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Supply Chain Disruption Due to Covid_19

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ABSTRACT: Covid-19 is a deadly virus spread across the globe. As of now there is no medicine to cure this disease. The entire world is devastating, loss of human life, capital and the life is in grind halt starting from China to United States, Entire Europe, Asia Pacific, Asia, South America, and Africa. Due to this pandemic disease industry is collapsed and a great risk of supply chain disruption. This crisis also gives us an opportunity for diversifying in to new product development and Innovation of Essential medical equipment particularly DRDO(Defence Research Development Organization) and Indian Institute of Technology Institutions(IIT's) working with various agencies to develop the medical equipment, Personal Protective Equipment. This paper highlights the supply chain disruption in entire world and what are the sectors that impact the business are discussed and at the end discussed about the new opportunities emerged in new product development for Emergency medical equipment to mitigate the risk of Covid-19.

KEYWORDS: Covid-19, Supply Chain Management, Innovation, Business Disruption

1. INTRODUCTION

There is an unprecedented disruption due to covid-19 and many shelves are empty and people are buying sanitary tissue papers, hand sanitizers and masks in large quantity and people are panic to buy essential daily use items. This was happened in the first week of march and after that ever country going for lock down for 40 to 60 days then the problem is compounded. Due to pandemic disease declared by WHO every Government is taking precautionary measures and people are cautious to wear masks to protect themselves. There is large scale shortage of Personal Protective Equipment, screening equipment, ventilators for emergency. Many hospitals flooded with patients and people effected are separated and kept in a isolation wards. In 2011 tsunami and earthquake in Japan there is certain portion of the region is affected in supply chain. But in this case the entire world is in grind halt and according the recent reports there is no recovery in near term and this impact will take place one to two years to recover (1). Many companies are placing factories in China due to cost advantage and some of the companies get the sub-assemblies from china and mostly effected are automobile companies in Germany, USA and France. According to Harvard Business Review (2) 70% of 300 respondents unprepared and still not assessed to identify the supply chain disruption Covid 19 Outbreak in china in December 2019. Supply chain disruptions are witnessed in the last decade due to eruption of volcano in Iceland, Earthquake and tsunami in Japan, Floods in Thailand (2). Many companies are not done supply chain risk mitigation plan to

estimate because of shortage of labour and time. Many companies obtain supplies due to low cost and quality .When the procurement on time the cost will be more and some of the companies in china more than 3,000 apply force majeure clause (2).

2. SUPPLY CHAIN DISRUPTION

According to KPMG Report the following are the supply chain disruptions due to Covid-19(3)

1. Demand weakening for some companies
2. For some companies demand skyrocketing
3. Uncertainty for obtaining raw materials
4. Receiving and despatching of the products impact on time due to logistics bottlenecks
5. Work force assurance to assemble and shop the products.

Some of the companies shifting their base from China to new location for example Wistron corp one of the suppliers of Apple eyeing to shift base from China to India, Vietnam, and Mexico (3). They also emphasised the actions to be taken in short term and long term as per the following.

Short Term:

1. Organizations has to understand financial and operational impact across multiple scenarios.
2. Balance supply and demand and build buffer stock
3. Financial evaluation of the key suppliers and their impact on supply chain

Long Term

1. Built Finite, decentralized, agile, mini operating models with flexible supplier relationships
2. Diversify the supplier base and geographically identify suppliers in the event of emergency.
Dual supplier base for sourcing of critical components
3. Short term approach to long term supply chain strategy.

As on April 28, 2020 Fig 1 and Fig 2 shows the number of victims due to Covid-19 worldwide

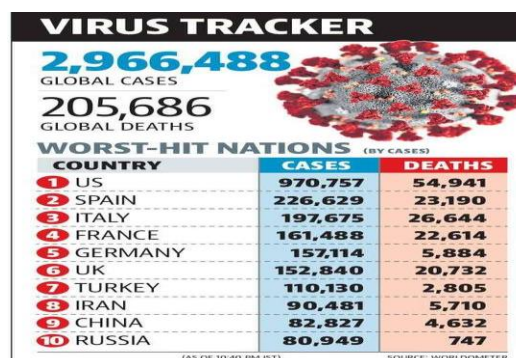


Fig.1. Covid-19 Number of Victims Worldwide(Courtesy: Hindustan Times)

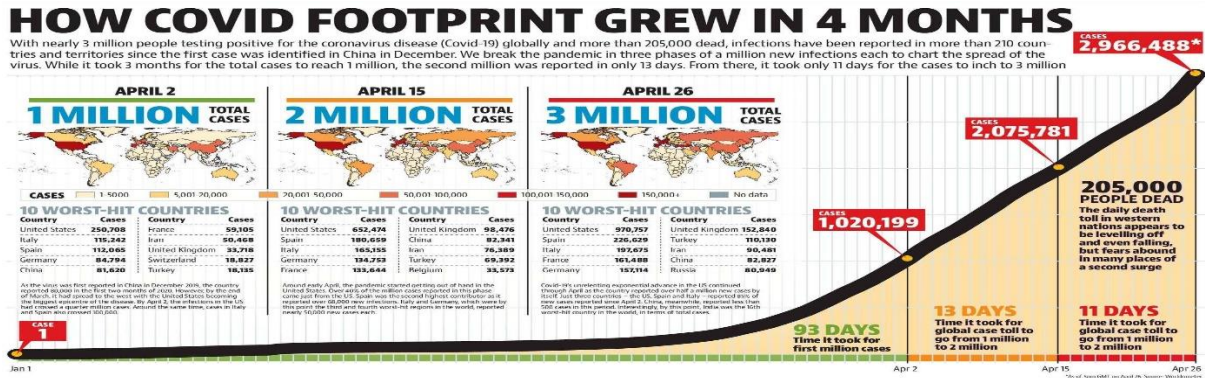


Fig. 2. Covid19 Patients Grow for the last Four Months(Courtesy: Hindustan Times)

According to Bill Hobbs (4) the following are the challenges in supply chain in future

- 1. Plan for disruption:** When the covid-19 was reported in China communication forward to Latin America to start tooth brushes to back up supplies in Europe, US and China and when the virus spread to Europe and US then China has stabilized and start manufacturing to make supply Chain agile to withstand crisis.
- 2. Develop different levels of contingencies:** Crisis management team has to establish for evaluating priorities contingencies depending upon the conditions
- 3. Update and test contingency plans:** When the one supplier fail to deliver then source for second supplier the goal is to identify weak supply chain link.
- 4. Facilitate Real Time Collaboration and Communication:** By using information technology artificial intelligence and internet of things to improve visibility of supply chain. Make use of tools like Google hangout s, WeChat, **WhatsApp** that keeps your team connected.
- 5. Stay ahead of demand:** Due to this crisis demand is uncertain, you have to plan according to the requirement in the current crisis.

The best way to managing supply chain disruptions are “Business Impact Analysis”, Identify Key “Business Processes” and asses the supply chain disruptions through “Risk Management Plan”. Disruptions can be both external and internal according their report the impact on business activities are (5)

- Inventory management of raw materials and finished goods
- Supplier relations
- Staffing
- Purchase Ordering
- Revenue and sales
- Customer Relationship Management and Business Reputation
- Financial Management

3. FOOD SUPPLY CHIAN DISRUPTION

The most effect supply chain disruption is the food supply chain. Due to prolonged lock down farmers produce unable to deliver their produce to markets. Movement of the people and logistics supply chain is greatly affected more shortage of essential items and spike in demand of the food items. In India harvesting season of Rice, Wheat is affected due to disruptions in the movement of the people. Lack of migrant labour in Mexico affected the harvesting of watermelons, blueberry

growers effected in Florida. Due to restriction of the movements of the flights shortage of food containers affected to the movement of the food supply chain (5). Imports of Onions, egg plant dropped to 80% to Canada from India. Due to shortage of labour from Morocco blueberry season is affected in Spain. Top exports of Sugar, Coffee, soya beans affected in Brazil due to shortage of labour, shortage of truck drivers and shortage of farm equipment spares (5). Shortage of refrigerated containers in USA and Canada supply of essential goods are affected. Some of the country's export the ban of food grains due to uncertainty. Rice exports from India is affected due to logistics and labour problems. African countries account for 35% of global exports of rice and 30% of import of wheat and earlier supply chain disruption is due to shortage of supply chain. But today's crisis is even though plenty of food grains are available getting the supply due to people are affected (5). The mostly effected in supply chain disruption is the dairy industry. Many milk processing industries are working half the capacity due to decline in demand from the small tea vendors, sweat shop owners which are unorganized and are closed due to lock down in India. Haryana Dairy Development Corporation procuring and selling 20,000 litres of milk before locking down and the demand is reduced to 5,000 litres per day. Azadpur market, Delhi, India daily arrival of the vegetables 1,32,000 tonnes reduced to 19,500 tons. The exodus of migrant labour return their home states Bihar, Uttar Pradesh, Orissa, West Bengal, India effect the disruption in supply chain in effecting the farming community in Punjab, Haryana and Himachal Pradesh, India . Gujarat Cooperative Milk Marketing Federation (GMCH), Gujarat, India one of the largest producer of milk and milk products Amul Brand faced problem for deliver their products to Mumbai, Delhi due to restriction of movement of vehicles and labour.

4. SUPPLY CHAIN DISRUPTION IN PHARMA

Due to restriction of the movement of the drugs this sector is mostly affected. When the outbreak occurs in China in 2019 most of the Active Pharmaceutical Ingredients, Protective Personal Equipment, Masks, testing kits is greatly affected. According to European Pharmaceutical Review (6) the following are sectors affect the pharma supply chain.

1. Producers of Generic drugs due to shortage of API's from China
2. Pharma manufactures shift their demand to antiviral drugs other chronic conditions are untreated and affect the patients
3. There is a restriction of movement certain drugs like Paracetamol, Antibiotics, and vitamin supplements from India to European Union and USA is affected. They are importing 40 to 50% of the market.
4. Due to this some of companies shifting base from China to new locations in the next six months
5. According to Data presented in Parliament India imports API worth 18,372 crores in 2016-17 and China contributes 12,250 crores from China alone. The other countries where API s imported from USA, Italy, Germany, and Singapore.

5. SUPPLY CHIAN DISRUPTION IN AUTO SECTOR

Auto industry already disrupted due to implementation of BS 6 norms. Many vehicles which are comply with BS 4 vehicles are stocked in a many dealers in India. Covid-19 add more problems in the sector. Many auto majors are depending on their sub vendors for getting parts or sub-assemblies. Many clusters are situated in Ludhiana. Manesar, Gujarat and Chennai and all ancillary units are closed due to lock down.

6. DISRUPTIONS CREATES NEW OPPORTUNITIES

Covid19 has given new opportunities for venturing into new product development. Mahindra and Mahindra, Maruti Suzuki in India has developed new Ventilators to support with medical professionals. General Motors and Ford in USA fabricated Ventilators production as per Government Order. Many companies are start manufacturing Personal Protective Equipment, Face Masks, and sanitizers. Samsung has developed Testing kit equipment. Sai Synergy, Haryana, India so far manufacturing firefighting equipment supplied to West Asia and according to Ministry of Health and Director of Research Textiles, Government of India requested to manufacture Personal Protective Equipment. Sure Safety, Vadodara, Gujarat involved in personal protection equipment. Sure Safety and Venus Safety, Mumbai manufacturing N95 masks. According to Reuters report India needs 38 million masks and 6.2 million PPE equipment. Invest India involved for manufacturing of Ventilators from 700 above companies, ICU monitors, masks, and testing kits. Food delivery apps surge in deliveries due to lock down. In India Swiggy and Zomato delivering the food to remote areas due to lock down. DRDO Develops ultraviolet disinfection tower for rapid sanitization in corona prone areas. This can operate through Mobile or laptop remotely with Wi-Fi connection. The device is called “Blaster” developed by Laser Science Technology Centre, New Delhi in collaboration with New age instruments and materials. IIT, Guwahati students has developed low cost incubation boxes dealing with corona-19 patients which are facing breathing and require assistance in the form of endotracheal incubation. It is the process of inserting tube called endotracheal tube through mouth and into the airway. It will limit the flow of virus laden droplets from the patient to the doctor during incubation period. They are developed in coordination with Defence Research Development Organization (DRDO) and All India Institute of Medical Sciences (AIIMS). By using Nano technology, The Ahmadabad Textile Industry’s Research Association (ATIRA) developed N99 masks approve by World Health Organization (WTO). Polyamide 6 polymer is used for making filter and manufactured N99 masks using coated fibre. The filtration efficiency is 99.99%. They have developed with DRDO (12). Northern Railway, New Delhi converted 100 railways coaches into isolation wards. They are also planned to make 5,000 isolation wards. Fig. 3. Shows the internal view of the railway coach view developed by South Western Railway. Indian Railways already converted more than 3,000 coaches into isolation wards . IIT Mumbai has developed “Digital Stethoscope” can listen heartbeat from a distance and record the reading. The data is remotely sent to Doctor for patient monitoring remotely. A start-up company developed “Ayudevice” mentored by IIT Mumbai Technology Business Incubator have been studied 1,000 different type of stethoscopes and developed to mitigate the risk of doctors due to Covid-19 . The image of the digital scope is shown in the Fig.4. The advantage of this device is that it can be attached to the any regular stethoscope and they can amplify and filter several sounds and converting into electrical signals which can be further amplified for optimal listening. This can be displayed in smart phone or laptop. They have deployed 1000 units across India



Fig.3 Courtesy; South Western Railway and Indian Express

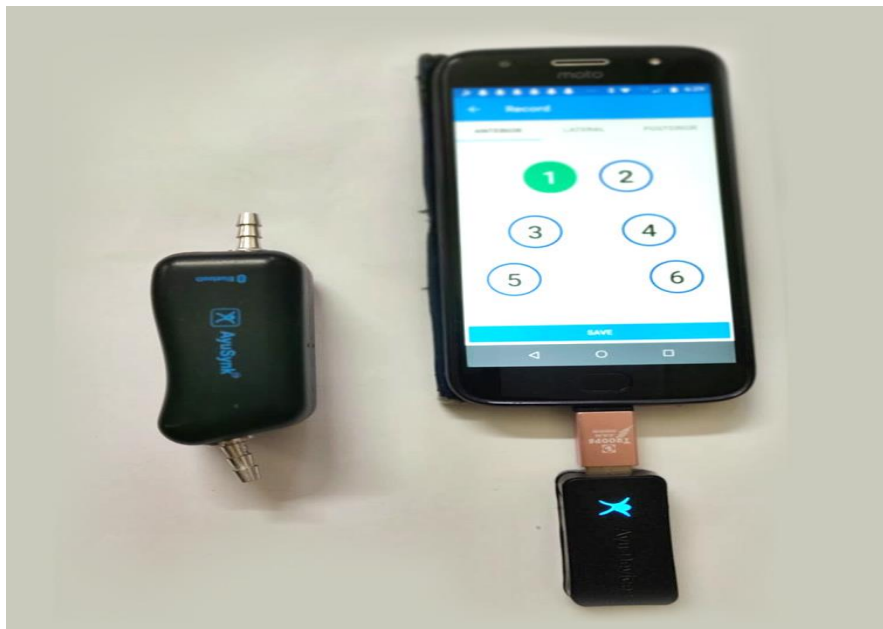


Fig.4. Courtesy: Adarsha Kachapilly and Indian Express

IIT, Ropar has developed a portable ventilator. The market rate of ventilator is about 5 to 12 lakhs. They have developed a cheaper version of Ambu (Artificial Manual Breathing Unit) bag to supply oxygen continuously, the developed device is shown in Fig.5. The mechanism simultaneously squeeze two bags can be connected to two patients. It can handle different type of bags according to individual requirement

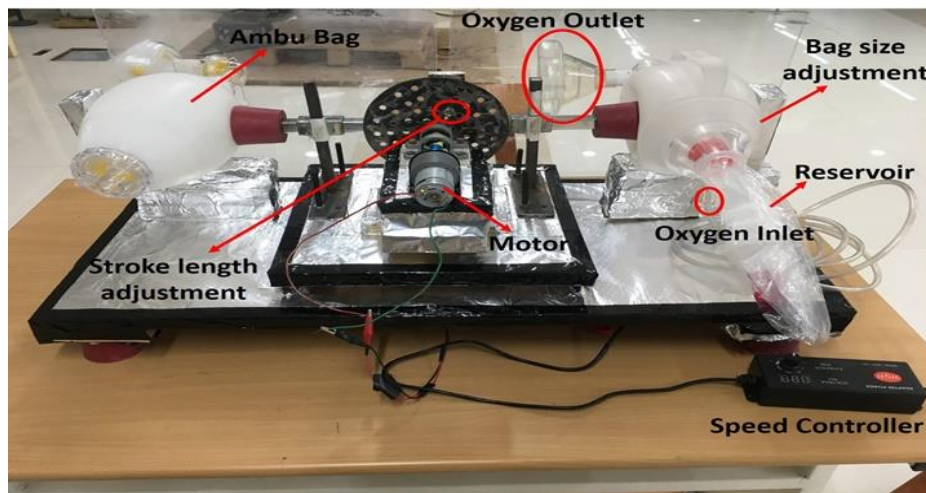


Fig.5. Courtesy: IIT Ropar and Indian Express

The best way to managing supply chain disruptions are “Business Impact Analysis”, Identify Key “Business Processes” and asses the supply chain disruptions through “Risk Management Plan”. Disruptions can be both external and internal according their report the impact on business activities are (5). IIT, Kanpur Start-up company Nocca Robotics in collaboration with Bharat Dynamics Ltd has developed affordable Ventilator for providing life support to the Covid-19 patients. They have developed the product within five weeks from conceptualization to prototyping as shown in Fig.6.



Fig.6. Ventilator Image (Courtesy: Hindustan Times)

7. CONCLUSIONS

Supply Chain Disruption taken place in ever sector due to Covid-19. Many countries suffered economically and financially. As of now no vaccine is developed to prevent Covid-19 and it will take more time to prepare trails and come into commercial production. Supply Chain disruption affect the entire daily life many sectors in India faced uncertainty in their business. At the same time many innovations are coming out from Indian Institute of Technology Institutions, , Defence Research and Development Organizations, Indian Railways and Medium Small and Micro Enterprises to create a Innovative products to mitigate the risk of Covid-19. Social distancing is a reality. There is a wide range of scope for research and innovation to develop a new products in

health, safety and environment from engineering sciences, medical sciences and IT and more technical disruptions will take place in near future.

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