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Changing Facet of Supply Chain Management – Is Human Factor No More Relevant? – A Study on Developing Countries

Vikas Gupta

University of Southern California
vikas.gupta.2022@marshall.usc.edu

Abstract- **The world is getting rapidly digitized in every aspect. Supply chains across industries and geographic locations must also adopt the new technologies that replace human labor in order to remain relevant and functional. That is not to say that the need for human labor is completely non-existent. For developing and emerging economies, where the extent of digitization is still dismally low because of various factors, the relevance of the human facet of Supply Chain Management (SCM) is still hugely relevant and essential. This article investigates the importance of the human factor in the management of digitized supply chain in the modern world, from the perspective of the developing countries. Complete digitalization of SC is impossible due to technological and budgetary constrictions. The research reveals machine is no substitute for human labor in SCM, especially where there is need for speed in decision making and where historical-data based computer programs become incapable of offering a proper solution. Human intervention is still necessary in areas such as customer handling where a personal touch is needed rather than machine offered solutions.**

Keywords- Digitization, Supply Chain, Supply Chain Management, Human, Labor, RPA, AI, ML, Labor displacement.

1.   Introduction

In the modern era of digitization, every aspect of domestic and commercial activities is undergoing sea change to ensure they remain viable and can compete in a ruthlessly competitive global arena. Higher levels of digitization such as Robotic Process Automation (RPA), Artificial Intelligence (AI) and Machine Learning (ML), are displacing human labor in mundane but necessary tasks, helping organizations to become leaner, achieve economy in operations yet remain highly efficient and competent to compete [1]. The question which then naturally arises is that whether computers will completely replace humans when it comes to functioning of an organization – at least in the day-to-day business? Is the human workforce at risk of completely losing its relevance and need when it comes to business operations? Is the fear of man being replaced by machine logical? Will there be no room for human discretion?

Before any of these questions can be answered conclusively it is essential to investigate the situation that led to the adoption of machines that will replace human efforts, understand the background and the need for digitization. The situation, though broadly similar across the globe, varies between developed and developing countries.

1.1   Background & Rationale

Supply Chain Management (SCM) is among the most interesting yet difficult areas and requires a lot of coordination between various sectors, particularly manufacturing, logistics and marketing [2, 3]. Hence it can be said that if SCM is streamlined and meeting its objectives, the overall business is also successful and profitable.

Business procedures are transforming regularly and rapidly due to evolution in technology, changing consumer demand, economic and environmental changes. This has resulted in the adoption of lean business practices with just-in-time (JIT) principles being incorporated in both transportation and distribution as well as in manufacturing. The last 3 decades saw logistics undergoing a sea change transforming into an autonomous SMC function that is being led by a CSO - the Chief Supply Chain Officer in certain companies, from being predominantly an operational function reporting to manufacturing or sales and concentrating on ensuring smooth supplies to production lines and placid delivery to consumers [4].

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Other changes that business needs to monitor constantly are globalization and adverse conditions brought about by natural calamities and geo-political concerns. SCM therefore is required to build a dynamic solution that would cater to all such challenges, as and when they appear. Novel technologies such as Artificial Intelligence, Robotics and Machine Learning have become a boon to the SCM by being able to mitigate those challenges [5].

1.2 Research Objective & Research Questions

The objective of this study is to establish the need for human intervention in the management of digitized supply chain, from the perspective of developing countries. These regions are particularly high on un-skilled workers who are likely to be replaced by machines when supply chain digitization happens. However, due to the very nature of these economies complete digitization is neither possible nor recommended. This article strives to evaluate the possibility and desirability of complete digitization of supply chains in developing economies.

The article will answer the following questions-

1. Will digitization completely replace human labor in developing countries?
2. Will complete digitization of supply chain be possible in these economies? Will it be desirable?
3. Will human resource lose its relevance when it comes to supply chain management?

1.3 Research Contribution & Future Scope

The research that has been presented through this article contributes towards adding to an ever expanding body of literature pertaining to industrial and socio-technical environments, global supply chains and human physical production systems. The ultimate objective of the research being the establishment of the argument that human element is still extremely relevant especially in the contxt of developing countries that are plagued by such constraints as limited financial budgets for investment in emerging technologies, dearth of technological training and education, and severe shortage of skilled labor necessary for implementation of digitization of supply chains.

This article also identifies and discusses various steps that the companies can adopt in order to cope with such disruptive scenarios as the global pandemic that hastened the adoption of digital technologies to reduce the human intervention in supply chain operations and management.

Further research can be carried out along a number of directions that can help unlock several rational and accommodating capabilities, as also open up the avenues for increased adoption of new digital and technological innovations in industrial socio-technical environments.

2. Literature Review

2.1 Need for Digitization

Technology is key to handling mundane and laborious tasks that involve usage of huge volumes of data [6]. Actual tracking through motion sensors, transaction systems with programmed responses to exceptions and analysis of data on a constant basis will be a game changer in such cases. Conventional approach to the logistics industry is seen as a physical infrastructure industry with huge part of the investment dedicated to transportation using vehicles, warehouses, ports, and ships [7]. Also, the human labor involved in this industry are mostly unskilled or semi-skilled. Thus, IT investment in such companies were limited to specific departments within the company [8]. The introduction of global supply chain has brought about a significant change in this viewpoint [9]. Components or commodities required by a company, to manufacture their finished products, are sourced globally. A chip making factory in Taiwan faces a problem and the ripple effect of stoppage in chip production is felt by car manufacturers in Europe and India. To handle such far reaching implication scenarios, supply chains need to be connected digitally and information on stoppages etc. need to be exchanged between companies and countries as and when they occur [8].

This is the age of highly uncertain demand, risk of supply line stoppages and ever-increasing cut-throat competition where Supply Chain (SC) effectiveness actually depends on the organization's capability to bring the full spectrum of transactions and processes under one umbrella and manage the full value chain from the acquisition of raw materials or individual components to the production of finished merchandise and delivering to customers. This also brings greater visibility across the whole procurement, production, sales & distribution, and many leading businesses have also tried to share real time info with their SC partners and collaborators.

This has made the SCM become more information oriented and is always looking for alternative assets that can be substituted as and when the need arises. These pre identified substitution assets range from inventory, warehouses to backup transportation and this info constantly updated in real time [10].

With the evolution in business scenario and intensification of competition, digitization of the supply chain has come to occupy a vital position when it comes to restructuring the business processes to make it more efficient while maintaining the competitive edge — and this transformation is not as intimidating as it might appear to corporate leaders and their employees. The speed with which digital development has been taking place has steadily picked up pace over the last few years. Every step ahead advancement feeds into the next and so increases the rate of change [11].

Digitization of supply chain is accomplished primarily, through the use of software — be it innovative, unique, custom-made, or an amalgamation of these while the focus remains strongly on automation and business intelligence (BI) [12]. A large number of stakeholders including producers, manufacturers, providers of logistics support and services, and technology suppliers drive the performance of the supply chains. The interrelation and interaction amongst these stakeholders at different levels of the supply chain covers in-sourcing, outsourcing, off-shoring, customization of products, and many more things. It has become absolutely necessary for the developing countries to concentrate on the acquisition of contemporary technologies and at the same time build up human capital, with the purpose of moving up the value chain [13].

In the early 2020s came the COVID-19 outbreak which had a substantial bearing on supply chains. The trend for companies to digitalize and standardize processes picked up pace. It was essential for rationalizing and data and information exchange across the supply chain and making it more efficient [14]. The distinction between the adoption of digital technologies at the time of and after the emergency is extremely fascinating. During the emergency, digitalization was instrumental in aiding companies to cope with disruptions in the supply chain, whereas post the emergency, digitalization facilitated recovery in the companies' businesses [15].

In order to perform efficiently, every level of supply chain demands an extremely elevated degree of visibility. For achieving this, an effectual and proficient mechanism becomes imperative that can integrate coordination amongst various supply chain stakeholders and makes it possible to share accurate data throughout the supply chain. New levels of visibility, enhanced performance, and supply chain coordination can be achieved through the use of next generation of technologies, including machine learning, advanced robotics, Internet of Things (IoT), 3D printing, and artificial intelligence [13].

2.2 Impact of Digitization on Human Resource

The crisis caused by the global pandemic, which still lingers on, has been responsible, to a large extent, for the shift in economics [16]. Whenever the labor market is faced with a turbulent environment that is characterized by a lengthy sequence of transformations and transitions, spawned by the processes of automation, robotization and digitalization, the recent global pandemic has showed that the workforce that possesses digital skills has better ability to adjust swiftly to changing and emerging circumstances [11]. Various emerging issues including distortions in the supply chains and limitations faced by internal movement, exert a lot of pressure on the labor markets [17] which has created an urgent need for restructuring and remodeling economies and pursuing latest technological drifts [16].

All over the world, the labor force was witnessing lot of uncertainties even much earlier than the crisis caused by the global pandemic for uncertainties are inherent to and is common for every market. But the equation now is different. In the contemporary period, to a huge extent, the uncertainty in the labor market is attributable to the remarkable and rapid pace with which technological growth and development is taking place all across the globe. The pillars of the future of work is formed by various factors including Computer science, information technology (IT), robotic process automation (RPA), remote working, mechanical engineering, electronics and communications, and the digitalization of public administration. Many of the researchers are of the opinion that unless robotic process automation is made a part of the technological processes, it will be extremely difficult if not impossible for the businesses to compete in markets, both at home and abroad [18]. A new concept has been generated by robots and automation of processes, especially the ones that are repetitive, called the robotic workforce [16].

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Robotics makes faster scaling up of supply chains possible that can help to fulfil supply requirements that are essential for matching the increases in demand. Robotics also makes way for better adaptability of the workforce, enhancing safety of the workforce by replacing human labor in hazardous tasks such as salvaging objects from high storage spaces [19].

2.3   Digitization in Developing Countries

The pace of Globalization has picked up tremendous momentum which has resulted in magnification of the significance of modern supply chain management. It has also made managing supply chains more difficult due to increasing complexity, huge economic diversities, convoluted legislations, multiplicity of regulations, and more stringent standards. Participation in these supply chains, fueled by low value-added manufacturing activities have contributed to high rates of economic growth in many developing countries in LATAM, the Caribbean, and Asia Pacific regions [13].

Digitization of supply chains has seen a huge investment by technology starts-ups with focus on various parts of the supply chain. One can get data from a wide range of sources viz. GPA trackers, IoT devices, sensors in cold chain as well as ship and flight tracking systems. To add on warehouse control systems, smart CCTV feeds. Mobile phones used by the delivery vehicles and RFID on the transport vehicles all generate immense amount of GPS data. Geo-codes of delivery locations, product images and delivery documents are also sources of data [8].

Within the span of a decade, logistics industry has shifted from too less information to an unlimited deluge of data. Increasing usage of Artificial Intelligence and Machine Learning has led to a huge number of manual tasks getting automated [8]. It is still a huge concern how disruptive will the effect of artificial intelligence and automation be on job security and employability of labor [20]. For developing countries, higher adoption rate of AI will mean declining rates of employment and wages increase [21]. Visionaries in the technology world provide a bold illustration of supply chains of future which are extremely digitized to the point of disappearance of the function itself. They visualize and predict a world with total automation and seamless integration of almost all tedious and complex yet sophisticated tasks including estimation, planning, and implementation, in which systems undergo adaptation and modification in order to be able to provide solution to problems and act in response to the variations in demand and supply without requiring any amount of human intervention [22].

3.   Research Methodology

This study scrutinizes literary work on digitization of supply chain and its management. Keywords analysis is the methodology that has been used to carry out the research. Keyword analysis has dual objectives: a) to ascertain, examine and discuss the key research areas associated with the impact of digitalization of supply chain on human resource and b) to clarify the need for and importance of human intervention in supply chain management in developing countries – a major research area in order to better comprehend the complexity in the relationships between research concepts in these premises [15]. There are several digital technologies that are involved in the process of digitalization of the supply chain, and these are the principal keywords that appear in the sample of articles analyzed for this research paper.

4.   Need for Human Intervention

No discussion on the topic of supply chains and its future is possible without talking about digitization which has now become the dominant theme on the subject matter. Any area that faces a problem, will definitely find a solution through the use of technologies that use various combinations of big data, automation, machine learning or artificial intelligence, and the Internet of Things [22].

4.1   The Adoption of Digital Technology

Implementation of new technology is not limited to stores alone. The warehouses which distribute goods and merchandise to the stores along with the delivery chain are currently challenged to respond to ever changing scenario in the retail sector and this requires them to become more flexible and dynamic. The question that arises with all this advancement of technology is whether humans will only be an impediment in the whole process, or do we still retain our role as enablers in the system? [23].

The digital supply chain has an ambitious goal which includes structuring a completely novel variety of supply network that will not only be resilient but also responsive. However, in order for the digital supply chain and the digital supply chain ecosystem to become a proper reality, the companies need to do a lot more than simply put in place technologies and build capabilities. It then becomes imperative for the corporates to find workforce possessing the right sets of skills and manage the

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transition to a working environment and culture that has the will and the capacity to implement the effort. Basically, it entails a paradigm transformation of the entire organization [24].

Conventionally, manufacturing firms have been able to even out their operations with the help of servitization [25] supply chain end-to-end visibility [26] and simulation-based risk analysis [27], especially in a situation in which unexpected disruptions are on the rise. In spite of everything, this sector has been one of the sectors that has been most negatively affected by the global pandemic and the implementation of rigorous and tough restrictions became necessary to cope with the rapid worldwide spread of the virus [28]. The system of production was indeed brought to a standstill, at times even simultaneously, by a couple of obstacles that were complementary though distinct, that were responsible for the partial or complete shutdown of production units [17]. One of these was an endogenous disruption resulting from the problem of downsizing of the global workforce causing a hitherto unseen deceleration of production with a distinctly negative impact on the global economy [29]. The other one was an exogenous disruption, which has been categorized as a Supply Downsizing Problem (SDP) that resulted from the moderation in workers' availability, shrunken productivity, distortion in patterns of demand, uncertainty in freight transportation because of further disasters, huge shortage in raw materials experienced by the manufacturing firms, and reduced responsiveness [17]. This highlighted the need to cut down human interventions in supply chains in order to preserve normal day-to-day manufacturing and distribution activities. Machines and not humans appeared to be the preferred alternative in carrying out regular mundane yet necessary activities without the fear of spreading infection. The stoppages in work could be avoided even in the lockdown situation. Hence the rapid need to change over to a regime characterized by the widest use of such technologies as robotic automation, artificial intelligence, and machine learning for replacing human labor. The transition has already begun, and the larger corporates are already seeing the benefits that can be derived from such transformation.

4.2   Role Played by Human Workforce

In spite of the huge advancement in technology, human workforce remains and continues to play a pivotal role in most logistic operations-primarily in handling exceptions. And exceptions are the norm as Covid-19 pandemic showed us. The pandemic led to massive confusions and hold-ups in global supply

chains and the chaos is yet to get normalized [8]. Completely automated supply chains are eventually likely to turn into a reality. However, it is imperative that corporates are able to integrate modern digital solutions into contemporary supply chains. Almost every modern supply chain is now struggling with the problems that are similar to what they have been facing for years now, such as uncertainty, lack of visibility, distrust and wariness amongst job roles and stakeholders, predispositions and prejudiced behaviors, cockeyed and wrong incentives, and delays in making decisions [22].

Application of novel technologies for digitalization along with digital initiatives can result in the optimization of conventional supply chains, improvement of control, and build better flexibility and readiness for any disruptions that may happen in the future. Apart from this, digital conversion brings in various advantages in the form of automation, cost reduction, swiftness, punctuality, teamwork, cooperation and connectivity. Digitalization of the supply chain also helps to eliminate inefficient business feed stores, improves business decision-making, and unlocks value for all stakeholders involved in the supply chain [30]. But for all these to happen it has become increasingly important that both institutional and leadership capabilities are able to assemble long-term commitment, integrate opportunities emerging in information and communication technology (ICT) and investments into strategies for development, align complementary policies pertaining to competences and competition, produce common vision, and engage in public-private partnerships that brings together the civil society and the private sector. [31].

The need for human intervention is significantly cut down by the digitalization of the supply chain. Beyond a doubt it helps to improve the supply chain by imparting constancy, speed, accuracy, excellence, and predictability. Nevertheless, human problem-solving and decision-making capabilities will always be needed for finer decision making. The success of digitalization is dependent on a workforce that is well-informed and has received adequate technological training in order to ensure that they are able to handle the novel technologies in a manner that is effective and optimal [30].

Human resource will continue to remain as a critical presence on shop floors69 in the factory and will not be fully replaced by robots and artificial intelligence (AI) in the immediate future as claimed by frontrunner experts from BMW and Deloitte. Automation innovations will continue to be adopted and has become a regular feature to upgrade

especially in the face of the global pandemic but all this advancement will assist human endeavor to improve and enhance and will thus ensure safer and less repetitive roles for human workers. Covid-19 Pandemic led to a crisis and this is all likelihood will bring acceleration to the shift towards automation and certain tasks within the manufacturing process for example repetitive tasks, material processing and some physically tough or dangerous tasks, or support in quality control are likely to be automated. Human effort will be supplemented by robots so that increased productivity, technical proficiency and safety are the ultimate advantages in the system [32].

It is very obvious that technology is poised to have a significant impact on every single element and aspect of supply-chain operations and management, starting from planning and ending with logistics. However too much of focus by corporates on expending huge attention on implementation of digital solutions throughout the organization may unintentionally become the reason ensuring the failure of digital transformation. That is the reason behind why the technology-first approach. It completely ignores the troublesome truth that by nature, the supply chain is intensely human [22].

4.3 Problems of Digitization

Excessive levels of digitalization and automation have the potential to cause the supply chain to become unyielding and rigid in terms of production, and make them incapable of quickly adapting to vicissitudes that result from such disruptive events, as the recent global pandemic [17]. Developing countries are blessed with optimum supply of unskillful and untrained labor which has made it possible for them to carry out jobs that are not only of low value but at the same time require much lesser intensity of skilled labor. This has been instrumental in developing and fostering competitive advantage. Several of the developed countries have a comparative advantage, which is more frequently man-made than natural [13]. For instance, in the post-Industrial Revolution era the UK possessed the comparative advantage in manufacturing of textiles, that eventually transferred to the south of U.S. and presently China and certain other developing economies characterized by low wages possess this advantage [13].

Not only is industry but in agriculture as well, AI is being applied to enhance productivity and efficiency of the supply chain. "E-plants in a box" - a concept that has turned into a reality is particularly suitable for mobile plants that can be cultivated in a small scale, entails low capital expenditure, and is capable of producing a restricted range of products at a restricted cost. A combination of computer vision and machine learning, along with an enhanced reality interface will essentially allow everyone to become a master farmer [33]. However, education and training are essential pillars on which such transition stand and ultimately become successful [34]. But in developing countries there is a significant dearth of skilled workforce and inadequate scope of imparting the right education and training that are necessary to develop the skill sets required for successful implementation of technologies for digital transformation [35]. Hence complete digitalization is neither possible nor feasible and human interference becomes an integral part of supply chains in these countries. essential.

Key requirements for digital transformation include significant expenditure in the form of investment in organizational capacities and capabilities, innovation in processes, and institutional learning. All such challenges have endured in those economies that are characterized by the presence of complementary assets and in which the managing institutions continue remain either absent or weak [35].

Machines and humans will survive in a harmonious environment is the key perspective that fosters human well-being in the rapidly changing business scenario. Recent social challenges provide the impetus for us to revisit the manners in which to optimally exploit the maximum potential of the new "cyber-physical factories" and the "digital twin environments" that are gradually arising [17]. Both present day and future supply chain are not only affected from the expanded reality in handling materials and other input, but is also empowered by the complete range of next generation of technologies, that includes but is not restricted to robotics or Artificial Intelligence, or Big Data, which uses certain algorithms to processes all the available information in order to produce analytics results for making decisions, govern automation devices, carry out estimation and planning [36].

Beyond any argument or any doubt technology exerts a lot of influence on almost every aspect of operations within a supply chain, that covers everything - from projection and preparation to logistics. However, technology is not a magic potion that can make everything suddenly more efficient on its own, and supply chain continues to remain a human affair, to a great extent [37]. Supply chains are dependent on human associations, influences and networks since, at the heart of it, a supply chain is all about human assemblies. These

associations and relations are amongst end consumers and the corporations that produce the goods and services that these consumers require or ask for. Supply chains also factor in and are heavily influenced by the associations between countless suppliers and the firms or organizations that are contesting for essential inputs and constituents. Associations between managers, organizers or developers and their counterparts in various departments and segments of the organization such as procurement, manufacturing, marketing, sales, finance, and operations also have significant bearing on the supply chains. The whole system factors in even the associations between supply chains – be it collaboration, partnership, or competition. Each one of these human associations is extremely crucial so far as the success story of any supply chain is considered [38].

For several countries, upgradation of supply chain is brought about primarily through investing in human capital and the consequential power to incorporate technology into their systems which has made significant contribution towards upgradation of international supply chains. Technological transition and the processes mentioned above have been able to help a number of developing countries, such as South Korea, Chinese Taipei, Singapore and Hong Kong, in meaningful modernization of their supply chains. It is possible to strike a much better balance between the developed and developing economies [13]. This superior balance in power can be achieved by way of the developing countries transitioning into major contributors of value-added tasks.

Automation and digitization impact the way day-to-day supply chain operations are streamlined and carried out. In supply chain settings, the outcome of the employment of such technologies, is the admission of the continued presence and persistence of so called mundane or monotonous knowledge work'. This may range from Checking and standardizing data, sharing of the data and preparation, technical assistance including repair, maintenance and supervision of robotic equipment deployed for automation of factory work. This essential subsidiary practice, which is crucial for the mainstream supply chain operations, has become an inseparable part of supply chain digitization and automation. It has been observed that ordinary, yet tedious knowledge work comprises a primary and essential part of automated and digitalized supply chain's functional time and responsibilities.

In contrast to prospects of the removal of monotonous jobs through automation and digitalization, our study strives to highlight that the mundane jobs surrounding data and robots continues by means of the processes of 'amplification' and 'diversification.' This has had a positive impact on speed and accuracy of regular supply chain operations with the replacement of unskilled workers in the performance of these mundane jobs, which in certain industry may even be dangerous including work that requires zero error during standardization of data from manual workforce. The continuance of mundane knowledge work suggests a digitalization paradox pertaining to routine labor: on the one hand robotics and advanced data analytics strive to simplify work processes, on the other hand it also work towards adding to the complexity of these works from the point of number, variety and multiplicity of work, especially in productive, knowledge-intensive professions [39].

A study reveals that a growing number of senior supply chain professionals are resorting to emergent and promising technologies but at the same time strongly believe that it is imperative for the supply chain workforce pick up novel digital skills in order to be able to remain competitive. Apart from the lack of adequate finances, the key drawback faced by the developing countries is this dearth of skilled manpower – the second, most pressing trouble [40]. Finding the right skill sets and talent is a huge challenge. As labor force gets employed in certain tasks they also take up functions that are more intricate catering to the secondary and tertiary requirements and in the process also become more complex and developed in terms of number and diversity of tasks in creative as well as information intensive industries [39].

In the modern day and in the near future, a perfect employee of the supply chain would be someone who would be able to cooperate with and pool resources from other companies and vendors, is able to easily and comfortably manipulate data and read dashboards and possess the right talent and skill necessary to lead the people. All these must happen simultaneously with gaining an understanding of the diverse components of the entire supply chain. The workers engaged in the supply chain jobs are most likely to need to strike a balance between novel digital skills and interpersonal skills which have now become more crucial than ever before [40]. Without the correct set of talent, it will not be possible to realize the complete potential and the full benefits of implementation of novel technology and processes optimization will not be able to deliver the desired results.

Developing countries as also the less developed nations of the world face a lot of risk in this new

atmosphere where the production and investment organizations at the international level are getting transformed. Being a part of the global value chain systems has been a major plank of development strategies of low-income countries during the past few decades. A large number of scholars, analysts and businesses are forestalling an era of transformation which will witness a comprehensive overhaul of the configuration of global supply chains [41].

There is tremendous value that can be brought to supply chains by such technologies as robotic process automation, AI and machine learning. However, it is not to say or accept that technology alone will be important or it can or should completely replace or undermine the role that is played by humans in supply chain management and operations including such important aspects as creativity and the ability to judge and decide between the available alternatives [38]. Besides, robots cannot do everything, neither can they be perfect substitute of human labor. For instance, modern industrial robots may be technological marvels but can only perform on smooth surfaces and specially fitted workspaces for optimally functioning and are usually restricted to some specific area within the factory premises and are still less dexterous compared to their human counterparts [42]. Technology must act as the enabler, empowering people to achieve new heights, not replace the human factor in any task [38].

Whatever happened during the recent global pandemic provides an excellent illustration. Supply chains of large number of companies have either fallen apart or done exceedingly well in handling the demand and supply shocks. A key challenge that consistently came to light has been the constraints that is faced during prediction using historical data. In abnormal times such as the global pandemic when human labor could not be used generally due to a series of lockdowns, demand and supply patterns lie wildly outside the norm.

Digital models that are used for forecasting using historical data construe these sudden spikes and drops as outliers, rather than what they really are or represent – a unexpected pattern of events that were so different from the usually anticipated disruptions that no one actually saw it coming. These conventional model outputs or the ones that are usually derived from the usage of the models generally available in the market make it extremely challenging for decision makers and planners to understand or figure out how to respond or cope with the situation at hand [38]. But response is something

that is inevitable. Herein comes the use of human intelligence and the human capacity to comprehend, think and respond to something that they have not witnessed till now.

Digitization happens through the use and application of computer programs. These computer programs are created and function on the basis of a set of pre-defined rules that are updated from time to time but never factored in such dire situations as the COVID-19 pandemic. so, they are unable to respond when something like the global pandemic happens. Yet every organization had to respond, and they did so exploiting the intelligence of their human resources and their domain expertise that had helped them make the finest judgment calls that were possible under the given circumstances, and even in a large number of cases where the speed of response mattered hugely human efforts helped to respond quickly.

In innumerable ways, disruptions such as the COVID-19 pandemic has illustrated the trade-offs between precision and dexterity, between responsiveness and accuracy. The pursuit of a seemingly perfect strategy can be overturned by such unanticipated disruptions, especially the one that was of such mammoth proportion. However, the question is whether to abandon any degree of conjectural accuracy in the name of speed and dexterity? Success is witnessed in a continue manner by consistently striking a balance between the power of digitalization and the speed of human thinking and comprehension. An amalgamation is necessary of accurateness and trends that appeared historically, with the responsiveness to detect, distinguish, comprehend and respond in situations in which those trends shift – whether minutely or significantly. It also becomes imperative to judge whether such disruption is a course correction happening only in the short-term to ease an immediate situation, or a long-term strategic change occurring to a business that would demand a complete overhaul and redesigning of the operating models [38].

Thriving and flourishing digitalization projects are real life illustration of the ways in which people and technology can interact with each other elegantly, harmoniously and interdependently, for the widespread benefit of each and every stakeholder. None of the elements can survive or succeed singly, without each other. This is the reason why the human aspect is crucial. It is essential for leaders to a) consistently strive for achieving dual objectives of garnering support from employees as early as possible in the course of implementation of the

digitization program, and b) effective change management [43]. The bottom line is that it is the human factor behind the supply chains that is responsible for the failure or success of it. The human element needs to be improved and empowered using technology. Technology should not displace or replace the human workforce. Successful implementation of the digitalization program can be ensured through the ability of the human workforce to make positive and assertive decisions and join forces with everyone within the four walls of the company and outside of it. Success is also achieved through the ability of the human resource to persist and endure under enormous pressure [38] .

Automation of supply chain will be able to help businesses better their management of logistics, tide over existing disruptions in supply chains, and continue to remain viable and competitive while the world economy continues to reel under the pressure created by the pandemic and the struggle that comes with it [44]. It is also extremely crucial for managers to understand the implication of digitization not only for their organization but also for its employees [45]. It is also essential for the companies to consider the limitations of supply chain automation prudently while they propose and strategize future investments in novel and disruptive technological.

Neither is COVID-19 the first major supply chain disruption witnessed by the world and will it be the last major disruption that had the capacity to overhaul the beliefs associated with the old supply chain. However, it might possibly be a supply chain disruption that redesigned and reformed it to focus on the human aspect of supply chain operations and management and put it at the forefront. Since in the end, central to every supply chains is the human factor [38].

There is no dearth of sophisticated logistics software that can electronically execute contracts and make a comprehensive, real-time snapshot of the processes of a supply chain available to the managers. Robotics can make product distribution much more efficient and freer of errors. However, there is no level of automation of supply chain that can possibly replace innovative thinking, resourcefulness, capacity to plan strategically of human managers, or the need for them to take care of such issues as sick days or other personnel issues of employees that may arise from time to time [42].

When it comes to receiving decision-support from the management, perceptibility as also digital twin applications become alarmed and apprehensive about the mixing of AI with human intelligence. Decision-making continues to remain essentially a human business and relies heavily on human experiences and capabilities might simply disappear if we allow complete control over supply chain operations that are driven fully by artificial intelligence [46].

All most all businesses across the globe are getting ready for an impending economic slump and are trying to employ austerity measures so that they are able to extract the maximum that they can from the limited resources as economic resources continue to deplete progressively. Since the power center is continuously shifting between automated support and human-centered support, both of these services need to co-exist and function in a coherent manner in order to be able to provide the superior customer experience. This is not the time to relinquish client support services that are provided by a company's workforce. This is because the customers prefer to be governed by the company's knowledgeable teams for a large number of critical business-activities [47].

Crisis management still continues to remain essentially a human function and its success depends mostly on experience and can vanish and dissipate with movement of employees out of the company. Here also the ability to manage knowledge efficiently and the capacity to channelize learning systems and amalgamation of lessons learned with the experiences gathered become the primary drivers for the management of economic crisis and the recovery. Digitalization plays a big part in supporting decision-making so far as recovery management is concerned. But is not the only factor affecting decision making. The lion's share of decision making is still a human function. In the future sales would be significantly affected by the resilience and sustainability [46].

Since the last decade customer support teams across the world had been widely using chatbots, automation, and AI for solving the woes of customers which had been rising significantly on the back of rapid increase customer demands. The new technologies has been effective in keeping up with growing customer demand and the resultant growth in the flow of customer queries and interaction. However, the consumers often feel that they are getting ignored and feel that they are trapped and bogged down by a slew of voicemails that have answers to only a few set questions that may or may not be useful for addressing their specific queries. Rater than getting a proper solution this voicemail system becomes a cause of irritation for the

customers. Such a trend has already been recognized by both consumers and corporates who are trying to take action [47].

There is fear among the people that the inception of artificial intelligence will most likely surpass and may even control the human mind. Which is why there is so much resistance in adopting the technology. There is lack of technological knowledge amongst the masses to understand that it is a myth. Neither do they have the resources to learn about the new research on digitization. There are evidences to believe that human intelligence actually undergoes expansion when it interacts with and maybe competes against, artificial intelligence. Robotics on the other hand would be analogous to the physical activity that takes place once the inefficiency has been identified. That is the reason why it is possible to apply robotics to the software features of any supply chain processes, despite the fact that human input will continue to be a necessary part of supply chain operations and management [36].

5.   Conclusion

The contemporary world is characterized by globalization. The world is a large global village. Hence what happens in one end of the world will always affect life and business in the other parts of the world. In such a world, digitization is not simply a choice that a country or an economy has but it is an imperative for every business with in an economy and is true for firms across all industries. Technology is a highly volatile field and every now and then a new, potentially disruptive technology is being introduced. Some of these are applied to the supply chains that are undergoing a digital makeover. It, therefore, becomes imperative for supply chain processes to enhance, improve and transform as and when gigantic massive injection of novel technologies, artificial intelligence, big data approach, robotics, happen. All organizations that aspire to benefit from AI, consider Supply Chain digitization as a means to stay relevant and competitive in the current volatile market scenario. Such actions make it possible to survive and sustain in the contemporary world besides helping to build and maintain competitive edge. It also helps to consider and tackle forever increasing environmental challenges being faced by most corporates. Supply Chain Digitization has turned into a principal theme for discussion amongst companies that want to exploit the benefits of digital supply chain as a means of developing and maintaining competitive advantage and market

leadership. State-of-the-art technologies including Advanced Analytics, Artificial intelligence (AI), Blockchain Internet of Things (IoT), and Robotics are amongst the key trends that are transforming today's supply chains.   These are also the key technologies that are driving the most important changes in the transport, logistics, and freight forwarding industries and promises to provide superior competences, bring down the labor cost substantially and in the process enhance the profitability. However, despite the fact that technology has an important role to play in every aspect of supply-chain operations, it is far away from acting as a replacement for taking over the jobs and responsibilities from the human participants of the supply chain operations and management. The computer programs can never match the skills and dexterities of the knowledgeable, conversant, educated and specialist logistics teams involved in carrying out supply chain functions and management in the real world.

While the human aspect of supply chain management remains very much relevant all across the world it is more so in the developing nations of the world. Complete digitalization is next to impossible. The key reasons for this are the dearth of financial budget necessary for implementation and subsequent maintenance, of digital supply chain. The next is the lack of skilled labor necessary for carrying out this transition smoothly and maintaining the same in the subsequent period.

It is evident from the foregoing discussion that the aspect of relevance of human workforce in a digitalized supply chain is dependent on such elements as affordability, feasibility and practicality of trying to achieve complete digitalization of supply chain in the developing and less developed economies. Modern day supply chain continues to be essentially a human enterprise. Comprehending the importance of human factor has become essential for offering an opportunity to the corporates for the pursuit of improvements of its supply chain enabled though the use of digital technology.

For a digital approach to accomplish better impact and at the same time prove to be much easier to execute and better maintainable over time, it must be something that can involve the labor force and collaborate with them rather than work around them or go against their interest. Such approaches tend to turn out better results than those that simply try to replace human labor to bring about speed and agility into the supply chain system while cutting down the margin of error to an insignificant level. The

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inclusive approaches operate through the improvement in the access to information, through the rationalization of the decision-making process, and by means of simplifying the process of collaboration between various supply chain functions and developing the mutual trust. This article highlights the human face of digital transformation. It provides the rationale behind an inclusive transition that involves the human workforce and factors in and advocates the inevitability of human involvement in digitization of modern supply chain rather than simple and ruthless displacement of human labor.

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