

**A Research Report on “IMPACT OF ‘ COVID -19’ ON
SUPPLY CHAIN ””**

School of Logistics and Aviation Management

**Bachelor in Business Administration (Logistics & Supply chain
Management)**

By

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Certificate of Approval

The following Conceptual Project Report titled "**IMPACT OF ' COVID -19' ON SUPPLY CHAIN** " is hereby approved as a certified study in Supply Chain Management carried out and presented by **Akanksha Seth in** a manner satisfactory to warrant its acceptance as a prerequisite for the award of **Bachelor of Business Administration in Logistics & Supply chain Management** for which it has been submitted. It is understood that by this approval the undersigned do not necessarily endorse or approve any statement made, opinion expressed or conclusion drawn therein but approve the Conceptual Project Report only for the purpose it is submitted to the Conceptual Project Report Examination Committee of the Galgotias University for evaluation of Conceptual Project.

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IMPACT OF COVID -19 ON SUPPLY CHAIN MANAGEMENT

ABSTRACT

- The coronavirus pandemic has a transparent impact on the availability chains of virtually all manufacturers, retailers, and wholesalers. because the world attempts to navigate through this difficult time, most companies are struggling to take care of a gentle flow of required goods and services. Whether it's frozen foods and grocery items (i.e., toilet papers), or ventilators and masks, or maybe the services (i.e., clinic visits), the availability chain has been facing multiple obstacles. Most models and frameworks inbuilt the extant literature aren't been ready to capture these disruptions and intrinsically , firms aren't having proper strategies to affect . For firms with complex supply chains (i.e., manufacturing, retailing), it's indeed critical to spot strategies to affect such a crisis. during this paper, we shall offer strategic insights in terms of major issues firms face and strategic options firms are contemplating. The firms face challenges in terms of demand-supply mismatch, technology, and development of a resilient supply chain. Moreover, moving beyond profitability, firms are experiencing difficulties to construct a sustainable supply chain. we offer futuristic strategic recommendations for the rebuilding of the availability chain.
- The COVID-19 pandemic continues to impact most industries at an unprecedented scale globally, including consumer products (CP) that has witnessed significant disruption over the past few months. Amidst widespread health concerns, travel restrictions and native movement limitations, several companies in India are already feeling the warmth. The crisis is impacting some categories quite others. Essentials (staples, packaged food, home and hygiene products) are less impacted, while economic concerns have reduced spending on discretionary goods like confectionery and appliances. The demand for alcoholic drinks and carbonated beverages declined thanks to restrictions on the onpremise consumption ,due to lockdown. Indian CP companies face a mess of challenges “now”, “next”, and “beyond”.
- We are currently within the “now” phase where most companies face a number of challenges like labour shortages in factories, unoptimized production, restrictions in vehicle movement and inability to make sure essential products are

available to consumers. within the medium term, or the “next” phase, where the govt starts easing restrictions, companies will got to focus on bouncing back from the present situation. The pandemic will presumably follow a see-saw pattern of recovery and hence, companies must build an agile operating model to attenuate future disruptions within the “next” phase. within the long-term “beyond” phase, they have to specialise in transforming to achieve a replacement business landscape.

- To address the crisis head-on and ensure business continuity, companies must devise strategies for the “now”, “next” and “beyond”. The change are going to be multifaceted - from building permanent precautions in office and on shop floors to gaining greater control over end-to end distribution network. Companies must proactively anticipate and be able to answer new habits that buyers will develop after living through the crisis.
- There will be increased specialise in health and wellbeing and better demand for value brands as consumers trade down. Hence, re-evaluating brand portfolio to get back consumers would entail re-adjusting pack sizes and pricing to redefine value proposition also as taking an opportunistic stance by developing “categories of tomorrow” (such as, hand sanitizers,disinfectants, immunity boosters). Social distancing has accelerated adoption of e-commerce and consumers will still embrace digital platforms for a spread of needs. Hence, companies should expand their relationships with third-party e-commerce platforms while also collaborating in new ways such as deeper data exchange or shared warehousing. At an equivalent time, they ought to build and strengthen their own direct-to-consumer capabilities. it's imperative for companies to possess a consistent presence online and offline.

INTRODUCTION

As the world manages to contain Covid-19 outbreak, various countries and various firms are that specialize in finding a vaccine, developing protocol to treat infected patients and creating a secure working environment for workers , because the situation evolves, there's a growing concern about economic also as social impact of the pandemic which can define norms for “new normal”, for several countries and lots of firms, the lack to reply to the Covid-19 outbreak lies in its supply chain— transportation of products whether it's masks or ventilators or grocery items or maybe services (e.g., visiting clinic)

The global downturn's speed and harshness thanks to COVID-19 have significant implications for the availability chains of worldwide manufacturers. That sort of volatility wreaks havoc on traditional supply chain planning: the process for determining production levels, raw-material purchases, transport capacity, and other vital factors, largely by examining historical patterns of demand. Indeed, the forecasting challenge is especially acute because in many upstream industrial settings, as supply partners along the chain anticipate that demand will fall, the availability chain appears to be decoupling from downstream consumption—

the focus of most forecasting models. In fact, risk managers and other executives fail to anticipate the consequences, both negative and positive, of events that occurred. At first glance, as an example, a thunderstorm during a distant place wouldn't appear to be cause for alarm. It had been initially reported to the World Health Organization (WHO) on New Year's Eve, 2019, about Coronavirus disease 2019 (COVID-19) identified amid an epidemic of respiratory disease cases in Wuhan City, Hubei Province, China. On January 30, 2020, the WHO declared the COVID-19 outbreak a worldwide health emergency. On March 11, 2020, the WHO declared COVID-19 a worldwide pandemic.

For a business to deliver its promise to its customers, it must have a properly functioning supply chain. "Without an intact supply chain, a producing business will starve for key inputs into its production process. A retailer will have empty shelves."

- **First**, it's having an impression on the availability of inputs for several manufacturers and retailers everywhere the planet, and that is important because China may be a huge source of components and finished goods. The longer plants in China sit idle, the emptier the worldwide pipeline of parts and components circling the world, which is supposed to feed manufacturers and retailers everywhere the planet. If the disruption continues, we may even see many manufacturers, and perhaps even retailers, suspending their operations as they run out of the key inputs they have.
- **Second**, China is additionally a serious marketplace for goods and services. Anywhere within the world, local economies that depend upon China as a customer are feeling the consequences, as consumers in China limit their travel and consumption, and as manufacturers in China hamper or suspend their production.

- how truck drivers in Mongolia are losing their income because they will not deliver coal to China—the border is closed, and therefore the demand for coal is much down anyway.
- A resilient supply chain must be ready to detect early warning signs of an interruption and it must respond by shifting production to alternative sources. It must have either a diversified supply base or some contingency decide to utilize backup suppliers. Of course, for a business to detect that an interruption is on the horizon, it must have an honest handle on what its supply chain seems like . it isn't enough to understand your suppliers; you want to also know who your supplier's suppliers are, and so on. Without that sort of detailed map of the availability chain, it's difficult to understand the vulnerable links.

–While the particular

- **impact of COVID-19 on India market are going to be evident by middle of 2020**, we expect a slowdown in terms of discretionary IT spending, contract renewals and new deals getting signed as enterprises recalibrate by cost structure in coming months. Existing project executions have also taken successful thanks to travel restrictions in situ . Corporates across the country implementing other ways of working, i.e. work from home, it's generating a parallel corporate line that demands to be connected from where they want, once they want and to who they need . But the different sets of challenges that the IT teams within the organization are grappling with - the way to secure data and assets from cyber threats. Companies can meet most challenges noted above with a sound supply chain strategy, with IT because the key enabler. Though the complexities of India's supply chain may appear overwhelming, understanding and mastering them may be a critical success determinant for a corporation attempting to serve customers in India. An efficient review of supply chain design will help better position companies in what's becoming an increasingly competitive marketplace.

Supply chain in Indian Economy

- Supply chain costs in India represent the maximum amount as 13 percent of the Gross Domestic Product (GDP). This is almost twice the share in developed countries: within the U.S., supply chain costs amount to eight .5 percent of the GDP . Demand side supply chain challenges in India relate to cost and variety. With 28 States and seven Union Territories, differing considerably in dress, food tastes, customs, traditions and buying habits, it's almost impossible for one manufacturer to address the big variety of consumer requirements.
- Thus, it is important for manufacturers to partner with local distributors and retailers who can help develop products that will appeal to local consumers, at appropriate price points. When it involves COVID-19's immediate aggregate demand shock (I . e purchases drop) is observed, for which, two aspects are to distinguish: real-world and emotional. Real-world since some consumers are or are going to be prevented from going to stores, so their demands disappears from the market. Similarly, some home delivery services are suspended, so goods and consumers are approaching together less frequently.
- Supply chain disruption is defined as a disruptive event that causes production difficulties for multiple suppliers and during which a minimum of two of those suppliers deliver non-identical goods or services to a minimum of two competing firms. The severity of a supply chain disruption are often measured by the amount of entities that encounter difficulties in receiving or delivering materials or goods thanks to hit or miss event.
- Firms will probably take into account the lesson they are learning that global supply chains can be abruptly broken by this health shock.

The Lockdown in India

- **First**, the recent disruptions have renewed attention on inventory levels. Many industries have spent the last several decades moving to just-in-time manufacturing models, which emphasize low stock levels so as to scale back inventory costs. Just-in-time, however, is predicated on assumptions of reliable, on-time deliveries of defect-free products. Production can rapidly

grind to a halt thanks to any delivery delays, situations that are exacerbated in many industries by Covid-19. While companies can hedge against these risks with higher levels of safety stock, there's a transparent cost trade-off between low and high inventory levels.

- **Second**, Covid-19 has highlighted the importance of flexibility within the availability chain. Supply chain flexibility is fundamentally about adjusting to changing circumstances, like product demand or supplier capacity. For instance, the pandemic has tested the power of companies to stay up with surging demand for a few products. It also tested the potential of companies to vary suppliers thanks to export restrictions or facility shutdowns, which may only be done if those suppliers have unused capacity or the power to rapidly shift production. Having a wider or redundant supplier base can facilitate such supplier pivots, but it could also mean trade-offs associated with increased contract costs or reduced efficiency thanks to lower order volumes per supplier.
- **Third**, the pandemic has shone light on the benefits of strong collaboration throughout the availability chain. Collaborations can help in proactively identifying and managing risks, which may increase the resilience of a supply chain during times of crisis. Regular communication with collaborators also can increase the visibility of the availability chain, which is critical in understanding the potential impacts of disruptions beyond the primary tier of suppliers. Strong collaborations, however, require long-term relationship building that need ongoing investments, like in information sharing and mutual capacity building. There's often a trade-off, a minimum of within the short-term, between the strength of supplier collaborations and therefore the costs of that relationship building.

[These examples are illustrative](#); there are many others and therefore the specific trade-offs can vary widely from one supply chain to a different one. It's also clear that addressing the trade-offs resurfaced by Covid-19 would require strategies tailored to a company's unique circumstances. A medical supply company will likely weigh trade-offs differently than a toy company.

Two key implications of the Covid-19 crisis, however, are broadly applicable.

- **First**, companies should place a greater emphasis on scenario analysis going forward. Scenario analysis is already widely utilized in business, but more weight is required on exploring the implications of low probability, high impact events and to worry test supply chain designs.
- **Second**, companies will get to adjust their measures and perspectives of supply chain performance. the likelihood of supply chain disruption is usually overlooked in existing metrics. Stock levels of critical inventory, for instance , may combat renewed significance. Scenario analysis and revised performance measures will provide important inputs into new models of supply chain design and operation.
- The pandemic has exposed the fragility of worldwide supply chains and revealed the immense costs of disruptions to those chains. there's an urgent got to revisit old assumptions grounded in supply chain reliability and stability. Difficult trade-offs in supply chain management must be identified, discussed, and assessed in light of those changed circumstances.

Impact of COVID 19 on Indian Economy

- After the good depression of 1930 during which the worldwide economy has faced the worst recession is now facing the worldwide pandemic of corona virus that has laid the adverse effect on all the economic activates across the planet . The sudden decline in economic activities thanks to the lockdown is unexpected within the history of India.
- The good economist Keynes has suggested the concept of trade cycle after the good depression. The four stage of business cycle is considered to live the expansion rate and real GDP. International fund (IMF) has projected the GDP growth as 1.9% and this shows the worst growth performance of India after the liberalisation policy of 1991 during this financial year because the corona virus has disturbed the entire economy.

- In India, the impact on real or predictive sectors of the economy is worse than that witnessed in 2008 crises. The country will now face multiple challenges in terms of monetary crises, health crises, collapse in commodity prices and far more. The banking industry has increased the excess liquidity because of the demand-side shocks that arises thanks to uncertainties also as lock down within the market. there's an enormous impact on the financial shock that has stock exchange crash, liquidity crises because it began to empty out from global market in banking industry and various changes in monetary policies. The US dollar liquidity crisis has started bothering the planet economy thanks to huge collapse of earnings, dollar denominated debts because the most of the businesses that depends upon international trade will suffer severe pressure.
- The worldwide economic production is on decline and expecting an enormous recession within the entire economy. the worldwide pandemic has hit the economy which questioned the target to form Indian economy of USD \$5 Trillion with 7% of GDP by the year 2024. As per the planet Bank latest assessment, India is predicted to grow 1.5 percent to 2.8 percent also as consistent with IMF, it's projected a GDP growth of 1.9 percent in 2020 and to realize the thing of USD \$5 Trillion economy it's expected to grow at 9 percent every year for five years

Demand side shock:

- The huge uncertainty and fall in market has led to double whammy of business that disturb the entire chain of production and demand cycle. It includes the varied facilities and services provided by the Indian government and personal sectors like Tourism, Hospitality and Aviation are the main sectors that face maximum loss within the present crises. Tourism that account for 9% of GDP may decline a minimum of next 2-3 quarters .Aviation that contributes around 2.4% of GDP has severely impacted and these sectors include employees around 42.7 million of individuals .
- Sectors like auto, that contributes 10% of GDP and employee around 40 million of individuals , is declining continuously thanks to less of demand and thanks to which the marginal firms and other industries has forced to pack up .Closing of cinema halls, declining in shopping from complex malls has

affected the retail sector too and also to the consumption pattern of consumer in terms of essentials and luxury goods. The consumption pattern of consumer has impacted and has shown a downfall thanks to fall in income and lost jobs especially to the daily wage earners that questioned the Ratchet Effect and Demonstration Effect .

- The constant fear of the pandemic within the public has affected their mental well-being and confidence level that postponed their purchasing decision. The service of travel and transport is on an interruption thanks to lockdown across the country as has direct impact on slowdown in economic activities. it's accounted for a loss of \$4.5 billion a day of the lockdown. The hotel services are catching huge cancellation from business travellers from various conferences, workshops seminar that got cancelled on such an outsized scale.

Supply side impact:

- Some targeted industries within the supply side choose the shutdown that are the marginal firms. India being the very best exporter of staple and import source of products that are required for his or her intermediate and final goods are on pause now thanks to the delay in supply of products from china. Various sectors like pharmaceuticals, automobiles, electronics and chemical products etc are facing a shortage of required component [14]. As china accounts for 27% of India's automotive part imports. India imports about 85% of active pharmaceuticals ingredients (API) from china and thanks to the factor there's an opportunity of shortage in availability and thus prices may continue hike. cycle which will further affect the investments .

Impact on International Trade:

- According to WTO, world trade is predicted to fall by between 13% and 32% in 2020 thanks to COVID 19 pandemic that has disturbed normal economic activity. Share of Indian export in, in total world's export is 3.5% and share important in world's import is 3.1% (2019). The trade balance of India has shown a deficit of 9.8 USD bn in March 2020. The unexpected decline the trade and production has negative consequences on the business and households. The aspect of international trade the govt may search for the countermeasure for the indigenous production and to scale back the dependency ratio on one

country which will somehow boost the roduction of domestic industries and reduce the deficit .

- China being the very best foreign trade with India and it's major marketplace for many Indian products like sea food, gems and jewellery, petrochemicals etc. thanks to the autumn in export the fisheries sector has shown a fall of Rs. 1300 crore. For the April-February period, India's current fiscal exports have dropped by 1.5% to 292.91 billion [16]. consistent with UNCTAD, India's trade impact is close to be 348 million dollars. India stood in among 15 most affected economies thanks to fall within the production of china that is disturbing the whole trade pattern of world. For India, the estimated trade impact to be most on chemical sector at 129 million dollars, textiles and apparel at 64 million dollars, automotive sector at 34 million dollars, electrical machinery at 12 million dollars, leather products at 13 million dollars, ,metal and metal products at 13 million dollars and wood products and furniture at 15 million dollars.

LITERATURE REVIEW

Businesses hooked in to global sourcing face hard choices in crisis management amid the availability chain disruptions thanks to COVID-19. The impact of the coronavirus pandemic on global supply chains may be a major disruption, along the lines of getting an earthquake or a tsunami. this is often an unprecedented sort of disruption. The uncertainties ahead swing between extremes. The main target of managing the availability chain is to understand and neutralize the uncertainties within the supply chain. Uncertainties within the supply, process and demand are recognized to possess a serious impact on the manufacturing function. As this paper focuses on the impact of COVID-19 on the availability chain management, the literatures were reviewed nearby similar context of reputed journals related to the pliability , agility and pro-activeness of the availability chain.

- The survey based work analyses what supply chain firms should do during a severe supply chain disruption under uncertain conditions. Strategies are classified into reactive (buffering) and proactive (redesigning). A framework is developed that links supply chain uncertainty, as result the 2 sorts of strategies for achieving supply chain flexibility and therefore the relevant objectives to be achieved. The research is endorsed by four case studies and are compared in terms of uncertainty typology and methods being adopted to improve supply chain flexibility. to determine the linkage, examined dimensions of supply

chain flexibility and their relationships with environmental uncertainty, business performance, and functional interfaces. chain agility by creating a link between the 2 called supply chain exposures.

- They considered and located two main problems of European industries, that is, -
 - 1. in accurate forecasting and**
 - 2. in developing an efficient and effective supply chain (SC) structure.**

The work described exposure as the degree to which an agile supply chain must be overextended (i.e. vulnerable) and, therefore, should be restructured or adjusted to deal with the problems in international SCs. to get high service levels at a coffee cost for emergency supply options in terms of lateral transshipments and direct deliveries . An analytical model is employed to calculate relevant performance measures. Comparison of the results of the model with the results of other models indicates that the combined use of lateral transshipments and direct deliveries can cause significant cost savings.

Like COVID-19, the earthquake and tsunami that struck Japan in March 2011 directly impacted over 27000 businesses whose production, warehousing, and retail facilities were destroyed or disabled by the natural disaster.

Supply chain disruption is defined as a disruptive event that causes production difficulties for multiple suppliers and during which a minimum of two of those suppliers deliver non-identical goods or services to a minimum of two competing firms. The severity of a supply chain disruption are often measured by the amount of entities that encounter difficulties in receiving or delivering materials or goods thanks to hit or miss event . A number of authors have tried to develop a framework for relationship between the typology of uncertainty and the type of strategies chosen for better supply chain. The study proposed during this article follows real time approach of the disruption COVID-19. The survey work analyses what supply chain firms should do during a severe supply chain disruption under uncertain conditions.

Some important points –

- Logistics firms, which are involved in the movement, storage and flow of goods, have been directly affected by the COVID-19 pandemic.
 - As an integral part of value chains, both within and across international borders, logistics firms facilitate trade and commerce and help businesses get their products to customers. Supply chain disruptions to the sector caused by the pandemic could, therefore, impact competitiveness, economic growth, and job creation.
 - We can observe the impacts on freight capacity in three key global transportation segments— ocean, land, and air.
- **Ocean freight:** Total container volumes handled at Chinese ports dropped by 10.1 percent in the first months of 2020. Agility Logistics reports considerable constraints to ocean freight around the world, impacting both key exporters, like Brazil, China, India, and Mexico, as well as importers like the European Union. According to DHL, weak demand will continue to affect routes between Asia and Europe, the United States, and Latin America.
Consequently, additional blank sailings are expected in the coming weeks.
 - **Land freight:** Unlike ocean and air transport, land transport has generally remained partially available globally as roads have remained in operation, except in countries under severe lockdowns, according to Agility Logistics' tracking tool. Trucking capacity is strained because of additional demand for their services— especially food and medical supply transportation— under lockdown, combined with reduced employee availability (due to COVID-19related restrictions), leading to higher rates. Other economic sectors that require land transport, such as manufacturing, are generally not at full capacity because of lockdowns. As a result, spot road freight rates have fallen in some markets. Demand for rail services has grown because of higher air cargo freight rates, blank sailings, and longer transit time for trucks.

- **Air freight:** Volumes fell by 19 percent in March 2020 due to a sharp reduction in passenger flights (which carry freight as belly cargo) and the drop in manufacturing in China. However, as shippers and governments turn to air cargo for essential goods, air freight rates have increased—some carriers are seeing delays with increased congestion at airports. Mid-April saw an increase in capacity, as well as a recovery in volumes transported (although they are still down, year-on-year). The overall reduction in capacity is greater than the net reduction in demand, which supports higher air freight rates. The economic recession will be a second demand shock. The full effect of the pandemic on global supply chains is not yet known. As the IMF is predicting a 3 percent contraction for the global economy in 2020, the expected recession will deliver a second hit to demand and, thus, logistics companies, highlighting logistics’ exposure to trade, manufacturing, and demand for goods.

- Supply chain disruptions and the lockdowns are already affecting logistics companies. Operational constraints are expected to lead to delivery delays, congestion, and higher freight rates. However, not all segments will be impacted equally—companies that serve e-commerce are seeing increased activity as consumers opt for online shopping of essentials, while those that serve other sectors (such as auto and consumer goods) will see a downturn. One mitigant: record-low fuel prices should provide some relief to transport operators. Overall, the uncertainty will exert downward pressure on revenues.
- Logistics companies connect firms to markets by providing various services, including multimodal transportation, freight forwarding, warehousing, and inventory management. They are important for global manufacturing, which is complex and multilocal. Apple’s iPhone, for example, uses components from more than 200 suppliers in 43 countries. As a result, today’s global value chains require greater resilience and efficiencies in the flow of goods between and within countries. These can be achieved by firms outsourcing their logistics functions to third-party logistics services providers, especially those with integrated, end-to-end solutions capabilities. The cost of logistics as a percentage of GDP can be up to 25 percent in some developing economies—as compared to 6–8 percent in OECD countries. Better efficiency in the sector can, therefore, boost competitiveness and stimulate economic growth in emerging markets.

- The impact of COVID-19 was first felt in China due to the role it plays in global manufacturing (with Wuhan, the epicenter of the pandemic, playing a particularly significant role—more than 200 of Fortune Global 500 Firms have a presence there).
- **China is also a major consumer of global commodities and agricultural products. Disruptions to manufacturing in China rippled through global supply chains. Cargo was backlogged at China’s major container ports, travel restrictions led to a shortage of truck drivers to pick up containers, and ocean carriers canceled (or blanked) sailings.**
- The resulting shortage of components from China impacted manufacturing operations overseas. Major industries around the world, including automotive, electronics, pharmaceuticals, medical equipment and supplies, as well as consumer goods, were affected. Although manufacturing picked back up—by end-February, about 70 percent of large industry had restarted operations—a return to full production capacity is unlikely in the short term because of the spread of the pandemic to China’s trading partners. The long-haul trucking sector—which carries more than 80 percent of the country’s goods— illustrates the effects of the lockdown on Chinese logistics. Between January 24 to February 26, 2020, the volume for long-haul trucking fell below 15 percent of 2019 levels before recovering to 50 percent by the end of February and 92 percent in March (see Figure 2). The rapid recovery was driven by the ability to contain the virus quickly and the government’s policy towards trucking (such as waiving national highway tolls and quarantine requirements for trucks shipping essential goods). The pandemic spread to the rest of the world, leading to lockdowns and border closures that restricted the movement of goods. Additional protocols (such as social distancing at warehouses) introduced to ensure the safety of workers contributed to bottlenecks for freight. For example, in the European Union, trucks formed 37-milelong lines on the A4 highway after Poland closed its border with Germany in mid-March. In India, the lockdown created a shortage of truck drivers, which resulted in over 50,000 containers piling up in the ports of Chennai, Kamajalar, and Kattupalli.

- The impact is severe for small players:
 - Small trucking businesses are being severely hit because they tend not to have any backup, recovery plan, or intermittent operation plan. Lack of technology, as well as tools to follow health guidelines (for example, disinfecting deliveries), further complicate their response.
- Top players are experiencing a strong impact: In April, both DHL and CEVA Logistics declared Force Majeure—

a clause that allows contracts to be declared null and void due to acts of God or other unexpected circumstances—on all their contracts due to COVID-19. Other companies' credit metrics are likely to deteriorate, triggering downgrades, as has already been seen in the sector.

RESPONSE TO THE CRISIS

For the most part, governments have responded to the crisis by designating ports, shipping, and trucking services as essential—and thereby exempt from lockdown measures. For example, the Indian government exempted the movement of cargo through ports, supply chains, and the transport of essential commodities from lockdown rules. Although many airports around the world are closed to passenger flights, most are still open to cargo, which can be essential to the COVID-19 response (for example, to transport medical supplies). Closer collaboration between governments and third-party logistics companies has also been necessary to address supply chain bottlenecks and facilitate clearances. Third-party logistics companies have adopted a range of responses to these uncertainties, including

a. **New safety protocols:**

To protect their staff's health, some companies have introduced new protocols on social distancing at warehouses, disinfecting work areas, or providing protective gear, while giving staff unlimited unpaid time off. However, these efforts, which come at a higher financial cost, cannot guarantee protection against outbreaks in confined warehouses.

b. **Alternative modes of transport:**

Many companies are using creative alternatives to their go-to transport modes. Since the reduction of passenger flights has reduced airplane belly cargo capacity,

companies such as DHL have used charter flights to transport shipments to and from China. Airlines are also repurposing passenger aircraft for cargo. Some observers are even forecasting a boom for the China-Europe rail as 60 percent of the air freight capacity between China-Europe has vanished.

c. Adapting service offerings to current demand and safety protocols:

Some larger players have been playing an important role in delivering medical supplies. For example, UPS provided free air transport for two million masks and protective gear to Wuhan in February. Companies are also adapting to demand. Warehouses and retailers are focusing on grocery deliveries since demand is high for essential products, while companies in the last-mile segment are offering nocontact delivery options (some of which include robots).

Last-Mile Delivery

Within the sphere of mobility and transportation, last mile delivery is of particular importance, representing the end of a supply chain's journey from initial production all the way to finally entering the hands of the consumers. Notably, as retailers shutter down there is an increased amount of online shopping. Recently the Wall Street Journal among several other outlets has reported on how strains caused by increasing demand have affected Amazon. Amazon Shipping (a service competing with UPS and FedEx to ship items from businesses directly to consumers) has been suspended. Instead, the capacity in labor and development spent there has been shifted to the core business. In addition there have been several cases of worker unrest and protests regarding severe working conditions amid an increasingly dangerous time. Carriers have to be more clever now than ever about how they manage the influx of orders. Smart solutions around either packaging or security of deliveries may become more important.

Areas of Improvement

During the crisis companies are going to be putting on hold some IT initiatives or transferring cash and resources to collaborative applications and infrastructure support to enable new ways of working and better manage the short-term implications. Moving forward, organizations should specialise in solutions that support advanced planning and mitigate the impact of comparable events within the future.

Among the areas for improvement are:

End-to-end stock visibility:

Organizations got to know what they need in their warehouses, in store, what's selling at what time, and where, in order that they can quickly react to changing conditions and customer needs. Having unified inventory visibility across channels during a single database is crucial. This not only enables organizations to form rapid and agile replenishment and stock transfers — it also means they avoid overspend on inventory.

Complex supplier monitoring:

Understanding how suppliers' and their subcontractors' locations are opened up globally, and knowing which products undergo those sites, is critical to manage any disruptions. this permits organizations to quickly predict how the availability chain are going to be impacted over the approaching weeks, giving them time to right away execute mitigation strategies.

Analytics and artificial intelligence:

Deploying tools infused with strong analytics capabilities will enable organizations to urge before demand, answer changing market conditions, improve demand forecast accuracy, and suggest better allocation and replenishment strategies. By combining internal and external data, supported by AI, applications can work on scenario analysis and “what-if” conditions, creating complex models to plot the simplest course of action.

Process automation:

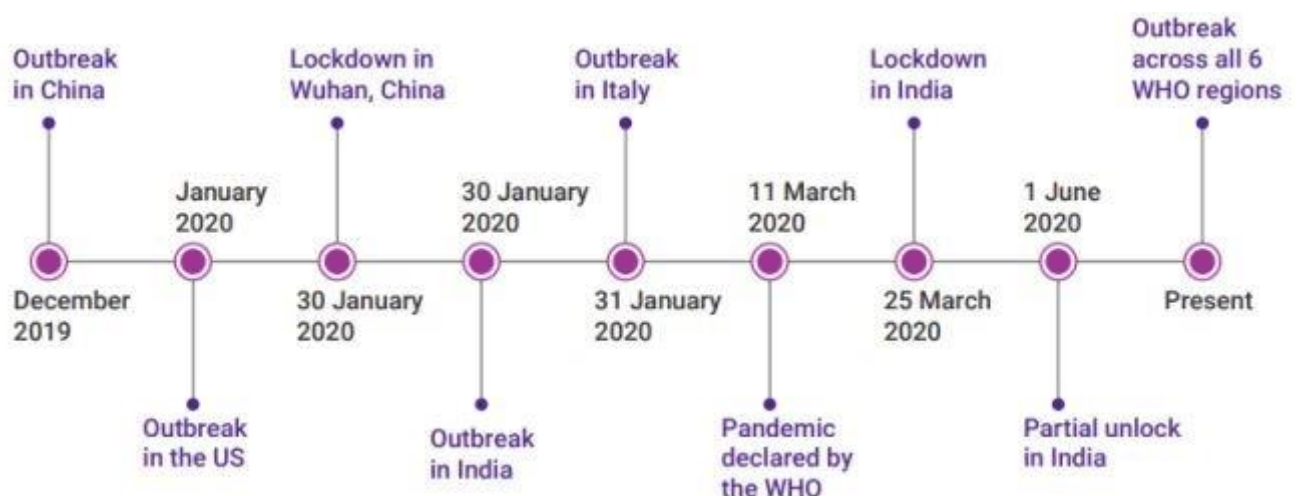
Workflow automation results in even faster and more agile replenishment processes. For instance, systems that provide low-stock alerts can automatically order goods for a specific store quickly and cost-effectively from the proper location.

How Supply Chain Management Technology Vendors Should Respond

For Supply Chain Management technology vendors, now's the time to place innovation and business process transformation at the front and center of the conversation. Customer organizations got to see how Supply Chain Management solutions can better prepare them for demand fluctuations, macroeconomic instability, and challenging conditions. Supply Chain Management also can support enterprise planning and management beyond the availability chain and make a strong but agile production model which will rise to current and future challenges.

Tracking the Timeline

COVID-19, a disease that was first reported in China in Dec 2019, spread rapidly to other parts of the world soon, reaching pandemic proportions. As showcased in Figure 1, the first case in India was recorded in late January 2020.



A Brief Timeline of Milestones related to COVID-19

In general, the national and state-level lockdowns imposed severe restrictions on the mobility of people, suspending all commercial and social activities that require people to come together, except for those defined as essential services. Several private and public enterprises initiated 'Work From Home arrangements' (WFH), a format that is still widely prevalent today.



Manufacturing



Today may be a far complex process, compared with just a couple of decades ago, with subcomponents required to assemble one final product sourced from several places across the world . The raw materials required to manufacture these subcomponents could also come from different countries and continents, and therefore the finished/semi-finished goods may then require to be transported everywhere the planet . This massive dependency upon logistics make import, manufacturing and export a difficult proposition just in case of disruption to the availability chains.

Consider a relevant example within the current situation: India imports overflow half its active pharmaceutical ingredients (APIs) from China. Between the Indian government selectively restricting API import and therefore the logistics challenges created by COVID-19, India’s pharmaceutical industry goes to seek out it difficult to take care of its export numbers. Considering that India is that the biggest supplier of generic medicines worldwide, this might very easily cause a worldwide shortage.

Procurement:



At the opposite side of the coin lies the procurement challenge for the sourcing organization.

In a globally integrated world, a drive towards efficiency has caused an increasing consolidation of production in lower cost geos—primarily based in China, Taiwan, Vietnam or other low-cost economies. With the pandemic starting in China and hitting countries across the world, and therefore the resultant fallout and shortages, the necessity for distributing risk has become more evident than ever.

Distribution:



Distribution of products goes through some unique challenges like staffing of warehouses, a requirement for direct distribution and more intelligent and responsive allocation across channels.

Retailing is additionally been impacted during a peculiar way. The lockdown and curfew scenarios across the planet have led to a singular situation where there's demand as far as essentials are concerned, subdued demand in some niche areas, and large challenges within the luxury items segment, and that we are likely to ascertain several retailers down their shutters while many others are going to be severely challenged on operating margins and models.

On the buyer side, hoarding/stocking of essential commodities and over-the-counter medicines has led to unusual stress on the availability chains. it's commonplace for consumers to panic stock food and other essential commodities during times of crisis. While this results in stress if the stockpiling goes beyond a couple of weeks, it's natural for consumers to worry about availability and resort to the present quite behavior. This unnatural spikes in demand and therefore the required supply

fluctuations are extremely difficult to handle and together create a bullwhip effect within the entire supply chain often resulting in artificial shortages.

Post-COVID:

The brave new 'digital' world From an industrial perspective, the present situation is probably going to accelerate digital transformation initiatives for businesses across the world , as they're forced to face their weaknesses and vulnerabilities.

Technology-led business models will emerge as more critical and important than ever and can play a key role in defining strategy as we reimagine the worldwide supply chains of tomorrow.

Based on lessons that are being reinforced and validated within the current global crises, there are several ways during which businesses can set about creating resilient supply chains within the post-COVID world. For one, there's an urgent got to reduce dependency on physical labor across transportation, logistics and warehousing. this will be enabled through core digital technologies for Industry 4.0 like Internet-of-things, blockchain, control towers, artificial intelligence/machine learning enabled demand forecasting, rule-based and self-adjusting stock allocations, autonomous devices like AGVs and drones, among others.

Factories which will modularize production and shift/adapt lines thanks to demand changes, are going to be the norm of the longer term . they might be backed by supply networks capable of communicating intelligently with each other , compounding their effectiveness and agility. Businesses are getting to pay tons of attention to creating critical systems available on the cloud in order that they will be remotely accessed by employees as they work from home. we should always also see a number of the fence-sitters on cloud migration get that final nudge to the opposite side—and finally move to the cloud to enable business continuity. Safety also will be a key factor and supplier risk management are going to be at the core to all or any planning initiatives. one among the few positives of the COVID-19 scenario has been exposing us to the chances of remote working across industries, domains and businesses, and if sustained within the post-COVID world, this trend will cause a renewed specialise in environment-friendly operating principles.

All this notwithstanding, the human element is that the most vital one which will emerge as we undergo the COVID-19 period over to the post-COVID world. Given the projections on the amount of infected/ hospitalized, it'll have a cascading impact on

the supply of even the core services. things in Italy, Spain, the US or China worsened further thanks to the essential services providers like medical professionals, nurses and forces being impacted by the virus. this is often also visible in a number of the newer impacted areas like India also .

Some key elements, which will prove crucial within the supply chains of tomorrow include:

Intelligent procurement: to assist organizations understand where and when to source using advanced machine learning algorithms supported past purchases, commodity pricing, agro and industrial trends, among others.

Supply chain control tower: one source of truth from sourcing to delivery for all trading partners to ascertain and adapt to changing demand and provide scenarios across the planet .

Supply chain data management with intelligent automation and analytics: End-to-end information management, taking the shape of a knowledge vault of sorts to capture supply chain transactions accurately with high consistency and minimum redundancy. this may help supply chain organizations gather insights around supplier performance, supply chain diagnostics, market intelligence and risk management.

Supplier risk management: N tier risk management helping organizations model cost structures, trend performance data and visibility in to extended value chain to stay au courant any supply disruptions and secure capacity. this might help companies avoid sudden disruptions in supply chain and affect lack of data , something that a lot of major global companies including Sony, face today.

Supply chain simulation: Modeling new supply chain strategies supported business/operating model change, current and/or future supply/demand/logistics constraints. Helps to validate and identify the simplest cost-efficient network to realize the required service level across the worth chain.

To conclude, the one thing that humans are better at than the other sentient lifeform is our ability to find out from our cumulative experiences and implement those learnings to return back stronger. From a purely business perspective, COVID-19 presents a slew of great and sometimes unprecedented challenges for organizations cutting across the business environment, including a possible liquidity crunch, global supply chain disruptions, increase in trade barriers, and a shifting consumer mindset. However, the post-COVID world will see digital technologies playing a critical

enabling-role in delivering improvements throughout the breadth of companies , including more resilient supply chains, significantly enhanced user-experiences, and intelligent optimized processes to deliver business outcomes.

CONCLUSION

Radically changing an existing supply chain is not as easy as it may sound, as creating a robust and secure supply chain will still need to balance the demands for cost efficiency. At the same time, new logistics considerations may also have an impact on supply chains and the changes thereto. In the near term, it is expected that companies will begin seeking out a more diversified supplier base, while looking to develop a flexible, but cost efficient, supply chain.

For the longer term, however, companies will need to undertake a more holistic analysis, which may lead to more drastic changes, such as moving supply chains nearby, or to different countries, as well as increasing the digitalizing of supply chains, with a view of creating a more sustainable operation for the future. A holistic analysis should be based on facts and include the modelling and testing of different scenarios. Change scenarios should also include a contingency plan that provides for the possibilities of having to quickly revert and adjust elements of the supply chain.

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