1, January 2017

Digital Supply Chain Management- A Review

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Abstract: Innovations capture imagination, motivate people and improve quality of life. Most are continuous improvements which are practiced to stay ahead in market but digital innovation redefine the market. In the future the concept of digital supply chain management plays an important role. Digitalization has touched upon all aspects of businesses, including supply chains and operating models. Today, technologies such as RFID, GPS, and sensors have enabled organizations to transform their existing hybrid combination of paper-based and IT-supported processes supply chain structures into more flexible, open, moving fast, and collaborative digital models. Unlike hybrid supply chain models, which have resulted in rigid organizational structures, inaccessible data, and fragmented relationships with partners, digital supply chains enable business process automation, and digital management of corporate assets. [1] "Digital supply chains have the capability for extensive information availability and superior collaboration that result in improved reliability, agility and effectiveness" use of Internet of things , and ERP-Software, EPC code enhance the stages for improving supply chain model of enterprise. [2]. In this paper we explain introduction and overview of Digital Supply Chain, how it works, Advantages of digital supply chain over conventional supply chain, Case Study on New RFID-Based Coca Cola Dispenser.

Keywords: Digital Supply Chain, RFID, Internet of Things, ERP, EPC.

I. INTRODUCTION

Now a days demand has become important competitive tool in the management of manufacturing industry. Firms deploying global sourcing strategies have to balance the benefits of cost effectiveness against the limitation of OFF Shore productions. Improving supply chain performance is a key to achieving cost effectiveness, and the improvement largely depends upon the degree to which uncertainty can be reduced in the supply chain. Supply chain management is cross functional approach the management of activities that procure materials and services, transform them into intermediate goods and final goods/products and deliver them to a distribution system to point of consumption. [3]. The flow includes information required by each activity or process, movement and storage of both raw materials work in progress goods, inventory and finished goods too.

There is a fundamental performance difference between traditional and digital supply chains. Traditional supply chains rely on a mix of electronic and paper-based processes and documentation. The organizational structure is often characterized by functional and geographic silos which do not share information openly, thereby leading to sub-optimal performance. Digital supply chains, on the other hand, have the capability for extensive information availability, and enable superior collaboration and communication across digital platforms resulting in improved reliability, agility and effectiveness. [4]

A. Disadvantages of Conventional Supply Chain Management. [5]

1. Sometimes Supply Chain Management can be very expensive to implement.
2. Competitors can easily copy the strategy of Supply Chain Management.
3. For better Supply Chain Management, proper skills and experience is required to achieve success.
4. Sometimes in Supply Chain Management various functions may be difficult to manage.
5. In Supply Chain Management there may be staff resistance.
6. It contain more paper work and requirement of labour.

The digital supply chain in compasses the process of the delivery of the digital media by electronic means , from the point of origin product, digital ,media must pass through various stages in processing to get to the point in which the consumer can enjoy their product.

The new concept arriving in digital SCM is "Internet of Things". It simply refers to the trend where everyday possessions are connected to internet and each other. So clothing machinery home appliances and practically anything you can thing of, use wireless and near- field communication to communicate with each other and rest of the internet without human intervention. For example, whirlpool has introduced future enabling consumer to start washing machine from their i-Phone. [2]

In the plant, internet of things enables manufacturing technology to be connected and Talk to each other. For example, sending & receiving critical notification. This might be a product or packaging defect or equipment failure. Needless to this has massive potential for business process optimization, reduced downtime and waste, and increased quality.

B. Internet of things is divided into three main layers-

1. Application layer
2. Network layer

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3. Sensing layer

The internet of things involves a lot of new technologies, whose core technology includes RFID, sensor technology, network communication technology and cloud computing. If a company expect to achieve benefits from their supply chain management process, they will require some level of investment in technology. These companies implements software's into companies supply chains, from purchasing of raw material to warranty service of item sold. Since the wide adaptation of such technology, all businesses can take advantage of web-based software and internet communication. Instant communication between vendors and customers allows for timely updates of information, which is key in management of supply chain. [6]

i. Radio Frequency Identification RFID :-
It is non-contact automatic identification technology and obtains relevant data by automatically identifying the label/tag on the objects. It is the one most critical technology in the internet of things.
For example - Combining integrated device is used in the shipment vehicle, data is transferred into the cloud, and the device can be identify the pallet and not only share its position using GPS co-ordinates, but also bring other data like weather, traffic condition and driver- specific data. RFID technology has become revolutionary element supply chain management. It makes supply chain considerably more precise and improves the efficiency and reliability. [2]

RFID benefits the manufacturing sector because manufactures can benefit from increase information in regards to repair and maintenance of their machine and equipments. RFID tags can store more information than conventional bar code labels and RFID tags can be automatically scanned simultaneously. This allows manufactures to have visibility in to valuable data such as: which machine has been repaired are undergone maintenance and when has this been done. This information helps to plan maintenance scheduled of production plant. It helps to prevent costly production breaks. [7]

ii. ERP- Enterprise Recourse Planning-
Is is a category of business-management software—typically a suite of integrated applications—that an organization can use to collect, store, manage and interpret data from many business activities, including:

- product planning, purchase
- manufacturing or service delivery
- marketing and sales
- shipping and payment
- finance
- Inventory Management.

ERP manage an automate many back office function related to technology services and human resources. [8]

iii. GPS Technology
Global positioning system (GPS) technology has finally hit its stride as a mainstream tool for helping consumers better navigate their travels -- yet experts say the technology is still in limited use in the manufacturing supply chain, primarily deployed in logistics applications.
While it's increasingly common to see GPS technology installed to help manufacturers keep tabs on trucks or to monitor the status of large containers in transit, for example, there are fewer instances of manufacturing GPS technology in use on the factory floor or in warehouse, according to supply chain and automatic identification and data capture (AIDC) experts. Some of the delay can be attributed to GPS' still significantly higher cost compared to other AIDC technologies such as RFID and bar codes, experts say, coupled with fact that the technology lacks the precision for locating items within an enclosed, inside space.

C. Advantages Of Digital Supply Chain over Conventional Supply Chain- [9]

1. Become More Forward-Looking
Supply chain entities have created bad habits when it comes to maintaining a backward-looking approach. in fact, 40.1 % of supply chain entities work almost exclusively in this manner. However, most respondents in the report indicates it becoming more forward-looking is the greatest opportunity for use of the digital supply network.

2. Connect and Relate Data Sources
The Internet of Things (IOT) has become a fundamental aspect of a successful, modern supply chain. The IOT is responsible for many improvements processes, preventive maintenance, and identification of better ways to move products. However, the IOT relies on the sharing of data, and the DSN can catalyze the current limitations of the IOT exponentially. for example, connected devices in the IOT can be used to deliver its data across multiple site, processes, and even organizations. As a result, a more connected system will naturally lead to more connections and sharing of such data.

3. Generate Data-Driven Plans Through Data Visualization.
As data becomes more available, this data will be applied to advanced analytics opportunities. Additionally, the use of data visualization capabilities will make applying data simpler. For example, providing a manager with data from yesterday's transactions is great, but giving a manager a graph with what time performance faltered will go much further in allowing the manager to change today's operations to prevent the failures of yesterday.

4. Improve Collaboration.
Since data visualization tools help make changes in both the digital and physical aspects of the supply chain, collaboration will be improved.

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5. Enter the World of Digital Products and Services.
Modern services and products are not necessarily physical. Apps, Netflix, Pandora, and Uber represent real enterprises that are based on the Internet. Some apps, such as Etsy, go a step further by directly linking the creation of goods with customer-generated designs. As a result, the need for embracing change is essential. The manufacturer, a third-party between the seller and the customer, needs to receive customer- or seller-generated data and apply it to production.

II. HOW IT WORKS

To implement digitalization in supply chain we have to go for stage wise modification into traditional supply chain. The supply chain works link wise from production of semi finished components to finished components its raw material purchasing transportation, inspection, packaging, distribution and sell, so modern technology is implemented in all these aspects with different stages.[6] These stages are given below-

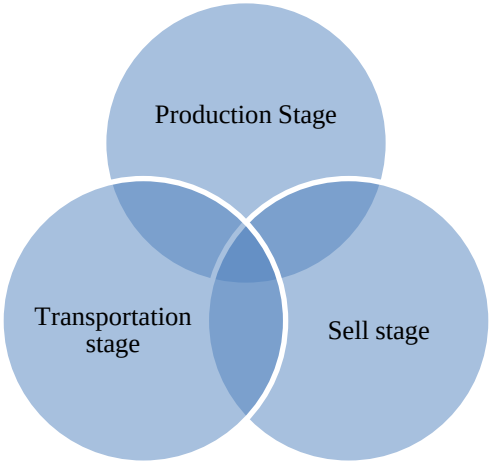

Figure No.1- Different stages of supply chain management

A. Production stage
Entire items like raw material, semi finished and finished product are identified and tracked to achieve balanced and steady production in form of **EPC** code.
It contains – 1 Product name
2 Manufacturing grade
3 Place of origin
4 Net weight
5. Batch number
6. Production date
7. Self life

B. 2.2 Transportation stage
The vehicles which are used to carry the goods and products are tracked by GPS system so that the manager knows location and stage of vehicles, driving direction and wireless system is used for communication. It helps to detect and prevent loss of stolen good during transportation.

C. 2.3 Sell stage
Before selling the product the foreman inspect the batch. The information like expiry date, production date can be identified by EPC code to judge the quality of the product. It confirm the authentication of product and relevant information about product can be found to eliminate the false product.

III. CASE STUDY

New RFID-Based Coca Cola Dispenser [10]
Summary-
RFID Technology is very effective to collect data of products which are distributed in very large scale among the customer. RFID can store each and every detail of product into data base, so that's why Coca Cola used this technology to take information of consumers habit for their favorite drinking soda.
With this help of data they created a regional report on the base of market research. Because of this instead of focusing on one product they able to go much broader spectrum.

A. How it works
Recently, Coca-Cola announced the summer release of a self-serve drink dispenser that is able to pour over 100 varieties of sodas, juices, teas, and flavored waters. Coca-Cola has testing an RFID-enabled drink dispenser that the company claims will transform the soft drink dispensing industry, by providing more than 100 drink options from a single machine. The machine, known as Freestyle, utilizes RFID technology to identify 30 or more cartridges, determine the quantity of flavoring inside each, and transmit data back to Coca-Cola indicating which drinks are being consumed, and when. The Freestyle drink dispenser will allow customers to choose their favorite beverage and add a variety of different flavors to it. [11]
By using the Freestyle drink dispenser, Coca-Cola will be able to collect value piece of data on consumer habits. Since each flavor cartridge is tagged with an RFID chip, and each dispenser contains an RFID reader, the dispenser is able to collect data on what customers are drinking and how much. Eventually, this data is sent over a wireless network to Coke's SAP data warehouse system. From there, the data will be analyzed in order to develop reports that assess how new drinks are thriving in the marketplace, and divide up results by regional tastes, ultimately helping fast-food places decide which drinks to serve. Rather than releasing a new soda with a few market studies, Coca-Cola will now be able to reach a much broader spectrum of people and model their flavors after what consumers choose.

In addition to developing new flavors, the new Freestyle Coke machines will allow fast-food customers keep a more accurate inventory of their beverages. Restaurants will be able to see a graphical view of drink consumption reports, ranking which drinks sold at specific time periods, through an e-business portal. Since most fast-food

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restaurants collect POS data only on the number and sizes of beverage cups sold, the Coca-Cola Freestyle machine ill allow visibility on data that has not previously been collected. Since all the cartridge information is all stored on a network, it will be easy to recall a flavor because the network will instantly disable the dispensers simultaneously across the nation.[10]

IV. CONCLUSION

In today's global competition the traditional Supply chain holds a lower hand to company policy. Because a new concept of digitalization is making its way in Supply Chain model. New technologies such as RFID, ERP Codes, GPS Technology etc. are making Supply Chain Management very easy and cost and time effective and they can be efficiently applicable into Supply Chain Management. But the "Internet Of Things" based on RFID technology has been integrated into all aspect of the Supply Chain Management and it has a significant impact on the development of Supply Chain Management.

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