

COVID-19: THE IMPACT ON THE MANUFACTURING INDUSTRIES

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ABSTRACT

The SARS-CoV-2 pandemic is spreading rapidly and threatening lives all over the globe. Due to the pandemic, economies all over the world are in deep distress due to disruption in work and operations across all sectors. The present case study was performed for a private Indian manufacturing company that has been affected to a great extent due to this pandemic, as India has the second highest number of SARS-CoV-2 cases after the USA. It is critical for the recovery of manufacturing industry against COVID-19 by analyzing its impact from supply chain perspective and exploring corresponding countermeasures. The initial impact caused by worldwide spread of the coronavirus, such as production disruption of raw material and spare parts, unsatisfied market demand due to setbacks in logistics, increasing bankruptcy risk for small and medium sized enterprises (SMEs), and demand fluctuation enlargement. Secondly, the aftershock of COVID-19 is analyzed. With the trend of regionalization and digitalization, two-step countermeasures are proposed to help the recovery of manufacturing industry within the pandemic and better prepare for the post-COVID-19 world from supply chain perspective.

KEY WORDS:

COVID19, Regionalization, Digitalization, Pandemic, Fluctuation Enlargement.

INTRODUCTION

The coronavirus outbreak, which now is more referred to as Covid-19 as a shortened version of “coronavirus disease of 2019”, first appeared in the region of Wuhan, China. The virus spreads incredibly quickly between people and in just a few months, tens of thousands of people worldwide have become infected. Furthermore, as the Covid-19 outbreak spreads, companies across the world are also getting affected by it. Some of the world's biggest companies had negative effects such as manufacturing being disrupted, stores being empty without consumers, and flagging demand for their wares. Some companies may also struggle because of their investors being more reluctant to lend them money after the outbreak. Some of the most hard-

hit sectors include airlines, leisure, and hospitality. Bars and restaurants are also being heavily affected. This pandemic has become the biggest threat to the global economy and financial markets as China, North America and Europe have been the most hard-hit markets and the Organization for Economic Co-operation and Development (OECD) have downgraded its 2020 real GDP growth projections for almost all economies. Furthermore, some countries are starting to put their citizens on various forms of lockdown to slow the spread of the virus. These include national quarantines, school and work closures, which are the head of global macro research at Oxford Economics, other than the number of cases of Covid-19 there is another key issue which is the level of distribution to economies from containment measures.

Widespread lockdowns, such as in China, UK, and Italy have been targeted as some of the virus hotspots and if enough measures are not taken, it can cause even more panic and make the global economy weaken even more. The Covid-19 outbreak has caused fear for the way it is impacting the global economy and how it has impacted markets worldwide, causing plunging stock prices and bond yields. Furthermore, the situation has made large banks and institutions to decrease their forecasts for the global economy and a new report from OECD shows that the 2020 growth forecasts have downgraded in almost all economies. Earlier this year, the percentage for the global economic growth was 2.9%, today that number has lowered to 2.4%. The manufacturing sector is also one of the most hard-hit sectors by the virus outbreak, especially the Chinese manufacturing industry. Such a slowdown could lead to other countries with close economic links to china to be negatively affected. Chinese factories are taking longer than expected to resume their operations and the further spreading of Covid19 in other countries across the globe, indicates that the global manufacturing activity will remain subdued for longer than expected.

According to a report by the United Nations Conference on Trade and Development (2020), China's situation has been crucial to the global economy. China does not only hold an important role in the global economy because of its manufacturing industry and exporter of consumer products, but they are also the main supplier of intermediate inputs (energy, raw materials and semi-finished goods) for manufacturing companies abroad. In the global trade in manufacturing, around 20% of intermediate products originates from China as of today. Many companies are today worried that the measures put to contain Covid-19, such as restrictions to economic activities and movement of people, are hindering the supply of critical parts from Chinese producers, which therefore would lead to affecting their output (UNCTAD, 2020). As the Covid-19 outbreak can affect the productivity capacity and exports of any given country, European automobile manufacturers may face a critical shortage of components needed for their operations and Japanese companies could find difficulties in obtaining necessary parts for digital cameras and etc. Many firms right now are forced to respond to multiple fronts at once, both the protection of their workers 'safety, as well as protecting their operational viability as many of them are experiencing difficulties with their supply chains .

According to an article by McKinsey & Company (2020), there are some immediate actions that firms should consider in response to Covid-19. Some of these actions include optimizing production and distribution capacity, and to assess realistic final-customer demand. Some firms may experience inventory shortages as a result of the travel restrictions and lockdowns and therefore it is important to prepare for these possible implications. Since the Covid-19 pandemic, many e-commerce firms have started to experience some short-term changes. For example, Americans are adapting to e-commerce faster as sales online for groceries have increased in double the amount in the middle of March compared to earlier in the month. This is due to physical stores closing because of the virus and is pushing consumers to go online for their necessities. According to statistics from Adobe Analytics (2020) e-commerce has overall increased with 25%. However, as with most external impacts, companies as well as e-commerce firms, should adapt to changes that emerge from the external influence, by modifying their marketing, and change their operations and business models to gain better customer satisfaction. For newer and modern firms, integrity is an important aspect of business operations and it is also important to ensure that a planned response to the external impact is executed, some methods for adapting a business to the current Covid-19 situation include, communicating with the consumers and explain how the crisis affects one's business, meeting customers commitments and to ensure operational continuity, which will be challenging but is now more important than ever. Furthermore, many online sellers have started to develop new product offers and sales strategies due to the Covid-19 pandemic, however, this could potentially result in them taking unwittingly tax responsibilities that they may have not encountered before. Some online retailers are profiting short-term from selling supplies like toilet paper, face masks and water bottles which have shown to increase in sales since Covid-19. However, when looking at the long-term impact, a lot of retailers have been concerned that the outbreak will negatively impact their revenue in 2020.

Due to the Covid-19 situation, many online and offline retailers are expecting delivery delays for online orders because of supply chain issues and inventory shortages. Furthermore, many U.S retail container ports are impacted by factory shutdowns and travel restrictions in China, which affects the production. The CEO of Urban Outfitters, said that the Covid-19 outbreak creates uncertainty in distributions and could possibly create demand uncertainty, explains that during a pandemic, it is important for firms to optimize the e-commerce fulfillment experience. It is important to bring value to the customers and many e-commerce firms strive to meet their needs by offering quick and affordable shipping. For e-commerce, customer service is very important, especially during an unprecedented time like this it is important for them to remain consistent in by bringing value to the customer service and to stay flexible and mitigate potential impacts of Covid-19. Some ways that e-commerce firms can optimize their customer intimacy in their value chains in a pandemic, is, for example by being more responsive to their customers on social media, phone or live chats. Package delivery tracking is also one way to optimize the information intermediaries of the value chain by offering package delivery tracking with notifications and alerts for the customers to keep them informed about their delivery. Other ways of optimizing value could be by, broader shipping choices, offer free or discounted shipping and

pre-arranged return shipping labels. Furthermore, some assumptions among digital marketing experts are that when individuals are social distancing and staying at home, e-commerce sales will boost.

Early findings are, however, suggesting that the reality is more complicated than that. According to preliminary data, e-commerce that is associated with specific physical stores, are experiencing an average revenue weekly growth rate increase of 52% and an 8.8% increase in conversion rates, compared to last year. So far, the evidence is showing that foot traffic in shopping malls is going down. This could potentially put pressure on e-commerce, and many argue that consumers will shift more towards online purchases such as Amazon. However, since the possibility of distribution and manufacturing issues is increasing, product shortages and potential declining consumer demand due to people being quarantined and not wanting to risk exposure to the virus, could furthermore, cut e-commerce growth. Especially if the economy falters and goes into recession. These findings and assumptions are, furthermore, suggesting that the outlook at the moment, is very uncertain among retailers. At the current moment, the outcome of Covid-19 is hard to predict when it comes to society, people's health, economically and for firms. However, by looking at previous pandemics in history, the effects can be compared. One pandemic where the effects of e-commerce can be compared is the SARS outbreak.

COVID-19'S INITIAL IMPACT ON MANUFACTURING SUPPLY CHAIN

There are two phases of initial impact caused by the outbreak and spread of the coronavirus.

- In Phase 1, the production was forced to pause in China and the global supply of raw material and spare parts was shrunk with the delay and decrease of export orders mainly in February and March.
- In Phase 2, the supply and demand in manufacturing supply chain are severely impacted with the continuous spread of COVID-19 globally.
- COVID19 has caused plants shutdown in major manufacturing countries due to the action like lockdown, flight stop, outside activities restrictions, etc.
- Manufacturing supply chain has been or about to be interrupted for some products in industries such as auto, electronics and pharmaceutical industry.
- Also, market demand has shown great uncertainty and cannot be satisfied because of the logistics setbacks.
- Moreover, many small and medium-sized enterprises (SMEs) are at higher risk of bankruptcy than ever.

Hence from above all aspects we try to see several factors which are influenced by the COVID 19 for the manufacturing companies.

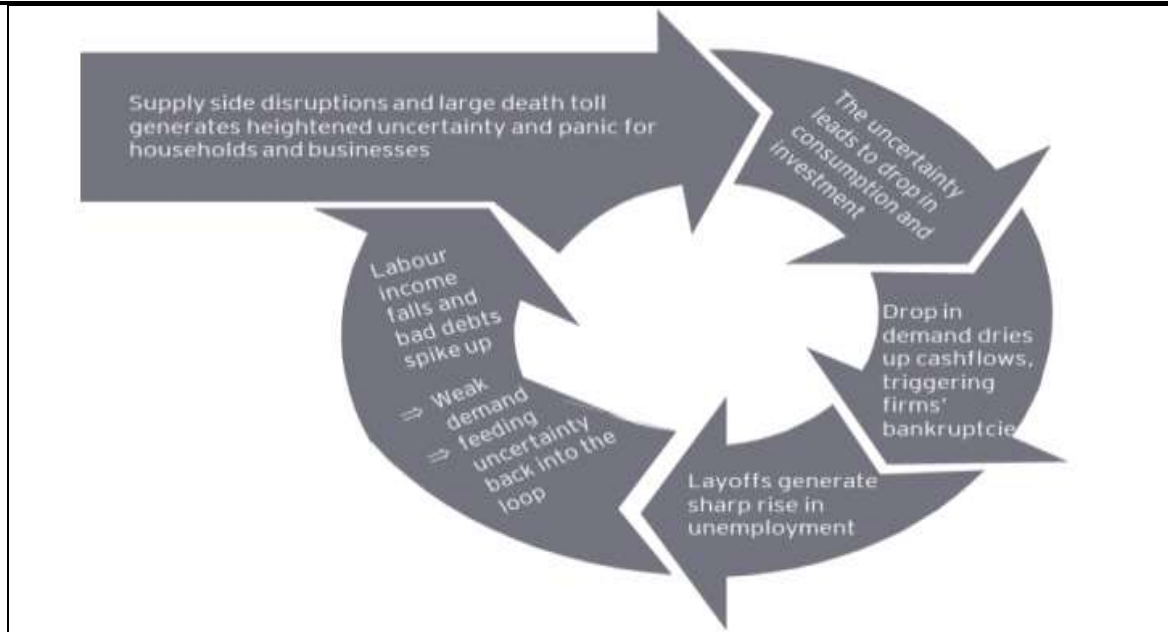


Figure 1. Represent the Report Generated by the International Labour Organisation's March 2020, which denote the current containment measures are affecting close to 2.7 billion workers

PRODUCTION INTERRUPTION OF RAW MATERIAL AND SPARE PARTS

Global supply chain has been formed for many manufacturing industries with enterprises closely connected with each other. China, US and Germany have become regional manufacturing centers for North Asia, North America and West Europe, respectively. Meanwhile South Korea, Japan and Singapore have been important members for global value chain due to their industry or geographic advantages. These countries have contributed over 40% of total export of intermediate products. Plenty of plants in above countries are facing production interruption or delay due to COVID19. In short time, a certain number of manufacturing enterprises which are deeply involved in global supply chain will be forced to shut down because of lack of raw material and spare parts supply. China imports a lot from countries which are deeply affected by COVID-19, as listed in Table 1 (data source: China Customs). Production may stop for key components such as integrated circuit, engine and chip in semiconductor, electronics and other industries due to the deteriorated situation in these countries. On the one hand, China has become the center of global manufacturing and the biggest manufacturing site for raw material and spare parts for many industries. China holds critical value to industries like machinery, telecommunication, precision instrument, etc. As the mostly affected city, Wuhan is also a major manufacturing center within China where large companies in auto and semiconductor industry have manufacturing sites, such as Foxcom, Dongfeng Motor Group, Honda, and General Motors.

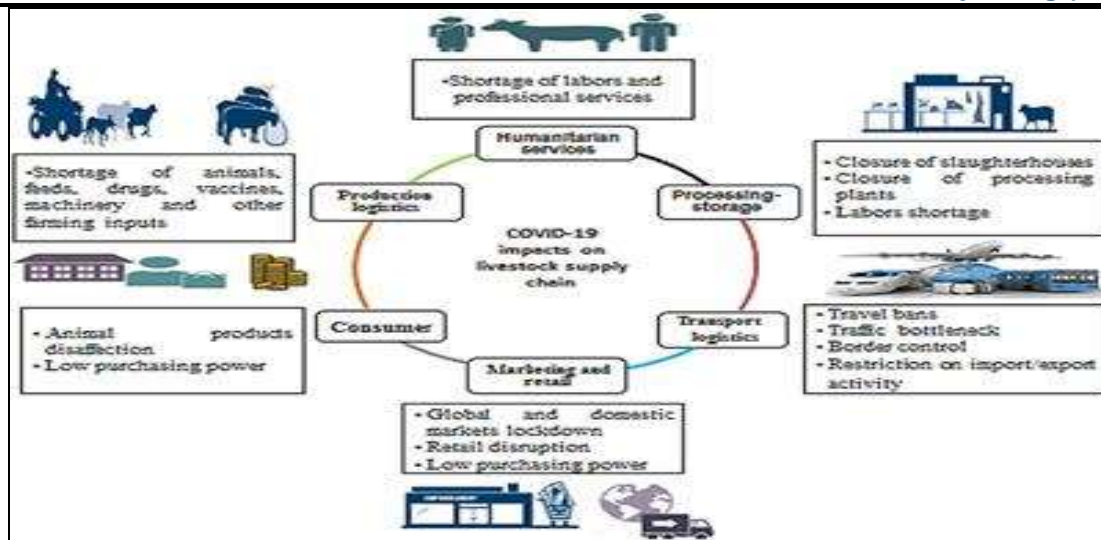


Figure 2. Represent the COVID 19 Impacts on Livestock Supply Chain

COVID-19 has severely affected Wuhan and spread out to other provinces like Guangdong, Zhejiang and Jiangsu where a great number of manufacturing enterprises are clustered. Enterprises within these areas have delayed or suspended the production since they are shortage of labors, raw material and spare parts. Hence, the output of cars, cell phones and related intermediate products has decreased dramatically. On the other hand, China is the main sourcing site for manufacturing industry. Plant shutdown or production delay within China poses great impacts on enterprises in related industries in other regions. According to the National Bureau of Statistics, new import and export order indexes in February were only 31.9% and 28.7% respectively. Although certain stock is kept, the decrease of China's export will gradually affect downstream enterprises in other regions and lead to supply interruption of raw material and spare parts for industries like machinery, auto, pharmaceutical industry, etc. World War III rumors. Earthquakes. Cyclones. Locust attack. Bushfires. Worldwide economic downturn. Asteroids. COVID-19. All these events have happened in 2020, triggering the fear of apocalypse, and making people wonder whether the world will come to an end this year. COVID-19 alone has been the biggest source of worry for people, claiming close to 4 lakh lives worldwide, and still going strong, even as the world struggles to come up with its vaccine. The Coronavirus pandemic has not just affected millions of lives, but also disturbed hundreds of thousands of businesses across the globe.

IMPACT ON THE MANUFACTURING SECTOR

One of the hardest-hit segments from COVID-19 is the manufacturing sector. The novel Coronavirus originated in China, which is home to the majority of the factories that supply raw materials to several manufacturing units across the world. Measures were taken to stop the spread of the virus.

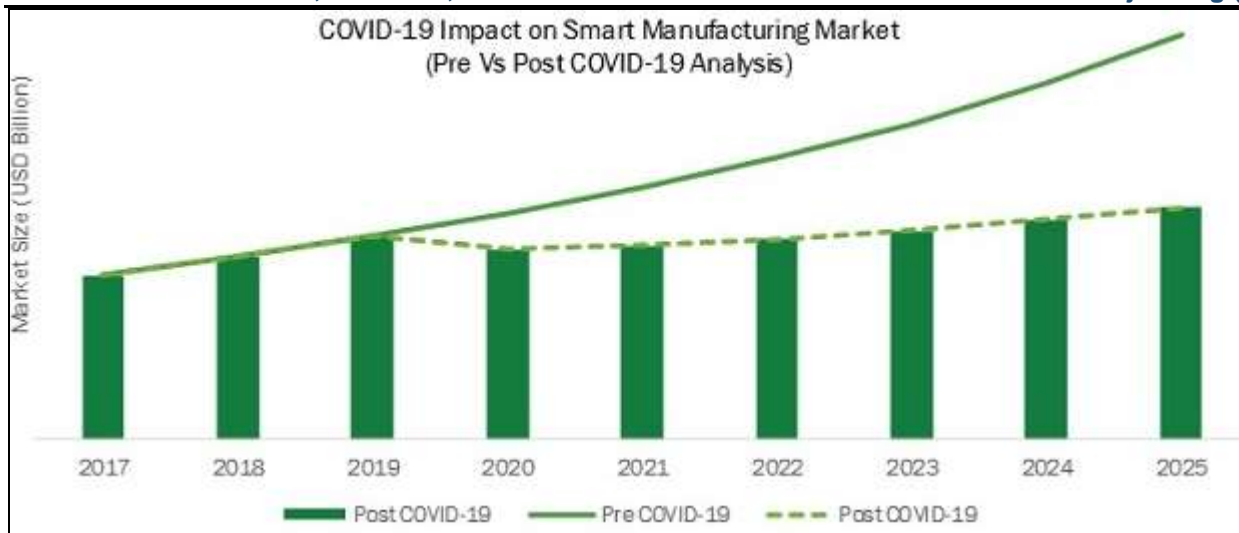


Figure 3. Represent the COVID 19 Impacts on Manufacturing Sector

The lockdown that followed brought the manufacturing facilities to a standstill, derailing the entire global supply chain. To put things into perspective, more than 75 percent of businesses have “one or more direct or Tier 1 supplier,” from China, and 938 of the Fortune 1000 companies have Tier 2 suppliers there.

This has triggered a chain of events, including a sharp decline in global FDI inflows, and a downturn in economies world over. The United Nations Conference on Trade and Development (UNCTAD) has estimated that the COVID-19 outbreak could cause global FDI to shrink by 5 to 15 percent, due to the downfall in the manufacturing sector coupled with factory shutdown.

IMPACT ON THE PHARMA MANUFACTURING INDUSTRY

The disruptive effects of the COVID-19 have put the global supply of medical products under tremendous pressure, creating the problem of shortages. The USA and other major pharmaceutical and medical device manufacturing nations rely heavily on sourcing material directly and indirectly from China, where the virus originated. With limited operational capacity in China, they now face high risks in supply shortages.

The USA, for example, gets 13 percent of its medical products manufactured in China. India, too, depends for about 80 percent of active pharmaceutical ingredients (API) on China, which is the world’s leading producer and exporter of APIs by volume. The pharma manufacturing companies in these countries have suffered heavily after the outbreak of the pandemic.

Also, India, another leading API manufacturer, has halted the export of 26 ingredients commonly used in pharmaceuticals in its efforts to ensure uninterrupted availability of critical APIs.

Clinical trials too are getting affected, as approximately 20 percent of studies are conducted in China. According to the clinical trials database of the USA, ClinicalTrials.gov, around 500 trials are conducted at sites in the city of Wuhan — the fountainhead of COVID-19.

COVID-19 has also forced many pharma manufacturing companies to focus on the production of masks, ventilators, and related components, sanitizer, and others. This way, they have been able to minimize the impact of the pandemic to some extent. But this cannot be their long-term strategy for survival, as they will have to focus on innovation, and the need to change business processes, to survive the pandemic.

PAINT & COATING MANUFACTURING INDUSTRY

The global paint & coatings manufacturing sector is also facing the prospect of a deep recession, as major markets continue to remain locked down to slow down the spread of the novel coronavirus. Again, China being the key exporter of some critical paint & coatings raw materials like pigments and certain additives, dealt the global paint & coatings industry with a heavy blow.

The ripple effect is huge when something unprecedented like COVID-19 happens. This can be witnessed in paint & coatings industry's case too, as in addition to its manufacturing operations getting affected, its big industrial customers, including automobile manufacturers and construction sites, have temporarily closed down in many countries, causing a significant fall in demand too.

Also, a recent increase in global oil prices has led to an increase in the costs of petrochemical-based raw materials, which the industry is heavily dependent upon.

SPECIALTY CHEMICALS MANUFACTURING INDUSTRY

The COVID-19 pandemic has resulted in global chemical production declining by 2.4 percent in February 2020, and 1.3 percent in the month of April, 2020. Almost every type of chemical category has witnessed a decline in production. But, the production of specialty chemicals has witnessed a 9.4 percent decline.

The unprecedented crisis has forced leading chemical manufacturers around the globe to reduce capital and operational expenditure, and scale down their manufacturing operations to 40-60 percent capacity due to labor shortages, reduced demand, potentially tightening credit markets, and shortage in the raw material supplies.

The corona virus outbreak has also meant that many production facilities of several end-user industries such as plastic, fertilizers, medicines, packaging products, etc. have been halted. With this, the demand for chemicals used in these facilities has also declined.

PERSONAL CARE & COSMETICS MANUFACTURING INDUSTRY

The global personal care & cosmetics manufacturing industry that can be classified into skincare, hair care, fragrances & perfumes, and other cosmetics, has experienced a downfall in sales during the COVID-19 outbreak due to the closing of offline stores at various locations across the globe.

Many countries still being in the lockdown mode across the globe, personal care & cosmetics manufacturers have had to shut down their production units due to labor shortage, and reduced demand, with finding markets where goods can be exported to, becoming hard.

Just like other industries, the personal care & cosmetics industry too has been severely affected at the supply chain front. Halted factory work in China has been the prime reason behind this disruption. In near future too, the industry is likely to remain affected by these developments, with e-commerce majors including Amazon and Flipkart halting the supply of non-essential products (including cosmetics).

COVID-19'S AFTERSHOCK ON MANUFACTURING SUPPLY CHAIN

The impact is kept pumping with the globally continuous escalation of COVID-19. Even though the timeframe and extent of COVID-19's full impact are not fully revealed yet, the pandemic has already posted profound ramifications to manufacturing supply chain in two ways. 2.1 Transformation from Globalization to Regionalization Nowadays, supply chain has been globally designed and optimized to identify proper lead time with the lowest operation cost for many manufacturing industries. However, the risk of delivery delays emerges greatly because of the dependency on remote sources and more complex logistics network caused by globalization[5]. Also, anti-globalization remains as enduring feature worldwide and seems to dominate among some developed countries. Over the past months prior to the pandemic, the trade war between China and US has intensified the international trade tensions. According to A.T. Kearney, the US manufacturing import ratio fell to 12.1 in 2019 which was firstly declined since 2011. The imports of manufactured goods in 2019 have decreased 7.2% from 14 low-cost countries in Asia with a particularly sharp decline from China. With the rise of protectionism, coupled with increasing cost in less-developed countries and new financial barriers, the reshoring increases. The change of machine tool consumption is good evidence. According to the 2019 world machine tool survey from Gardner Intelligence, despite a globally overall consumption reduction of 13.5%, China's figure dropped 25.3%. However, the consumption in Mexico increased 9.1%, and the consumption in US only declined 1.6%. With the continuous spread of the coronavirus, regionalization can be the new normal of manufacturing supply chain after the crisis. On the one hand, the weakness in current model of global manufacturing has been fully revealed. The recovery of manufacturing supply chain is not likely to be achieved shortly because of unsynchronized recovery pace among the global and continuous restrictions of international flight. On the other hand, the COVID-19 can pose backlash against globalization and aggregate the decoupling afterwards. According to the forecasts by the World Trade Organization, the International Civil Aviation

Organization, and the United Nations Conference on Trade and Development, the pandemic will cause 13%—32% decline in merchandise trade, 44%—80% drop in international flow of people in 2020, and 30%—40% reduction in investment and trade during 2020 to 2021. The trust between China and western countries is diminishing together with the decline of flow of people, fund and trade. Multinational companies will seek to build manufacturing sites and supply network nearby the end market and form regionalized supply chain.

ACCELERATION OF SUPPLY CHAIN DIGITALIZATION

Digital technology and analytics can assist companies to navigate the crisis and better prepare to serve the market. Back in 2011, Procter & Gamble (P&G) used cloud-based software to maintain a digital map for its supply chain to capture real-time information and mitigated the disruptions in cost-effective manner during Hurricane Sandy in 2012. To some extent, the supply chain digitalization has been on the agenda for quite some time. However, the progress is not promising in manufacturing industries due to the reasons such as high investment, bureaucracy, and reluctance to change. Now business is operated in a new context of flux with constant change of external environment which happens on a daily basis due to the pandemic. Digital supply chain will be the prerequisites to success within the pandemic and afterwards to improve the smartness and responsiveness of supply chain. Technologies such as cloud and big data have already played an important role in the supply chain operation for many industries to anticipate customer's needs, mitigate uncertainty and resume operations quickly during crisis. The trend would continue because of the necessity and all the benefits gained from every easy and low-cost digital initiative like cloud-meeting. With more matured development of big data and artificial intelligence as tools coupled with wider adoption of cloud-based technology and radio frequency identification in 5G environment, COVID-19 can spur a leap to the supply chain digitalization for manufacturing industries.

ENHANCING SUPPLY CHAIN RESILIENCE IN POST-COVID-19 WORLD

Even though manufacturing companies are busy dealing with immediate shocks currently, they also need to think beyond firefighting plan and start to prepare for the post-crisis world to recover and thrive afterwards. COVID-19 has amplified the drawbacks of complex and closely collaborated global manufacturing supply chain and indicated its lack of resilience. Supply chain resilience is to be enhanced to improve its responsiveness to unforeseen shocks.

(1) Improving supply chain visibility. The supply chain disruption caused by the coronavirus has underscored the necessity of end-to-end visibility of the entire manufacturing supply chain. To do so, the panic buying of toilet paper in Australia can be avoided if consumers had the visibility of the inventory levels. However, most companies are having difficulties of possessing end-to-end visibility when managing a multi-tiered supply chain nowadays. With the acceleration of digital supply chain stimulated by COVID-19, technologies such as radio frequency identification and block chain can be implemented to enhance information sharing and improve

the visibility in the supply chain. With better bridge of the physical and the digital information, real-time visibility can be achieved in the network and help to build a more robust supply chain.

(2) Managing supply chain planning with intelligent analyses and simulations. It is hard but critical for enterprises to do a better job of supply chain planning like what P&G did during SARS. With economic stimuli announced in many countries, there are strong needs for infrastructure, auto and electronics, which can help the rebound of many manufacturing industries. Companies should better plan to avoid the bull-whip effect with all the irrational consumer behaviors and stimuli announced during the pandemic. Agile and smart supply chain planning is essential to minimize the disruption and help to balance the severe volatility of supply and demand caused by “Black Swan” events. In the era of big data, recalibrating and optimizing supply chain planning with extensive data digging and analysis is critical for business success. However, planners do not have enough time or skill-set to do their job better with considering all the massive variables instead of their own experience and tuition. In order to overcome this, intelligent analytical and simulation tools can be beneficial. Firstly, planners can quickly collaborate and understand the impact of stimulants from both internal and external with the help of a data-sharing platform in the digitalized supply chain. Secondly, scenario planning can be done with the leverage of the predictive power of artificial intelligence and help to anticipate the uncertainties better. A wide range of possible scenarios can be computed as a basis for better planning. Then, the sourcing strategy is to be re-evaluated and supply network can be redesigned accordingly with the aid of dynamic programming to create a more resilient supply chain.



CONCLUSION

Assessing COVID-19's impacts from supply chain perspective and exploring countermeasures is critical for manufacturing industry. Interruption of raw material and spare parts, setbacks in logistics and demand fluctuation are gradually intensified within the period. Also, the manufacturing supply chain is likely to become regionalized and digitalized in the post-crisis world. As such, two-step countermeasures are suggested in this paper. The first step is to ensure the continuous supply chain operation at present. The second step is to enhance supply chain resilience for better preparation to recover and thrive afterwards. All the major sectors of the process manufacturing industry are suffering in the time of COVID-19. Reduced demand, and disrupted supply chain have been their major headaches. However, with challenge comes opportunity. Once the dust settles, the process manufacturers will find it imperative to innovate and change with time to remain relevant. The need of the hour though, for them, is to:

- Introduce worker safety measures, along with best hygiene & sanitization practices, at work
- Revisit their sourcing strategies, and line up alternate suppliers
- Rationalize their product ranges
- Evaluate supply chain agility, and make it more resilient
- Review their crisis or emergency response plans

- Optimize & streamline e-commerce & distribution networks
- Revisit their pricing, and promotion strategies

A good process Manufacturing ERP software can help achieve most of the objectives mentioned above, and beyond. The sooner the process manufacturers realize that an ERP software for process manufacturing can be of great help in the post-COVID world, the better for them.

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