Journal of Economics, Finance and Management Studies

ISSN(print): 2644-0490, ISSN(online): 2644-0504

Volume 3 Issue 11 November 2020

Article DOI: 10.47191/jefms/v3-i11-03

Page No.- 173-182

Developing Sustainable World Class Local Supply Chain Ecosystem in India during the Corona Pandemic

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Abstract: During the ongoing crisis of corona pandemic, designing effective local sourcing programs supported by sound policies can make efficient and sustainable local supply chains for goods and services. Through their relationship with OEMs, local Suppliers shall get benefit of increased revenue, expansion in business operations, knowhow, technical and financial support resulting into sustainable growth of their businesses. The Corona pandemic poses a unique opportunity for India to fill the vacuum in global supply chain created due to negative global sentiments towards China and occupy significant pie in the global supply chain by getting its act together, thinking strategically and out of the box and implementing swiftly during and post corona. This study proposes a socio economic and technical framework to develop sustainable world class local supply chain ecosystem in India to come at the center stage of global supply chain.

Keywords: Local supply chains in India; Corona; sustainability; business continuity; global supply chain; artificial intelligence in supply chains

1. Introduction

"Crisis either causes regress or progress depending on the will of the people" **-** Abhijit Naskar (Neuroscientist)

Since December 2019, the COVID-19 pandemic has been fast spreading all over the world forcing countries to shut businesses and close international borders to contain virus infection which was inching towards more than twenty million mark and 8 lakh deaths by August 2020.The global economy had been hit hard by the pandemic which eventually became labor market and economic crisis apart from health crisis impacting both lives and livelihood of the people.

The Asian Development Bank (ADB) has estimated the global economic losses due to the covid-19 pandemic USD 5 trillion and decline in jobs of 200 million globally, with Asia and the Pacific comprising 75 per cent of total job losses. According to Moody's global macro outlook report for June, second quarter of the fiscal 2020 will go down in history as the worst quarter for the global economy since World War-II. Apple Inc. announced that its quarterly earnings were lower than previously ex5pected due to a constrained global supply of iPhones and fall in demand.

To control the pandemic, the governments across the world imposed lockdowns which will have a serious economic fall-out all around the world in next three to four quarters due to huge fall in manufacturing. Millions of people in all these countries had lost jobs due to the economic slowdown leading to big fall in consumer demand, which has a vicious ripple effect forcing the global economy into a recession. In such a recessionary state of economy, the private companies are finding it hard to raise capital. With the fall in consumer demand and rise in the cost of capital, many companies may be forced to file for bankruptcy. The worst effect will be on startups and SMEs due to financial constraints.

In terms of global supply chains, most of the countries have started diversifying their supply chains and moving the production lines out of China which was at the heart of global supply chain before the pandemic but now looked at with suspicion and blamed for not doing enough to stop the spread of disease and hiding the information about covid-19 a from rest of the world. The world's mistrust of China has caused a disruption in the global supply chains and countries may become more and more wary of buying goods from China in the near future.

The countries have started evaluating their supply chain strategies from a national strategic point of view. Japan is incentivizing domestic companies to shift production out of China. The pandemic had caused countries to look at localizing their production and supply chains to mitigate the disruptive effects of the covid-19 crisis as well as other challenges and switching over to local supply chains.

India's gross domestic product (GDP) is expected to contract 3.1 per cent in 2020 due to the coronavirus-led nationwide lockdown.(Moody ratings) while the unemployment rate in August 2020 was 8.5% (CMIE) and the consumer sentiment has dipped in August 2020 by 1.6 percentage points (Refinitiv-Ipsos Primary Consumer Sentiment Index). In the month of June, Moody's downgraded India's foreign currency and local currency long term issuer ratings to Baa3 from Baa2 with a negative outlook citing the economic disruption caused by the coronavirus and predict amplification of vulnerabilities in India's credit profile which were already under stress before outbreak of pandemic.

The stringent lockdowns adversely affected companies leading to a large number of job losses which has impacted consumer demand, household and corporate's finances leading to the overall depressive climate of investment. Both the household and government revenue significantly affected during the lockdown. On the manufacturing front, the Index of Industrial Production in June 2020 was 16.6 per cent lower than its level a year ago.

2. Literature Review

Supply Chain Management is a network where the raw materials are procured to be converted into intermediate and final products in manufacturing process and distributed to end consumers (Lee & Billington 1995) with an objective of extracting maximum value at least possible cost by linking all related parties throughout the supply chain. (Finch 2006). It involves managing material, money, men, and data for achieving competitive advantage through customer satisfaction using resources efficiently across the supply chain.

The fierce global competition started in the decade of 80s forced the companies worldwide to offer high quality, low cost, flexible and reliable products using techniques like Just in Time (JIT) to enhance efficiency while reducing lead times. In the decade of 90s, the companies started concentrating on creating core competencies and specialisations and outsourced non-core jobs to other companies and periphery of supply chain extend beyond logistics and transportation to collaborations and innovations using internet and world wide web and in areas like management focus and functioning, institutional structure, vendor training and human capital management and supply chain management (Gunasekaran and McGaughey 2003).

The supply chain management depends upon the entire supply chain ecosystem and business relations among the partners in the chain rather than merely focusing on large scale integration (Mouritsen et al. 2003).That makes it imperative to crack down barriers within internal departments, systems and processes along with hurdles across the organizations within the ecosystem of supply chain (Vollman et al., 1997). The barriers in SCM such as poor planning, lack of vision, lack of trust and commitment can be overcome through information transparency, collaborative planning, use of IT, sound performance measurement, attention to behavioral factors, certification and training of suppliers, focusing on target segmented customers and shared investments and benefits like higher inventory turnover, reduction in cost, more revenue, asset utilization and reduced time to market (Fawcett et al. 2008).

The overall supply chain cost increases due to high capital cost, real estate expenses and transportation cost (Koch, 2006). But appropriate material, production and distribution planning reduces time, energy, wastage along with the cost (Verma et al., 2006). The ill effects during economic fluctuation era can be mitigated through appropriate adjustments in inventory investment (Heng et al. 2005). The demand visibility is essential for improvement in production and efficient inventory control which depends upon the intended product's replenishment frequencies and the production planning cycle used during manufacturing (Småros et al. 2003).

The knowledge is now a key for business organizations to satisfy customer needs. The stiff global competition and tremendous technological changes in ICT sphere is making competition knowledge-based affecting management aspects of supply chains (Lang, 2001).The transfer of knowledge and its utilization among the different functions depends on the organizational and operational structure of the organization (Desouza et al. (2003). The efficient Knowledge management enables taking informed decisions and action supporting the strategic thinking of the organization like efficient consumer response (ECR) to achieve customer satisfaction of higher levels.

Lambert and Pohlen (2001) developed a supply chain metrics to measure shareholder value using supply chain performance parameters by managing the interaction between CRM and SRM at each point in the supply chain creating better relations between customer and supplier resulting into higher customer satisfaction. A key element of success of supply chain managing both customers and vendors effectively. A customer driven corporate vision and use of techniques like TQM and JIT give a competitive edge to the organization along with other benefits such as increased productivity, reduced stock and process time, customer loyalty, improved sales market share and margins.

The "lean" and "agile" methods can be integrated in total supply chain depending upon the demand patterns (Manson- Jones et al. 2000).The systems perspective thinking and continuous simulation of the system designed as per suitability of SCM helps to enhance the overall performance of supply chains (Lalwani et. al. 2006).The reverse logistics is significant aspect of SCM where

product returns can be managed by managing product data in real time basis, improving life cycle of products, analyzing past sales data, forecasting future demand and estimating the impact on natural climate (Srivastava and Srivastava 2006 & Meade and Sarkis 2002).

The thrust on outsourcing gained momentum due to fierce global competition and shorter product life cycles. The decision of outsourcing affects cost, quality, flexibility, technology, capability, strategy, loss of competitive knowledge and skills and value proposition in terms of handling of the product (Jennings (2002 & Zeng 2003).The outsourcing decisions at times may lead to disruptions of supply chains (Buxey 2005 & Svensson 2001) .

A performance measurement is an effective strategic tool to achieve firm's vision, mission and long term objectives and achieving continuous improvement. The key performance metrics of SCM should focus on parameters like warehousing, procurement, ordering, information and data dissemination, transportation of both inbound and outbound types, production, timely deliveries and packaging (Blowfield 2005).The financial measures such as return on assets, sales and investment, price fluctuations, average sales per employee, productivity and margin per single manufacturing unit can be used to assess the performance of SCM.

The partnerships and collaborations are essential in global scenario. An efficient and intelligent use of e-commerce networks provides competitive advantage by reducing cost and improvement in service and growth opportunity to all agents in the value chain (Horvath 2001).The companies that reduce supply chain partners to manage them efficiently may face difficulties during crisis like Corona to manage business continuity. The measures such as bringing back outsourced products and services, developing alternative sources of supply , enhancing the capabilities of existing supply partners using training and quality assurance programs and sharing of risk, reward and information with business partners and developing trust and long term relation with them (Watts and Hahn, 1993).

The essential stages of managing supply chain management are strategic planning, analyzing involved factors, developing relations with the suppliers, Information systems , managing routine processes like payment and deliveries, integrating procurement, production, communication, transportation , distribution and fast and accurate deliveries to satisfy the customers (Sadler and Hines 2002 & Zailani and Rajagopal (2005). The models such as SCOR (Huan et al. 2004) assists in analysis of strength and weakness of the strategies for efficient decision making. The IT infrastructure and technologies such as RFID can be used for efficient processing (Smith 2005).The used products can be remanufactured in an innovative way in return management (Mukhopadhyay & Setoputro 2004). The current trends like TPL and 4PL and various statistical models coupled with data science and artificial intelligence can be used in SCM for performance improvement.

The local area supply chain is as efficient as the skills and technical abilities of the companies within the chain. In the past, many OEMs had moved towards global supplier due to lack of capabilities in local suppliers. The combination of local and global supplier can give a competitive edge to companies. (Andrew j. et.al 2007).The local supplier development initiatives imparts benefits like increased business with OEMs, enhanced capital from local banks, more numbers of products and services, more employment opportunities for local people and the development of sustainable business ecosystem (Yadav P. et.al.2018).

In an article in Harward Business Review in February 2020, during beginning phase of Corona, David Simchi and Pierre Haren predicted shut down of manufacturing plants in the U.S. and Europe and the companies which depends upon China and other Asian countries. Due to severe global competition, these companies had resorted to lean manufacturing, outsourcing and offshoring to cut cost before corona era, have been affected due to supply disruptions in China and other Asian supplier countries due to corona pandemic.

The Regulation of International Supply Chains (RISC) has studied early impacts of corona pandemic on apparel supply chain in Bangladesh. Many global garment companies cancelled the orders after eruption of corona severely affecting the readymade garment industry in Bangladesh and the workers working in this sector. On one hand the production hampered due to dependency on China for raw material and piles of inventory due to order cancellations and shifting cost and liabilities from buyers to suppliers severely affecting the livelihood of millions of workers. (Leitheiser .et.al.2020).

3. Objective of the Research

The objective of this study is to study the impact of corona pandemic crisis on global and local sourcing and if there is any opportunity for Indian nation of developing a high-quality local supplier ecosystem in India and investigate if India can emerge as alternative to China in current global supply chain reorganization.

The research is an attempt to identify viable strategic organizational frameworks and policy measures that can help India to effectively manage domestic businesses with local sourcing partners and develop cost effective, high quality sustainable local supply chain procurement reforms, enduring OEM and local vendor partnerships to gain higher value for money through local sourcing and distribution channels in India during and after corona pandemic.

Developing Sustainable World Class Local Supply Chain Ecosystem in India during the Corona Pandemic

The following hypothesis is developed based on the literature review on which this study and suggested framework is based:

The development of effective and sustainable local supply chain ecosystem managing both local as well as global demand of products and services will build institutional and operational capacities of local small businesses and will create jobs to overcome recessionary situation due to corona pandemic in India.

4. Methodology and sources of data

A rigorous review of literature is done to explore the latest trends in global and local supply chain pre corona. An overview of impact of corona pandemic on global supply chains is done through various media articles, academic research, watchdog reports, governmental policies and industry updates. Based on this a comprehensive analysis of intermediate, short, medium and long impact of the crisis on the local economy and local supplier's financial conditions, relationships with OEMs, and organizational capacities over time is carried out and based on that a hypothesis is developed. Looking beyond the numbers, the analysis of and reflections on the broader issues and challenges emerge due to corona pandemic is done and a framework is suggested to convert this small window of opportunity to build world class and sustainable local supply chains in India.

5. Discussion

5.1. Opportunity for India

The worldwide drive to diversify global supply chains is a great opportunity for India. The Indian government is encouraging for "Atmnirbhar Bharat" i.e. self-reliant India in terms of creating domestic manufacturing and local supply chains to meet internal and global demands. The Indian government announced a ₹20 lakh crore stimulus package to arrest impact of pandemic on the economy and people and aiming for structural reforms in areas like agriculture aimed to attract investment with a long term objective of making India the global nerve center of the global supply chain.

In the past, India had performed well in sectors like information technology, pharmaceuticals, now it is opportune time to focus on the neglected sectors like defense, agriculture and food processing industry to increase participation from private sector enabling the integration of farmers and SMEs into global supply chains and promoting indigenously developed products like low cost 2 and 3-wheelers , auto spares to other developing countries markets and enhancing export in sectors like textiles, garments and consumer durables to countries which are striving to diversify their sources of supply.

In terms of the service industry, Indian e-commerce, IT and IT enabled service industries have performed well during corona crisis. The digital technology can be used to leverage India's higher education capabilities through tele-education onto a much larger market. In the Healthcare and pharmaceuticals sector, India has a great opportunity in terms of tele-medicine, development of vaccine and making indigenous medical equipments. By leveraging its large domestic market, India can develop products in telecom market. Indian IT industry should move up the value chain, from back-office operations to develop advanced softwares like operating systems, video conferencing and messaging apps and IT security products. India can fill the gap due to US China trade war in terms of electronic and computer hardware.

The positives in the favor of India are ; improvement of its global ease of doing business ranking, implementation of GST act, insolvency act and slashing of corporate tax to 25.17% in general and even lower of around 17% for new manufacturing companies in recent past. To grasp this opportunity apart from focusing on low-cost and diversification of risk, India should strengthen its resilience of domestic supply chains.

Case of entrepreneur Amol Yadav

Captain Amol Yadav, a pilot by profession built a six-seater aircraft on the terrace of his house in Mumbai. Amol Yadav faced issues in getting regulatory clearances from Director General of Civil Aviation (DGCA) to get 'Right to Fly' for this innovative project. He received flying clearance in October 2019 after intervention by the prime minister of India. Mr. Yadav was working for last 19 years on this project. During a 'Make in India' event in Mumbai in February 2016, he presented his project but after that he faced various hurdles to reach to the stage of commercial production.

Apart from shortage of funds the most disturbing thing for Mr.Yadav was to be ridiculed by the people to whom he showed his idea. The biggest challenge was the procurement of the spare parts like the engine and the navigation system. He raised money to procure spare parts from US by selling off ancestral jewellery and mortgaging his home. In August 2020, he made public announcement that he cleared the entire test and get all the permissions to start the manufacturing but he still waiting to get land for setting his factory.

5.2. Challenges to overcome:

In terms of innovations, India's global standing is not satisfactory which is evident from its 40th position in the International Intellectual Property (IP) Index of IP climate among 53 countries. With America, Britain, Sweden, France and Germany as top leading countries in 2019 index.

The Government of India is encouraging and supporting investments in innovation and research through sound IP protection and enforcement rules and regulations and declared its National IPR policy in 2016 to increase the speed of processing for patent and trademark applications, creating awareness about IP rights among Indian entrepreneurs and creative innovators and researchers. India has just begin its journey and yet miles to go to reach the destination.

Two of India's ambitious government projects "Make in India" to attract FDI in India and "Startup India" to encourage entrepreneurship and create jobs have yet to fulfill their objectives. Historically MNCs such as Nestle, HUL, P&G have set up factories in India in low capital, high manpower commodities based FMCG business like soaps, biscuits, chocolates and in sectors like IT business and textile where skilled labor is available cheaply. But now it is high time for India to develop capital intensive export oriented manufacturing industries like China by both MNCs and Indian corporates while hurdles in the road of young entrepreneurs and MSMEs like high regulatory costs to set up business should be removed for new ventures to grow and create employment opportunities.

The challenge for the local suppliers pre corona was their inability to meet the international quality standards and capability requirements. Now during pandemic when global trade has come to standstill, it has become imperative for the OEMs and the PSUs to promote the local supplier development for business continuity. It is up to the local vendors and suppliers to convert this opportunity of smaller time frame to convert into a long sustainable business.

While local supply chains provides benefits of cost savings, sustainability, local capacity enhancement and local economic benefits, they are incapable in meeting the global standards for quality and reliability resulting into value destruction than value addition in total value chains. The companies with sound business processes, efficient management and a proven past record of sustainable growth shall progress faster than their peers while the unprepared small local suppliers required to upgrade the quality, breadth, and depth of the products and services.

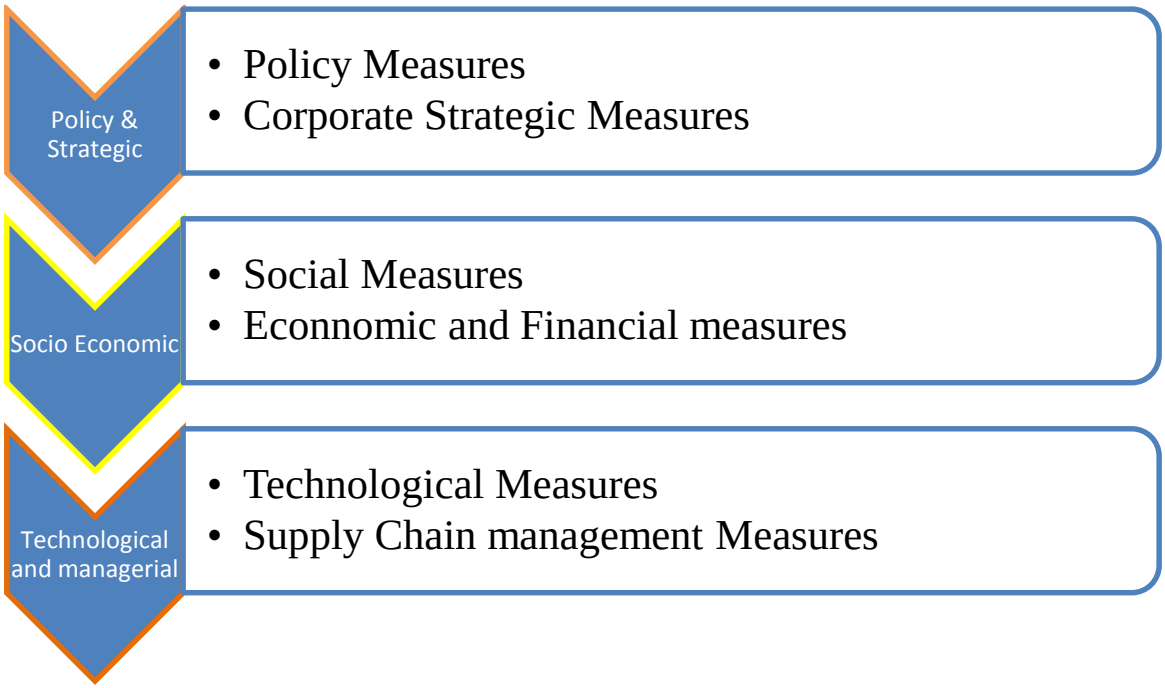
The local suppliers needs capital to invest in processes, manufacturing facilities, equipments, transportation facilities and inventory to stand firmly in the local and global competition. But the higher interest rates, absence of long-term funding and non-availability of the credit history of small firms are creating big hindrance for MSMEs to survive and grow. The local vendors need capital from local banks and financial institutions once they began doing business with OEMs for creating sustainable businesses. This will happen when the local lenders start trusting local suppliers when these smaller firms starts fulfilling timely delivery demands of large domestic and international OEMs and the predictability of demand will be established during and after pandemic. The need of the hour is to develop and implement innovative financing solutions providing access to capital of local suppliers to achieve business sustainability.

A gap analysis to assess the sustainability of the vendors can help to spot the limitations of current supplier system and working on strategies to enhance capabilities to grow. The Indian OEMs, PSUs and the government policymakers should work together to identify the sectorial opportunities to design local supplier development programs while dealing with challenge of rise in product cost due to uncompetitive local suppliers through high quality supplier development and training programs and diffusion of know-how from OEMs to MSMEs supported with certainty of demand, assured funding and opportunity to grow by doing business with a large global firm.

A local supplier development requires human resources to search, train, fund, develop and audit the local suppliers and help them to grow along with the OEM. The big PSUs should dissolve the current inefficient tendering and procurement processes to form new flexible systems for efficient vendor development and management.

To achieve growth of small local vendors multi-year programs needs to be designed as a strategic approach for local supplier development to enhance the quality of local work force, growth of MSMEs to have positive impact on local economy.An effective local sourcing program can be developed to create a sustainable local marker catering local demands for goods and services and encouraging and helping local suppliers investing in new assets, enhancing quality standards, recruiting new employees and developing and producing better and innovative products and services.

6. Framework to develop world class local supply ecosystem in India



6.1. Policy Measures

1. Arranging appropriate manufacturing locations with suitable ecosystem coping with local demand and providing local employment.
2. Encouraging young innovative entrepreneurs to develop indigenous patents and IPRs through government programs like "Make in India" and "Startup India".
3. Combining all the research laboratories scattered throughout India into one strong central unit which will give R&D support and funding to researchers to nurture research oriented ecosystem in India.
4. Sourcing from large PSUs from local suppliers in sectors like defense and telecom and allowing the private partners to compete with PSUs to get the business in projects like 5G and building broad band network in rural India.
5. Framing the policies based on the suggestions of industry people working at ground level bypassing the consultants who promote MNCs without awareness of local ground realities.
6. Developing India's own local supplier model instead of copy pasting already established American, European or Chinese models and formulating policies to create real tech unicorns of India by giving encouragement to young entrepreneurs. The big government PSUs like DRDO, BHEL, and BEL should find the technical gaps in procurement and encourage private SMEs and MSMEs to fill that gap. For this contract should be awarded to technically competent players abandoning the current prevalent inefficient L1 system of public procurement of selecting suppliers which impact the quality of the products in long term.
7. Allowing sops to Indian entrepreneurs instead of requesting foreign MNCs to set up businesses in India. The local capable SMEs to be encouraged to move up the value chain and create world class globally competitive products.

6.2. Corporate Strategic Measures

1. Instilling a confidence in stakeholders including employees, customers and suppliers by incorporating safety measures throughout the supply chains during after corona or any future crisis.
2. Reviewing business plans frequently and relaying realistic messages to the suppliers and stakeholders to instill confidence in the operations. keeping people abreast of any changes in work environment.
3.Incorporating nimbleness in operations by drawing out a detailed relaunch map after crisis gets over, updating all parties involved of their responsibilities and educating them why it is safe to relaunch, quickly reviewing and rebooting operational plans depending upon the demand with a closer watch at market signals.
4. Reshaping the strategy to maintain business continuity and build resilience carrying out a full risk overview from an end to end supply chain management perspective. A continuous stress testing of the operations not only from a commercial cost perspective, but from an operational stability and demand fulfillment perspective.

5. Investing in a scenario building simulation tool based on artificial intelligence that will help to assess supply chain dynamically and to plan better.
6. Building resilient supply chains to manage the fundamental structural changes due to ongoing pandemic in businesses and in consumer behavior by reviewing the impact of these changes on end-to-end supply chains from both cost and benefit perspective.

6.3. Social Measures

1. The cost of failure is very high India. This culture needs to be changed and more risk capital should be made available to risk taking entrepreneurial innovations. The real achievers should be praised, encouraged and publically acknowledged and rent seekers to be pubished.The graduates to be encouraged to become job providers than job seekers.
2. Socially, India should stopped looking at every businessman as crook but instead create culture where businessman will get due respect as provider of employment.
3. Funding of risk capital by venture capital to entrepreneurs who instead of copy pasting proven western models, working to develop models addressing the local problems and meet local demand and have potential of scalability to become global tech leaders.
4. Simplifying the tax laws and creating a transparent tax environment in country with minimum human intervention in tax related transactions using digital technology.
5. Building the local supply chains on the principals of equality, inclusivity and job opportunity to everyone.

6.4. Economic and financial Measures

1. Integrating the supply-demand environment with highly scattered and largely diversified existing value and supply chains.
2. Developing local supply chains enabling lower transport costs, lower supply chain risk, and greater sustainability.
3. Improving operational, technical and financial capability of local suppliers.
4. Offering grants instead of loans to the talented but financially constraint SMEs to make them financially capable.
5. Developing innovative financial instruments to ensure availability of cheap risk capital from finance institutions to talented innovators.
6. Using IPR, patents and human capital in new tech businesses as collateral instead of usual collateral like land, machines, materials etc.

6.5. Technological Measures

1. Using innovative digital platforms and IT applications, Internet of things (IOT), process automation and optimization using smart AI based machines enabling local vendors to compete with MNCs in online market space.
2. Developing India's own business and social media messaging apps, operating systems, browsers, search engines, emails to avoid stealing of data to other countries and develop IPR and digital platforms to make use of internally generated data to cater needs of huge local Indian market.
3. Providing services like tele-medicine and tele-education up to the last mile, leveraging the digital revolution in India with billions of mobile phones and internet users and developing digital platform for buying and selling for farmers to enhance their earnings and improve lifestyle.
4. Incorporating proactive risk management by identifying the risks in advance and mitigating them.e.g keeping minimum inventory, looking beyond tier one suppliers, using tools for supply chain visibility.
5. Incorporating effective data management leveraging the significance of accessible, actionable and clean data and use cases as the organizing principle for supply chain transformation enabling visibility to be simpler, easier, and more accessible throughout the enterprise.
6. Using technologies to enable customers to see where their orders are and when they expect to be delivered.
7. Reviewing and reengineering operating models on continuous basis.
8. Making the supply chains simpler, flexible and of shorter length to be resilient to any shocks to the system such as corona pandemic in future as shorter supply chains recover faster due to fewer moving parts and environmental complexities.
9. Mapping all systems, processes, information and cash flows cohesively to gain an end-to-end visibility. The internal systems and processes should speed up information flows to implement any fall-back plans as quickly as possible.
10. Focusing on business continuity, operational complexities, resilience and sustainability beyond cost efficiency to appreciate the real cost of the supply chain.

11. Revisiting the business continuity plans frequently and continuously monitoring and planning for business continuity in today's volatile and uncertain working environment.
12. Demolishing the functional walls and operating the organization as a single value enhancing system.

6.6. Supply Chain Management Measures

1. Increasing inventory velocity, implementing lean, flexible and customer responsive logistics, enhancing tier two and three supplier's performance, compressing process cycle time, maximizing inventory yield, utilizing meaningful parametrical metrics, segmenting the supply chain.
2. Adopting the best practices in the return supply chain to protect the natural environment.
3. Using AI based SCM software applications for planning and execution and fulfilling the order in the best possible way.
4. Creating the agile supply chains for promoting responsiveness, competency, flexibility, and nimbleness in routine operations focusing on quick response to the market demand with smaller, customizable batches of production to reduce wastage and inventory.
5. Applying appropriate sourcing strategy like outsourcing, insourcing, near sourcing, vertical integration, JVs and virtual enterprise.
6. Achieving efficiency by creating greater visibility between the "upstream" and "downstream" segments of the value chain by sharing data with business partners.
7. Using lean principles of manufacturing focusing on cutting costs by producing high volumes of products with low variability.

7. Application of artificial Intelligence in local supply chains

Artificial intelligence (AI) based machines replaces human intelligence in problem-solving or learning.AI Automates processes and actions and operates without human intervention. Data analytics helps in reducing errors and bias in the day to day human decision-making process. The companies should invest in AI and train employees to use modern AI-powered systems. AI automates the supply chain from warehouses to retail outlets. The mobile applications should be used to deliver groceries and FMCG goods at doorstep of consumers.AI Chatbots and virtual assistants can be used for effective communication with customers.

During corona and lockdowns, corporate employees are working from home (WFH). The business meetings and webinars are happening online using applications such as Zoom and Google meet. Since WFH is saving travelling time and enhancing productivity of employees, companies should use WFH as permanent strategy for their partial workforce. More AI-based applications shall be used in future to conduct official events and discussions. The webinars replacing physical seminars and workshops will cut cost.

AI based business analytics and prediction models can be used as a tool to gain business insights using real time and real world data and statistics enabling data-driven decision making in warehouse, logistics and transport operations. The machine learning can be used to automate systems and processes such accurately estimating transport schedule and the load which can reduce cost through accurate forecasting and the risk management and faster deliveries of goods by optimizing transport routes.

The routine manual, paper-based processes such as follow up with suppliers can be automated using virtual assistant similar to Alexa and Siri. The demand can be estimated accurately using Artificial Intelligence based systems using smart algorithms can and goods delivery process can be improved by matching demand and supply using big data with no human intervention.

The effective decision making is facilitated using artificial intelligence to process data generated through business activities like audit of vendors performance and analysis of product failure. A competitive supplier can be selected by creating various scenarios and parameters. The Out-of-date data leading to poor decision making can be replaced by real time updated data. AI enhances business value by helping to take intelligent decisions and implementing them across all business stakeholders in the supply and value chain.

AI requires large capital investments for upgrading the existing Information technology infrastructure of the organisation and incorporating structural changes in the organization which is currently costly and possible only for big players while others with aged legacy systems may face hurdles in deploying and reaping the benefits of AI. Nevertheless the economy of scale will reduce the AI technology cost in near future. The another downside of AI is concern about loss of jobs since AI replaces routine and manual work .The companies should develop strategies to change job rolls to increase employee productivity by assigning them more meaningful work.

AI and new communication technologies such as machine vision or automated guided vehicles can be used to automate material handling by merging them with data from existing warehouse facility by and implementing software based warehouse management. The conversational interfaces like chat bots can be beneficial in terms of reduction in cost and sales cycle

duration. Although current human interaction will take some more time to be replaced by AI, chat bots can be used to do routine repetitive tasks and employees can be imparted the skills to perform more-productive jobs.

Conclusion

During the ongoing crisis of corona pandemic, designing effective local sourcing programs supported by sound policies can create efficient and sustainable local supply chains for local products and services. The local Supplier firm working with big PSUs and large OEMs shall benefit from enhanced revenue, expansion in business operations and getting training, technical and financial support and sustainable growth of their businesses. The Corona pandemic poses a unique opportunity for India to fill the vacuum created due to negative global sentiments towards China and occupy some pie in the global supply chain by getting its act together, thinking strategically and out of the box and implementing swiftly during and post corona.

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