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A Comprehensive Review of Frameworks and Research Directions in Digital Supply Chain

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Abstract

Digital innovation and technology are bringing huge changes and advancement in the supply chain. At same time, the effect of digitalization and advanced globalization are taking the expectations of customer service to the top and increasing the spectrum of supply chain to the edge of the globe which puts the supply chain under unprecedented pressure. This day's SC is doing a lot more than moving items and materials between 2 areas. In advance and digital world of today the SC has become main pillar of the information ecosystem. In this ecosystem, a group of communicated and carefully coordinated processes must be tracked at all level to increase efficiency and satisfy the client's needs. The point of this survey is to provide compiled assortment of earlier research on DSC and create room for new research on the same.

Keywords: Supply chain; Digital supply chain; Supply chain and business management; Digitization; Digital technology

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Introduction

The word Supply chain points towards complete enterprise architecture, Beginning from parts then making initial items and then from final products development to the delivering of that item at relevant consumers through the complete channel, connecting each suppliers, manufacturers, distributors and end users into an active chain of network as an organized structure. The actual business idea of SCM is to gain the overall conversion of the supply chain through connection between organizations from the aspect of any customer / end user. Complete SCM can communicate and connect every activity in the supply chain, and ultimately be an interconnected package providing end to end services [1].

Supply chain is basically a set of different firms that move any materials from manufacturer to consumer. Normally, There is list of different organization that are involved in this process chain, From beginning the supply of raw item it's conversion to product and movement to distributor then from distributor to retailer and consumer it's all part of a Supply chain process [2].

One of the most significant changes in any organizational business models has been that it is not only the individual organization that competes with each other; rather it is the supply chain network of the organizations that competes [3].

With advancement in all fields in today's world when any organization wants to bring innovation in its processes and techniques, they mostly incorporate digital process and tools replacing the previously used techniques and tools either it is a culture or practice. Digital conversion not refers to the purchase of a certain product or a certain solution, but will affect all the features involved in information technology of various industries. Lack of any technology or failure is more problem than continuous emergence of technology. We now reside in a new digital era in which we aspect that the digital means can be used by us to provide a greater and better experience. In almost all the current scenarios it is achievable. Our smart gadgets have all the data (and more other features) needed to make sure that we work. These better features include text processing tools, calendars, household electricity bill, transportation planning, food delivery services, and weather Forecast etc. However, when the technology is not available to us, it may feel very powerless. For example, because there is no automatic toll meter installed on the highway, you need to wait for cash to be paid in front the booth; go to the court in the city to obtain a public record that should have been published on the Internet as far as you know; watch the conference call device repeatedly fail [4].

The interconnection of person with products and the transmission of the real world with virtual worlds that is enabled by ICT- the information communication technology has now become the strongest driver of innovation in the coming years and may act as the trigger of next wave in technological innovation. That will transform all the noticeable infrastructures in areas such as Supply chain, manufacturing and other. As a result, current value chains/business models will be under immense pressure causing a heavily disruptive impact on every market [5].

A best way to begin when designing a digital plan is from getting the basic knowledge of industry background. I.e. Most organization begins with the altered legacy of their current digital systems. Replacing them with latest digital gadgets and technologies that can increase current revenue, increase efficiencies, improve results, and lower the price of ownership for the IT system. Leading industry develop the culture of data analytics and the IT systems to provide support for the digital strategy and their business objectives. They pursue some specific goals with short term value while getting a wide preview of the organizations digital goals [6].

Literature Review

Supply chain is a progression of interconnected exercises that include the coordination, arranging and controlling of items and administration among manufacturer and clients. A large number of these structures are not self-sufficient because of technological development. Digitization has contacted practically every single part of human life everywhere on the world, influencing supply chain measure as well. In a similar time skyline, 26 billion web associated things are relied upon internet to get operational. Digitization has a disruptive transformation impacts across enterprises, creating worth and organization impacts. One day individuals may even have the option to dispatch fleet of vehicles with basic handheld gadget. It might be conceivable to discover the substance of a freight holder with simply a small electronic device. In a little while, wearable PCs on sleeves. With such outcomes, associations can become more mindful of these expected turns of events with how DSC can increase the value of firms [7].

What started as improvements in industry as 1.0 carried on till 4.0 and still did not end; today we are in the 4th revolution in industry that solely is based upon digitization. In different words, it is now the new decade of Industry Four. In particular there does not exist any definition of Industry Four. The main idea behind it is that in the future, companies may intensively utilize and then connect materials, machines, warehouses, technology, transportation, tools and etc. Which is an intellectual way? This implies the alignment of a Cyber Physical Systems. All the equipment i.e. devices, machines, materials can connect with each other and migrate information to set priorities and trigger action that schedule work to be done. There no longer human intervention will be required for the process to be started. Industry Four also reduces the risk and resilience in Supply Chain process. These 2 fundamental aspects of risk mitigation and Lean Thinking offer new opportunities to achieve SC operations management Excellence at the times of digitization [8].

The increase of digitization in processes it is fundamentally changing organization model, overall organization and even the entire industry. Digital ecosystems are now emerging. Digital products and their relevant services is expected to convert the competition between companies and supply chain in a noticeable way. However, the creation of digital services is based on digital products which are always associated with the complementary innovation and technologies such as mobile computing, block-chain, Cloud, AI and data analytics. The most important fact is that the real improvement is that innovation does not lie in the individual technology but in the combination of itself with others [9].

In current environment the use of modern technologies is necessary in businesses to increase the productivity and organize the SC process. Some of the technologies being used currently for supply chain management around the world are as follows;

1. Electronic data interchange
2. Bar coding and scanning
3. Enterprise resource planning systems
4. Radio frequency and identification
5. Social media
6. Electronic commerce
7. Computerized shipping and tracking

Still the digitization processes are limited and not enough to achieve complete advantage in current market because the use of World Wide Web had changed the behavior of purchasing consumer and the patterns of demand that create high burden on SCM. So there is the need to shift towards digital innovations to remain competitive in current global market area [10].

IOT technologies like cyber-physical systems, radio frequency identification etc. It enables the vertical integration of material & information flows in SC, the block chain gains importance with respect to the horizontal integration of information that flows between institutes because of the role of bitcoin in the current financial system [11].

Power of making important decision while dealing with risk depends on real time availability of information that eases the process to make immediate decisions for actions. Today technology allows gathering lot of SC data online, from supplier and other sources. This is achievable based on online risk databases, track and trace systems, internet of things sensors, and RFID. This monitoring system allows the identification of critical points and also allows timely alerts about incident that can disrupt the SC process. All of the real time data can be entered into simulation model, along the third party RT data about financial, political or natural risk. The integration of this and optimization with RT data allows the use of models for operational planning. Such a Real-time SC risk modeling system constitutes 'digital twin'. 'Digital twin' represent current SC State, with actual demand, inventory, capacity data and transportation. I.e. In case some strike happens at any overseas logistics center, then this problem can be monitored by the risk data system and the details transmitted to the simulation system as a disruptive event occurrence. The simulation in the digital twin can be helpful to show the disruption propagation and then quantify its impact. This enables efficient recovery and adaptation of contingency plans i.e. reconsidering alternative network, back-up routes and other [12].

Cloud computing is the most known outsourcing setup for

any company to support its IM - information management in between the basic cycle of digital information. Supply chain with cloud computing is a game changer. The structure enables the interconnected networks of organizations and customers to follow the stairs for digital product cycle as value of chain. A changeable package for logistic and related service can be developed to ensure privacy and confidentiality in items supply and much more [13].

Block-chain is a revolutionary technology with innovation which can transform many of the traditional systems into more distributed, transparent, collaborative and secure systems while empowering its users. Combining all the aspects, the immediate low-cost assurance of trust provided by block-chain can unleash sufficient improvement and innovation by allowing supplier and manufacturer to instantly make decisions. In the same way as other industries SC can also be improved in a noticeable way through block-chain [14].

The conversion of current conventional supply chain model to a brand new digital one is currently the major challenge in this transformation [15]. The initial step is to set the organization to transform towards digital equivalent. For which the aim is the scientific approach of the maturity model that concerns the digital conversion of organization within the industry SC. The actual trend of digital conversion is expected to play a major role for organizations as well for the DSC of coming future [16]. Such predicted model consist of the objective of addressing important aspects, relevant terminologies and complementary innovations, like CPS-Cyber Physical Systems, smart products, and Big Data Analytics. Scientific rigor is gained through performing grounded theory and research with in-depth interviews which is a method of evaluation and data collection. Furthermore, aspects concerning development and creation of maturity models are discussed, before some suitable/scientifically elaborated model for digitization emerges from investigation and value for economic practice. Lacking in the creation of perfect digitalized model could cause failure in further implementation and processes [17,18].

Discussion

The developments in digital technologies depend on selection of correct technology for the process conversion and the right resource which is an increasingly complex for any type of organization. Technology is the spot light in the 21st century, for which it is crucial to develop the strategy to have full access over the costs and benefits of going ahead with the planned digitization especially for Supply Chain In the current state of technology.

Other than the industry sectors, connection in between different items involved in the SC is necessary. However, relying on the area of business and the end products or end services that are delivered to the customers/ consumer, these functions can be distinct. The coordination and connection of all the different processes in the SC is important to match the demand and supply. Any company is as good as the supply chain behind it. Considering the coming future of SC, it will definitely be as great as the technology that is behind it. In future decision and support system will extensively depend on technology and as so the SCM.

Conclusion

In this literature review a clear look at DSC and current publications in the same field was conducted. The considerable demand in the addition for new technologies proves that the digitalization will continue to affect every part of organizations operation and specifically in the field of SCM. Frequent pressure from the consumer and other competitors means that organizations are under a lot pressure to plan strategies for proper collaboration, coordination, digitization, integration and the usage of new technologies, in order to respond to the customers demand in a batter manner. As the degree for digitization of supply chain can be determined the success of resource allocation, inventory monitoring in real time, overall efficiency and customer interaction, it is imperative for companies to become more knowledgeable in the field of Digital Supply Chain and how it can finally lead ahead towards improvement in performance and further profitability.

The heterogeneity in the difference of contributions in shape of research shows that the research in the field of “Digital supply chain” is limited and there is a lot room for any future research in the field of DSC. I can recommend following topics to be covered: a data driven model that support the agile SC; Analytics in industry, sensor data and social media data; improved smart services for the customer that are relied on smart gadgets; effects of product virtualization on supply chains.

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