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Toward Supply Chain 4.0 and How Disruptive Technologies Help

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ABSTRACT: Industry 4.0 is characterized by new technological inventions that already make it possible to merge the physical world with the virtual one using real-time data and information. This industrial revolution has brought about major changes in the way it is already manufactured, constructed, designed, communicated, and has a significant impact on the supply chain. Supported by a large number of analytics tools, such as scenario analysis, smart planning algorithms, companies are now able to build new, flexible, fast and efficient supply chain values. The common enterprise supply chain network should not use linear connections. Instead, it needs to change to a dynamic network that can be developed with the Internet of Things and emerging digital technologies. This shift from linear to a dynamic network configuration could lay the foundation and determine how companies will compete in prospective.

Keywords: Supply chain 4.0, Industry 4.0, Industry help, Supply chain management, Motives, disruptive technologies.

Abbreviations: SC, supply chain; SCM, Supply chain management; RFID, Radio Frequency Identification; AGVS, Automated Guided Vehicle System.

I. INTRODUCTION

For a long time, high-quality supply chain management has been regarded as the secret of business success. The balance between cost and inventory has always been the focus of enterprises.

In the context of globalization, many companies have begun to seek offshore outsourcing and build global supply chain networks. Globalized supply chains bring economies of scale, global talent, and other benefits. Nevertheless, the challenges that accompany it are the complexity of the supply chain network and the transparency, risk, and sustainable development, which are created by multi-level and multinational supply chain networks.

In recent years, with the development of digitalization, the traditional model of supply chain management has suffered. The emergence of supply chain finance has made managers realize that the management of capital in the supply chain can also create added value for the enterprise. Customers are also becoming pickier. The speed of the supply chain, service, and agility also directly affect sales. The rise of e-commerce and reverse logistics has had a huge impact on the traditional retail industry.

Over the past year, global trade has been affected by some major international political events, and globalized supply chains have been under escalating political risks. Companies are facing more scenarios and even ambiguity. In different scenarios, managers need to consider how to make optimal decisions.

However, in SCM, factors such as cost, service, risk, agility, transparency, etc. are correlated. It is difficult to separate these factors and find solutions individually. How to find a balance among these factors is the biggest challenge. Fortunately, with the development of Industry 4.0, more and more technologies, such as big data, artificial intelligence, RFID, cloud technology, etc. are becoming powerful tools for enterprises to solve these problems [1]. Many technologies are still immature, and many companies have not realized the importance of Industry 4.0 to their supply chains. This article will discuss examples that have been put into use and produced good results, as well as applications with preliminary concepts. Therefore, this article is going to discuss the motives for supply chain management to integrate with industry 4.0 and elaborate on how disruptive technologies will help to improve the supply chain.

II. MATERIALS AND METHODS

This is a literature review work. Online search engine has been the key database. Published articles have been reviewed.

III. RESULTS AND DISCUSSION

In 1760s, where the first industrial revolution brought the transformation of manufacturing processes by using steam and water. In these moments, we see the transition of the economy from agricultural to industrial, bringing mass production and meeting consumer demand. In particular, the textile and transport industries were developed and transformed by mechanization[2]. The use of water and steam as a source of power enabled the machines to be used more easily and to produce a higher output of goods and better living standards. But the new inventions brought about two adverse effects, reduced manual work, and increased new jobs such as mechanics, needed to build and maintain newly invented machinery [3].

The mid-1850s may be regarded as the beginning of the second industrial revolution, which began in states like USA, England and Germany, a period historians often

refer to as the "Technological Revolution". This era of inventions has more to do with the discovery of electricity, oil, gas, and their use as sources of energy, which brought about electrical technology, more advanced machinery, and increased production. These energy sources were subsequently reclaimed and evaluated with the invention of the combustion engine, thereby leading to the introduction of steel and chemicals. It should also be noted that the transport industry has undergone radical changes with the invention of vehicles and aircraft, as well as the methods of communication since the invention of the telephone [3].

The third stage of the industrial revolution relates to the birth of computers, nuclear power and electronics. Around the 1970s the industry developed manufacturing automation including information technology, electronics, renewable energy and connectivity. Later, communication and work modes changed radically with the invention of the Internet. Industry 3.0 included even more process automation by replacing manual work and making many people believe that computers would soon replace people [4].

The fourth industrial revolution has improved what industry 3 brought to us by merging computers and digitizing with smart machines, storage systems, which have the ability to operate independently without the need for human involvement. It is expected that Industry 4.0 will radically transform production, with more avant-garde technologies now improving manufacturing as well [2]. The benefits of advanced technologies invented during this revolution are expected to bring higher efficiency and to change the relationships between different business stakeholders, such as suppliers, customers and producers and also the way people interact with machines [5].

A. Disruptive technologies in Industry 4.0

Advanced technologies are already developing and advancing rapidly, and are being widely used in manufacturing. Computer technology enables gathering and processing large volumes of information and data that would be impossible under manual conditions, and Industry 4.0 enables manufacturers to make efficient and optimal actions by knowing which processes require more attention and development [5]. Here is a brief explanation of some of the disruptive technologies that have a major impact on the advancement of the distribution network, in the relationships between suppliers and consumers, between humans and machinery [6].

Internet of Things: With simple words we can describe it as connected devices, basically, everything that can be connected to the Internet. These means, connections from home appliances up to the most sophisticated technology, as long as it has a switch on and off on it. IoT would give these devices the opportunity to communicate with each other [7].

Cloud: One of the major factors in Industry 4.0 Cloud computing; by using the cloud environment in which all data is stored, it allows different users to access and utilize this data in order to optimize operations [6].

Robots and drones: Once imagined, today it is possible for robots to be used by companies of all sizes at an affordable cost, delivering high efficiency and support to companies, from collecting goods to making them ready for distribution. Amazon is a good example of using robots for moving products in the warehouses and reducing costs by adjusting the spaces also.

3D Printing: This technology is truly an innovation and has undergone significant developments, especially in the last decade. Known as add-on technology after using computer-aided design models, it has become a major advantage for companies by reducing costs, production time and innovative designs [6].

Artificial Intelligence: It refers to that technology which in itself requires some human and logical abilities to perform various tasks and to be as close to the human's preferences and requirements as possible [8].

Autonomous vehicles: They are also called self-driving cars, where there will be a small need for human intervention during driving or not at all. They are considered to be future cars with a lot of potential in reducing energy consumption and also very environmentally friendly [9].

Virtual Reality/Augmented Reality: Virtual reality is presented as a physical device which through viewing and listening stimulates a virtual reality in which you can intervene, such as in various games, for example, facebook Oculus. Matrix is for real now!

Augmented reality can be described as incorporating digital elements into real life, through various software systems such as 3d layers, etc. The best example of AR in practically is Pokemon go, or Ikea Place, a program used in computers that through 3D image can make you have a clear view of how a flower vase can look in your table [8].

RFID (Radio Frequency Identification): RFID is a tool used to identify various objects through labels or tags placed on those objects, which may be goods, equipment, animals, even humans and is mainly used to trace their location, monitor, survey or read the data contained in the Id by using wireless technology.

AGVS (Automated Guided Vehicle System): AGVs are devices of different sizes or otherwise called robotics, which use different programming systems to navigate and perform assigned tasks without the need for a driver or human intervention. The major benefits of these robotics are lifting very heavy weights, transporting them, inserting them into unsafe areas, reducing manpower, and performing tasks with high accuracy and efficiency.

B. SC goals & drivers & levers

Under Industry 4.0, to deal with more demanding customers and increasing operation cost pressure, the trend of supply chain management is to become faster, flexible, granular and accurate [10].Generally, the main goals of supply chain management can be concluded as lower cost, greater agility, better service quality, and capital management.

To achieve success in all goals, six drivers are specified based on the classification of supply chain activities. They are planning, order management, performance management, supply chain strategy, collaboration, and physical flow [10]. Corresponding levers can be used to improve the performance of each of the six drivers. These levers are the real implementation of Industry 4.0 technology in different areas of supply chain management.

C. Disruptive technologies into SC levers

Explanation and cases will be provided in the following part. Also, the application of
disruptive tech corresponding to corresponding leverage will be presented.

Collaboration:

Supply chain cloud & Multi tier suppliers connectivity. Traditional IT systems are primarily deployed locally or hosted by third parties. From server to infrastructure, data, applications, and operating systems are all stored locally or on designated third-party servers. Therefore, the data between different parties of the supply chain has been isolated. This kind of mode helped companies to improve their confidentiality. However, it hinders the information exchange between different stakeholders. Besides, it raised infrastructure costs because creating as well as maintaining local information systems requires a lot of manpower and capital.

Under industry 4.0, Cloud computing has been widely implemented in supply chain management, especially in an information system. Cloud providers can virtualize calculation, data, and network and store them in the cloud. This cloud can be shared by multiple parties, which means that any stakeholder in the supply chain can view other's data in the local infrastructure if allowed. Traditionally, the pain point in supply chain collaboration is the low transparency no matter in operation or strategy. In real cases, the relationship between different parties is gambling rather than cooperative. This implementation does well to all participants in the supply chain.

For customers, they will be provided with the latest information, including inventory, category, transportation. This information will address their concerns about the operation. For example, UPS has developed a system that allows customers to get access to real-time logistics information on their goods, satisfying their consumers and leveling up service quality. For retailers, Cloud technology enables employees to keep track of real-time inventory and availability, which allows retailers to better adjust their inventory and sales strategies. Furthermore, several concerns can be addressed in terms of inbound logistics. Cloud computing systems are equipped with multiple language models, which eases communication difficulties caused by language barriers. Suppliers at all tiers will transform the original linear supply model which leads to the bullwhip effect into a modular supply model. In the face of fluctuations in the upstream and downstream of the supply chain, suppliers at all levels are no longer passively increasing or decreasing inventory as in the past but actively adopting collective solutions.

Planning:

Predictive analytics in demand planning. Predictive analytics refers to the practice of extracting information from existing data sets to determine patterns and predict future outcomes and trends. The purpose of predictive analysis is to provide a picture of future pictures and identify what and why. In the past, supply chain planning is based on historical data [11].

To forecast future demand, the usual method was to collect historical data and apply both quantitative and qualitative approach for instance time series or Delphi method. The predictive analysis takes a more comprehensive analysis integrating influencers, interactions and actions to form a forecast. Despite the disadvantages of distance compared to retailers, they can deliver goods' wrist. predictive analytics not only helps to process data in a more sophisticated way but also to classify data and figure out the relationship between data.

In planning, the biggest challenge that all parties are facing is the accuracy of the forecast. A forecast is always with errors. Predictive analysis assists companies by mitigating errors. Changes in any one factor will affect the forecast results. Traditional forecasting methods are powerless for any sudden changes, and predictive analysis can provide accurate figures by analyzing the changes that similar factors have brought to the supply chain planning, reducing inventory costs and optimizing capital utilities. According to Ulanoff, [12] Amazon presents a best example of predictive analysis. Amazon collects the data of their consumers' age, occupation, view, clicks to links, time on site data to predict customers' favor, conducting a forecast on sales. Based on this forecast, they can arrange logistics activities 2 or 3 weeks in advance. Despite a lower cost and a shorter time. Predictive analysis can also help to manage suppliers, it can identify the stability of suppliers, the type of risk appetite, etc., and reduce the risks brought by suppliers.

Scenario planning. A so-called "Silo planning" strategy is widely used in supply chain planning. With regard to time, planning is classified as long-run planning and short-run planning. It is not viable to apply time series or even predictive analysis in long-run planning, as these methods can not perform well in a longer horizon due to the potential occurrence of step changes and unforeseen events such as political events, climate changes, economic upheavals and technological innovations.

Scenario planning makes it possible for multiple possible futures at once instead of one future. According to Axson [13], there are three main phases of scenario planning, including identification of issues, driving forces, and factors, making rough scenario plans and evaluation of possible decisions. For instance, Electronic IQ company implemented scenario planning in identifying potential risks and profits of investment in the development of new software [13]. Through associating several key drivers including GDP, climate change, technical viability and so forth, it created four possible scenarios. With this planning, the managers and executives have constructed corresponding marketing, financial and innovative approaches and strategies. As a result, Electronic IQ achieve a leadership position and far exceeded the minimum demand of the market.

Advanced profit optimization. Advanced profit optimization refers to achieve the lowest costs and the highest revenues through balancing resources attainable and demand constraints [14]. To maximize profits, firms would like to increase their sales as much as possible while lowering their cost and assure an optimal pricing strategy. With regard to pricing, it is now possible to conduct dynamic pricing, which facilitates companies to find out optimal sales and price combination when facing demand fluctuations. By taking

into account consumer behavior patterns and competitor strategies, sales volume corresponding to different prices can be calculated. Take Uber as an example, it has implemented an advanced algorithm to vary it's rated based on time, distance and traffic condition. At the same time, Uber will fine-tune the freight rate based on the volume of traffic that can be provided based on the possible characteristic time and location [15].

On the other hand, the greatest advancement brought by predictive analysis is that factors used to be hard to calculate now can be quantified. Some silent costs and opportunity costs such as manpower, public relation costs can be taken into consideration when calculating the total cost. Furthermore, when it comes to the selection of suppliers, big data allows firms to quantify possible costs when choosing a mixture of suppliers. Other factors like suppliers' reliability, additional costs to variable delivery time, default costs will be included in the calculation of total costs by the form of quantitative analysis. As a result, firms are easier to choose the best portfolios.

Automation of knowledge work. Automation of knowledge work refers to the "use of computers to perform tasks that rely on complex analyses, subtle judgments, and creative problem solving" [16].

There are a series of basic knowledge work in supply chain activities such as invoicing, keeping track of orders, proofreading contracts, order fulfillment, etc. With regards to where machines work better, Thompson illustrates how "tractors are more powerful than farmers, and how robotic arms are more tireless than assembly-line workers" [17]. Even though many of complex strategic work cannot be replaced by robotics due to the immaturity of the technology, some of the fundamental activities are now gradually handed to robotics. Apart from low cost and high accuracy, robotics shows its advantages in resolving language problems and time difference. Even in the transactions of multinational companies, robots can deal with the problem of language incompetence, and can always give feedback for the first time, which has won a lot of time for the supply chain.

Meanwhile, customer service robotics provides a better solution to reverse logistics. As an example, the robot customer service developed by SF Company, based on the standardized advantages of its own team of more than 1,000 maintenance engineers, provides on-site service of "5 minutes response, 2 hours on-site, 1 hour recovery/repair", which tremendously improved their service quality. In this process, the data collected by the robot customer service will be fed back and used in future predictions, forming a closed loop of data.

Physical flow:

Automation of warehousing. Automation of warehousing refers to the application of advanced technology in the warehouse using managed computer systems, robots, automated conveyor systems, automated guided vehicles, pallet flow racking and automated storage and retrieval systems. This reduces the use of manual labor and increases efficiency when goods are delivered, distributed, stored in the warehouse and when they are picked up from the warehouse.

Managed computer systems consist of the combination of warehouse control and warehouse management which facilitate the efficient storage and movement of goods in the warehouse [18]. The systems are linked to the barcode readers and to the radio frequency identification which then helps in tracking and an indication of the data of goods [18]. For example, Amazon captures its data using this advanced technology in its warehouses and this had led to improved data accuracy, reduced errors, reduction in losses and a decrease of paperwork. Ultimately, this has propelled Amazon to become more competitive since their supply chain's physical flow has been optimized by the successful integration of this technology. Also, advanced technology has benefited small to medium enterprises (SMEs), multinational companies (MNCs) and other different stakeholders to become competitive within the supply chain industry.

The continuous advancement of technology to the 4.0 industrial revolution in the supply chain has led warehouses to become automated with the use of robots that have in the materials handling [18]. Robots are devices which are programmed, self-controlled, perform tasks in place of human beings, they have artificial intelligence and are flexible as they do different responsibilities [18]. The advanced robotic system that is used in the supply chain industry in the current era is called the Kiva robot. This robotic system is making warehouse operations such as lifting, sorting and packaging to become so easy, effortless. Also, these robots can work 24 hours a day without a tea break or lunch break making it very productive and competitive to the companies within the supply chain [18]. For instance, Ocado a British online-only supermarket created an enormous structure that fills the whole warehouse which they call the hive-grid- machine and it is occupied completely by robots [19]. The robots are more than a thousand and are aimed at reducing the cost of labour, errors, accidents that can be caused by human beings [19]. Ocado is also growing in the business of manufacturing the type of advanced technology they are using in their warehouse selling it to other firms in the supply chain industry. However, this is causing high rates of unemployment as the tasks of humans are now replaced by the use of robots [19].

Autonomous and smart vehicle. The physical flow of goods within the supply chain from supplier to retailer is made easier, faster and cheaper due to the continuous evolution of technology. Although some companies have not yet initiated the use of smart vehicles, the few that are using smart vehicles in the supply chain are becoming competitive [20]. This is because the autonomous and smart vehicles reduce the transport and operational costs, decrease the lead time and therefore, increase customer service and they encourage less environmental costs [20]

More so, smart vehicles and warehouses will be communicating through the combination of internet of things (IoT) sensors and radio frequency identification (RFID) tags to monitor and come up with comprehensive results upon the movement, load balancing and control of supplies and inventory [20]. Normally the information transferred between the smart vehicles and warehouse is for the warehouse staff to decide and to free up some space for the incoming goods [20]. Also, for the smart vehicles to be prepared for the picking and delivering of finished goods to

specific customers in the right condition and the right time.

Autonomous and smart vehicles in the supply chain refer to both light and heavy trucks that are used to transport raw materials, semi-finished and finished products up and down the supply chain [21]. These trucks can choose the best route to use from the different options that will be offered, they contain smart containers and pallets that can sense the parameters such as temperature. Also, they can make the required regulations and send real-time information so that the cargo will be transported in the right conditions [20]. For example, Volvo and Tesla are competitors in the automotive industry that are producing autonomous and smart trucks selling to different companies in the supply chain. As these two companies have goals to continuously manufacture smart vehicles in years to come, many logistics companies will slowly replace old trucks with autonomous and smart vehicles.

Smart logistics planning algorithms. To gain a competitive advantage in the supply chain, logistics companies should invest in advanced technologies. They must be able to be easily modified to respond to altered circumstances and enable the business operations to be smarter, well organized and successful[22]. The smart logistics policy enables the generation and development of activities to be sent off to employees who then deliver the products using the first in first out method (FIFO), making the best of the most effective routes [22]. Also, smart logistics algorithms allow safekeeping of involved customers until the end of the cycle, observing and checking the progress of the daily operations and based on real-time, examining the different tasks are being carried out [22]. Finally, by way of smart auto-routing, the distributors are given the most desirable routes and therefore, this reduces time to reach the destination and enhanced productivity.

Machine-learning basing on geo-coding skills helps the warehouse operator and the customer to have the actual knowledge of the place or site of the distributor, delays and expected time of arrival of the goods [22]. Smart logistics application for delivery such as mouse's web and mobile-based utilizes an advanced set of rules to upgrade the value of addresses and this can change address from one language to another for it to be more specific and exact in form of distinctive coordinates in the whole world [22]. For instance, switching an address from English to another specified language.

To enhance the physical flow of goods and information in the supply chain industry for both national and international companies, there is a need to include the enterprise resource planning (ERP) system which encourages smart logistics planning within different supply chain companies [22]. ERP system offers the plan of action to the distributors and other stakeholders in the supply chain through real-time information [22]. This enables the distributors to find the quickest and cheapest way to deliver the goods to the point of destination with the help of a variety of services. On the other hand, the ERP system also keeps other stakeholders informed about where the distributors are located, provided with information about products to be delivered and notified in time if there are any delays [22]

Order management:

In recent years order management has been made easier through automation of information technology such as machine learning, predictive analytics, IoT enabled sensors and RFID tags and digital twins that have been implemented in the supply chain 4.0 [23]. The advanced technology in the supply chain is enabling many companies to engage in no-touch order processing and demand, sales and operations re-planning have been made easier through enhanced forecasting [23].

Many companies in the supply chain are tracing, observing and checking the RFID equipped stock and supply levels using sensors. RFID tags and IoT sensors are of great importance as they are helping the planners of different departments in the supply chain to have a clear understanding of the movement of goods from raw materials to finished products [23]. In addition, the advanced technology provides real-time information concerning the supply needed from suppliers and the demand for products from the customers in a certain period [23]. This ultimately reduces errors, becomes quicker and uncomplicated in forecasting demand and supply for the next month or months to come.

The supply chain system of the logistics industry is incorporating the latest developments and trends of technology which then enables it to have a dependable planning base for its resources [5]. This is through real-time re-planning which provides immediate order date confirmations and retrieves information from the past of re-planning production program [5]. Also, real-time encourages faster lead time to the customers, increased customer satisfaction and loyalty.

Furthermore, many logistics companies are manual and physical ordering process into completely using the automated ordering process. These logistics companies are aiming to operate with no touch process in the event of taking orders and when the order has been completed, which means there are no manual activities needed [5]. Automation of the order process is a combination of available-to-promise process and no-touch order process [5]. This process is the response given to a customer based on products available in stock, product quantities and dates for delivery and this is the first step to be employed before the no-touch order process [5]. This advanced technology, therefore, makes the order processing to be much faster, it also reduces the chance of errors and enhances the customer service and productivity within the supply chain industry.

SC Strategies:

Micro segmentation. Given the number of customers who require customization in the products and services they purchase, enterprises must manage these requirements in more detail using different techniques such as micro segmentation, greater customization, and many other planning tools. With so many new ideas for order delivery, and even drone delivery, it will enable companies to manage every possible distance, meeting customer personal requirements, delivering orders on time, even exceeding the expectations of clients [24].

Micro segmentation has a lot to do with what customers watch, what sites they navigate, how much time they spend on a particular site, and how much they are influenced by various promotions advertised. In this

way, the system, relying on big data analytics, can develop micro segmentations for different clients or groups based on their infinite personal characteristics. This also brings with it the opportunity to develop individual promotions. The best way to synchronously manage the supply chain would be to use big data and advanced technologies. This helps companies understand what did happen before and foresee what will happen in the future. For example, through a predictive model known as collaborative filtering which, through the use of customer data, has made it possible for the online retailer Amazon to further enhance the "you may also like ..." recommendation option [24].

Performance management:

Performance management has undergone changes over time and continues to be in the process of continuous change. In the past, Key Performance Indicator tables were an important task and were found in some aggregated levels, while nowadays very detailed data are available at every moment from various sources, both external and internal. This has made the performance management process an operational process that strives to achieve constant and continuous improvement, compared to what was previously a normal and scheduled monthly process. For example, planners may quickly realize critical supply chain disruptions in order to be more easily reached by an automatic treatment of small eliminations or possible settlements to the larger ones [25]

An efficient way of treating exceptions is the automated root of the analysis. A performance management system using different comparative domains whether with a particular typology of basic indicators or analyzing a large set of data through the use and use of machine learning information and types can thus identify the reasons key to an exception. After identifying the root cause, the system will automatically take action, such as activating the command to change the rating settings on some programming systems and other measures in response to root cause modulation.

Digital Performance Management. Digital Performance Management is a very efficient tool for measuring the customer experience and how satisfied they are, connecting it with distribution chain metrics, operations and infrastructure, filling it with different datasets. This tool also helps us to get a clearer and more complete picture of how satisfied the client is with the application experience, and new processes need to be improved and developed for this. DPI is an all-inclusive tool that helps all business stakeholders from social media, IT or development departments, customer statistics department, work and develops the same data achieved during customer navigation, so they do not use separate information regarding the same clients. In this way different departments can search customer data from different outlooks on what they see is more relevant [26].

The main purpose of digital performance management is to achieve a more resilient, fast-flow experience for all stakeholders, with the objective of achieving the biggest revenue, and this is achieved by enabling business-IT collaboration, so it serves as a bridge between these two main actors.

Digital performance monitoring tools and approaches. User background data collected through surveillance and testing help improve and guarantee digital performance. Active surveying, which works around-the-clock, marks continuously the distribution experience. Lately, synthetic surveying is becoming more widespread, as managers at different levels are handling international markets which are asking for more quality of backgrounds.

Obviously, the reason behind collecting all this information by surveying and analyzing digital services is to detect and adjust problems that users can face. If we can explain in a general way, we could say that digital performance analytics gives sense and value to data and information. Key Performance Indicators can address technical departments and business relevant teams, relying on the nature of connections and standards you choose in your data visualization implementation [26].

Table of contents both qualitative and quantitative data, with information collected during the monitoring and digital performance study, enable business decision-makers together with IT to collaborate and make timely investments for the proper purpose with appropriate technical options. Most of the entrepreneurs nowadays realize that giving a successful digital experience to their clients, like for example new features empowered by the Internet of Things, leads them to successful and prosperous digital efforts.

IV. CONCLUSION

Undoubtedly, it can be noted that there are many motives behind the emergence of the supply chain industry 4.0. These motives have been changing depending on the current era from the supply chain industry 1.0 up until the industry 4.0. To further explain the motives of industry 4.0, the six main value drivers that are, planning, physical flow, performance management, order management, collaboration and supply chain strategy have been described and analyzed through the different levers of each driver.

Management dilemma is still noticeable under supply chain industry 4.0, as many companies still must shift from their past focus on reduction of cost for the success within the supply chain and to give emphasis on other different issues such as increasing their markets and to have a networked supply chain through outsourcing and offshoring.

In supply chain 3.0, there was less transparency in collaboration through the exchange of data from the suppliers to the final customer and this caused many interruptions to the success of the supply chain industry. However, the invention of cloud technology which consists of cloud computing systems has managed to solve many problems faced by firms in the supply chain as they provide real-time information whenever it is needed from the supplier to the consumer.

Planning used to be difficult in the supply chain industry in past years as there were many errors in forecasting and to make future demand forecast, data was accurate, but the way can lead to some inaccuracy. This has been eliminated by the introduction of the predictive analysis as this provides exact data and categorizes data therefore, firms in the supply chain can deal with their customers and suppliers successfully.

The supply chain 4.0 has made order management easy as main customers in the supply chain can

monitor, control, and place orders to their suppliers through automation of information technology such as IoT sensors and RFID tags. This technology helps in real-time re-planning and for the supply chain to engage in no-touch order processing which is a lot more faster and efficient.

Due to the invention of the global market, customers are also becoming picky and prefer more customized products which then causes many different segments of the market to be catered for. However, due to supply chain 4.0, firms are able to manage their segments through micro-segmentation which cost-efficient and increases customer service throughout the supply chain. The last driver is performance management which has been made better and easy due to the real-time data available from different sources in supply chain 4.0. This allows for unceasing enhancements in a firm's operations than what used to be done in the past where performance evaluation would only do after a period like a month or so. In Summary bellow table 1 have been discussed in this paper.

Table 1: Review Gist.

	Internet of things	Cloud	Robots and drones	3D Printing	Artificial Intelligence	VR/AR	RFID	AGVS
Advanced Profit Optimization	✓	✓	✓		✓			
Scenario Planning			✓		✓			
Predictive Analysis			✓		✓			
SC Cloud and Multi-Tier Connectivity		✓						
Automation of Warehousing	✓		✓				✓	✓
Smart and autonomous vehicles					✓			
Smart Logistic Planning Algorithms	✓	✓			✓			
Micro segmentation		✓			✓	✓		
Performance Management		✓			✓	✓		
Digital Performance Management		✓			✓	✓		

V. FUTURE SCOPE

Even though the motives for the supply chain industry 4.0 have been debated in this paper, there is still some unanswered question remaining which requires further research. Besides the application of advanced technology in the supply chain, there is also a need to research more on the management part of it after the implementation of these different advanced technologies. Time was the major limiting factor for the researcher to have some further research. Therefore, the researcher calls for empirical research in this area. Also, indeed how much efficiency or benefits we can get is blurring, so maybe in the future, a quantitative method can develop this topic further.

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