EasyChair Preprint

№ 5493

Engineering Aspects on Corona Pandemic 2019-2022

Sudarshan Bhalshankar

May 11, 2021

Engineering Aspects On Corona Pandemic 2019- 2022

Sudarshan Dilip Bhalshankar

Mechanical Engineering (CAD/CAM)

Zeal College Of Engineering And Research, PUNE, Maharashtra, India.

Sudarshanbhalshankar111@gmail.com

ABSTRACT

***A** new disease has brought havoc to the whole world. And that is Corona (COVID-19). By the end of 2019, Corona spread all over the world and in many economically powerful countries like USA, England, Russia, European countries and India, lockdown situation was created. This lockdown has affected industrial , transport, tourism, economy and many other areas. In this article, we will consider the industrial sector and plan solutions. Corona virus is a infectious and contagious disease that spreads rapidly. Lockdown is an important preventive measure to prevent this. Accordingly, the whole world followed it and became a lockdown. The Corona's second episode has arrived. But this time the result is a deeper and more deadly solvent than before. It is infecting millions of people every day. And the death rate is changing every day. In the financial year 2021-2022 and As the corona virus becomes more contagious and more infectious by the year 2020-21, it is time to return to Lockdown. In this article, we will study the impact on the industrial sector from an engineering point of view and try to preview and remedy it, suggest measures for management in the industrial sector, planning. Proper planning and management of this subdivision will reduce the prevalence of corona (COVID-19) in the industrial sector.*

KEYWORDS- MANUFACTURING, INDUSTRIES, LOCKDOWN, PLAN, REVIEW, AUTOMATION.

INTRODUCTION

The novel coronavirus disease, also referred to as COVID-19, was first identified in December 2019 in the city of Wuhan, which is in the Hubei province of China. Within a short time, the COVID-19 epidemic spread throughout the globe, becoming a true pandemic that has severely affected almost every country. The COVID-19 pandemic has a direct impact on public health (Paul & Chowdhury 2020a). As of September 6, 2020, COVID-19 had resulted in more than 26.9 million infections and more than 881 thousand deaths (Worldometers 2020). Along with its impact on public health, the pandemic has also impacted the operations of supply chains, sustainable economic growth, and the environmental performance of supply chains (Chowdhury & Paul, 2020; Khan et al., 2019; Suhi et al. 2019; Paul et al. 2019a; Khan et al., 2020; Moktadir et al. 2020).

The COVID-19 pandemic has also had significant economic consequences globally. In particular, the world economy faces a negative supply stock because of the pandemic, which has forced factories to keep shutting down, thereby disrupting the global network of

supply chains. The Organization for Economic Co-operation and Development (OECR, 2020) has predicted the most substantial downward growth in South Korea, Australia, and Japan. More generally, because of COVID-19, people have been advised to maintain "social distancing" with severe effects on the business of tourism and travel-related industries. For example, the International Air Transport Association estimates that the pandemic has cost global air carriers between $63 billion and $113 billion in revenue in 2020 alone (Segal & Gerstel 2020). Many other industries, such as tourism and hospitality, food processing, education, fashion and apparel, leather, and other retail sectors, have all been affected significantly by COVID-19 pandemic.

Among the many industries impacted by the pandemic, the food and beverage industry is unique, fulfilling some of the most basic needs of humankind. This industry is one of the fast-growing industries in the world. In the European Union (EU), agriculture and the industrial sectors responsible for the production of food, beverages, and tobacco deliver 75% of the bio-economy turnover, and they account for 80% of the employment in the overall EU bio-economy (Klitkou & Bolwig, 2019). In India, the food industry accounts for over 40% of India's Consumer Packaged Goods (CPG) industry, and continues to grow at record levels (Ministry of Food Processing Industries of India, 2017). In line with the growth of the food and beverage industry globally, the food-processing growth rate in Bangladesh, which is the context of the current study, was 6.1% in 2010, while just five years later, in 2015, the growth rate was 12.5%. The total number of people employed in this sector is 1.3 million, making up 10.27% of the total number of people employed across all industries (Nath 2012). In short, the food and beverage industry plays a vital role in the national and international economy including Bangladesh. Like other industries, the food and beverage industry has been hit hard by impacts from the COVID-19 pandemic, which has caused enormous losses in many sectors of the global economy. It is thus all the more crucial to explore the impacts of COVID-19 pandemic on the industry and to consider potential strategies for dealing with those impacts.

There are several strands of research on business disruption and its management in the context of the food and beverage industry (Bruzzone et al. 2013; Sharma & Singhal 2018). Some of the latest studies have investigated the impacts of COVID-19 pandemic on the food supply chain, but they have not considered strategies to overcome the negative impacts of the pandemic. For example, Deaton and Deaton (2020) investigated the effects of COVID-19 pandemic on food security in the context of Canada's agricultural system. Hobbs (2020) assessed the impacts of the pandemic on food supply chain resilience while also discussing the demand-side shocks caused by panic buying and consumption patterns in Canada. However, to the best of our knowledge, no research has yet explored the impacts of COVID-19 pandemic on the food and beverage industry in the context of an emerging economy. Therefore, this research contributes to the emerging economy by investigating the case of the food and beverage industry which is one of the fastest-growing industries in Bangladesh.

Further, nor have researchers examined strategies for overcoming those impacts and thereby improving resiliency in such contexts. To fill these gaps in the literature, the present study establishes.

Scope

This report analyzes the impact of COVID-19 on the global industrial automation sector. It identifies those companies that may benefit from the impact of COVID-19 over a 12-month period, as well as those companies that will lose out. It includes a thematic screen, that ranks the 58 leading companies in this sector on the basis of overall leadership in the 10 themes that matter most to their industry, including COVID-19. This generates a leading indicator.

OBJECTIVES

The manufacturing sector is a major part of the economy as it accounts for nearly 16% of the global GDP in 2018. As a result, the government across the countries primarily focuses on encouraging the manufacturing sector. Certain initiatives in emerging economies to promote the manufacturing sector include Make in India and Made in China (MIC) 2025. MIC 2025 is the first stage of a larger three-step strategy to transform China into a leading manufacturing power. The initiative seeks to move China up the manufacturing value chain by utilizing innovative manufacturing technologies or smart manufacturing.

1. A comprehensive research methodology of global manufacturing industry.
2. A detailed and extensive market overview with key analyst insights.
3. An exhaustive analysis of macro and micro factors influencing the market guided by key recommendations.

4. Analysis of regional regulations and other government policies impacting global manufacturing industry.
5. Insights about market determinants which are stimulating the global manufacturing industry.
6. Detailed and extensive market segments with regional distribution of forecasted revenues.
7. Extensive profiles and recent developments of market players.

LITERATURE REVIEW

The world is witnessing tumultuous times as major economic powers including the US, UK, Russia, India, and most of Europe continue to be in a state of lockdown. The worst-hit sectors due to this lockdown are sales, production (manufacturing), transport (aerospace and automotive) and tourism. Lockdowns became necessary as a preventive measure to avoid the spread of the contagious and infectious "Coronavirus Disease 2019" (COVID-19). This newly identified disease is caused by a new strain of the virus being referred to as Severe Acute Respiratory Syndrome Coronavirus 2 (SARS CoV-2; formerly called 2019-nCoV). We review the current medical and manufacturing response to COVID-19, including advances in instrumentation, sensing, use of lasers, fumigation chambers and development of novel tools such as lab-on-the-chip using combinatorial additive and subtractive manufacturing techniques and use of molecular modelling and molecular docking in drug and vaccine discovery. We also offer perspectives on future considerations on climate change, outsourced versus indigenous manufacturing, automation, and antimicrobial resistance. Overall, this paper attempts to identify key areas where manufacturing can be employed to address societal challenges such as COVID-19[1]

Pandemics cause chaotic situations in supply chains (SC) around the globe, which can lead towards survivability challenges. The ongoing COVID-19 pandemic is an unprecedented humanitarian crisis that has severely affected global business dynamics. Similar vulnerabilities have been caused by other outbreaks in the past. In these terms, prevention strategies against propagating disruption require vigilant goal conceptualization and roadmaps. In this respect, there is a need to explore supply chain operation management strategies to overcome the challenges that emerge due to COVID-19-like situations. Therefore, this review aimed at exploring these challenges and developing strategies for sustainability, and viability perspectives for SCs, through a structured literature review (SLR) approach. Moreover, this study investigated the impacts of previous epidemic outbreaks on SCs through a literature review, to identify the research objectives, methodological approaches, and implications for SCs. The study also explored the impact of epidemic outbreaks on the business environment, in terms of effective resource allocation, supply and demand disruptions, and transportation network optimization, through operations management techniques. Furthermore, this article structured a framework that emphasizes the integration of industry 4.0 technologies, resilience strategies, and sustainability to overcome SC challenges during pandemics. Finally, future research avenues were identified by including a research agenda for experts and practitioners to develop new pathways to get out of the crisis.[2]

The ongoing Coronavirus Disease 2019 (COVID-19) global pandemic has triggered a flurry of associated research publications, numbering to ~137 papers a day since February 2020. This rate of publication appears to be exceptionally high, when compared to research papers published on other similar topics. Searches of COVID-19-associated publications on PubMed and Retraction Watch Database indicate that the retraction record appearance rate for COVID-19-related research is also exceptionally high compared to other related research topics in viral epidemics/pandemics and surpasses the basal level of about 4 in 10,000 papers. This finding serves as a reminder and caution against any lapses in the standard of work, peer review, and publication of COVID-19-related research.[3]

Coronavirus Disease 2019 (COVID-19) has been affecting most of the countries and impacting almost every aspect of people's lives. More than one hundred million confirmed cases and two million deaths have been reported due to COVID-19 as of February 2021. While our society suffers an unanticipated epidemic, researchers and engineers have developed various technologies to manage this global emergency. Specifically, multimedia tools, techniques, and applications have been developed and played essential roles in facilitating the recovery, resilience, and management of COVID-19, including pandemic status monitoring and impact prediction, enhancing public awareness and telehealth, etc. However, there are many challenges that require further investigation and research to better manage COVID-19 and prepare for future pandemics.[4]

In 1881, Louis Pasteur proved the "germ theory of disease", namely that microorganisms are responsible for causing a range of diseases. Following Pasteur's and Robert Koch's ground-breaking work on pathogens, further research during the 20th century elucidated how the immune system fends off disease-causing microorganisms from a molecular perspective. The COVID-19

pandemic has again focused scientific and public attention on immunology not the least owing to the race of employing vaccines to halt the spread of the virus. Although most countries have now started vaccination programs to immunize a large part of the world's population, the process will take time, vaccines may not be available to everyone, and a number of unresolved issues remain including the potential contagiousness of vaccinated individuals and the duration of protection (Polack et al, 2020).[5]

➢ Impact of COVID-19 on specific social and economic sectors and industries

The preliminary assessment of the impact of COVID-19 on specific social and economic sectors and industries is captured in a series of sectorial briefs. The briefs also contain policy responses and measures taken by ILO constituents – governments, employers and workers – as well as available ILO tools and responses at the sector-specific level. The intended audience is ILO constituents at the national, sectorial, regional and global level, as well as international organizations and other partners in the effort to advance decent work for women and men in specific social and economic sectors. The briefs will be updated regularly. Constituents are invited to comment on and contribute to the briefs so that they can serve as repository of good practices and lessons learned in pandemic responses in order to "build back better" in the post-pandemic future.

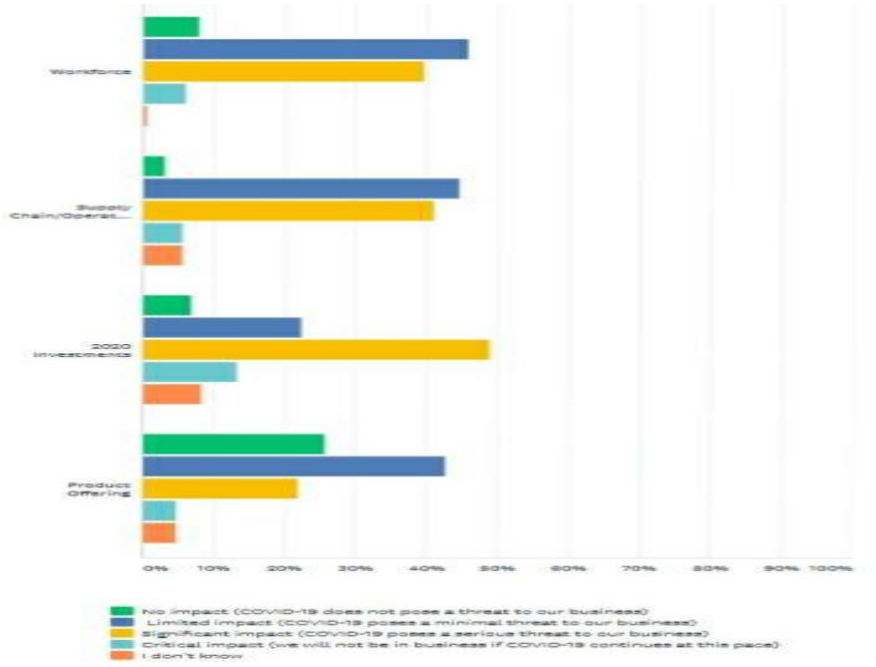


Fig. Level Of Impact From COVID-19 On Business sector

- ***Manufacturing sector***

The pandemic has sped up the shift from global to more local economies—a trend already underway thanks to international trade tensions and other factors. As part of this transformation, industries are looking to bring supply chains closer to home and are creating major "reshoring" opportunities. That means manufacturers and the industries they serve are building new factories or reviving old ones that went dormant during years of expanding globalization. These new factories are likely to be smaller and more automated, with technology that enables them to change product lines more quickly as demand shifts. This, in turn, means opportunities for other manufacturers—those that make automation components, as well as "integrators" who put together automated systems. And with new demand for personal technology products and remote connectivity, manufacturers that serve the sector with components for technology hardware, data-canters and cellular connectivity have benefited from increased investment.

- ✓ ***PLAN***

Manufacturers are increasingly aware that even when the pandemic ends, it will leave behind fundamental changes, such as greater automation and a focus on smaller, more local factories.

- ✓ ***Remix***

The pandemic continues to pose obstacles, particularly for manufacturers that serve industries hurt by the decrease in travel and the resulting slump in energy production. Specialist companies that may have produced a single part used in just one manufacturing segment for struggling industries are looking to reduce their exposure to these areas while aggressively reconfiguring their products and processes for other, more profitable markets. As a part of that move toward diversification, manufacturers also need to look ahead, identifying categories that are likely to outperform in a new economy. liquidity, too, is a persistent challenge, as companies look to remain viable or to make investments to move into new areas. In some cases, projections of when things may return to normal have proven overly optimistic, and it's important to plan for the possibility that the current disruptions may continue. Adding to these challenges is uncertainty about further government stimulus in the year to come. As they move ahead in a changed landscape, manufacturers must adapt to multiple transformations, often by changing processes and practices that they had grown accustomed to. Amid the explosion in online shopping, consumers are demanding faster deliveries and greater choices than ever before. Satisfying those demands will require manufacturers to adapt quickly, whether by innovating with new products or modifying existing ones—say, by allowing consumers to customize products and arranging manufacturing processes to be flexible enough to handle product variations.

Automation, which can help protect workers' health by minimizing contact with one another, may also help companies reduce labour costs further down the road. While they may not be able to invest in full-scale automation all at once, midsize manufacturers can explore along the edges of their manufacturing processes, identifying one or two areas that could be automated and proceeding modularly. And to thrive in the post-pandemic world, in part by implementing these and other changes, manufacturers should maintain ongoing conversations with their bankers. Detailed conversations can help ensure they're financially prepared for any challenge or opportunity that comes their way in the months and years ahead.

❖ *Recommend On Manufacturing Sector.*

1. Hygiene protocols.
2. Supply chain.
3. Cost and expenses control.
4. Reduce transmission between employees
5. Maintain sanitary measures.
6. Promote a healthy environment.
7. Cleaning area.
8. Cleaning Protocols.
9. Operators cleaning routines.
10. Redirected work flows
11. Break time.
12. Personnel training.

• *Automation sector*

The COVID-19 outbreak is now travelling around the world, leaving a trail of destruction in its wake. This report discusses the impact of the virus on leading companies in the industrial automation sector. Industrial automation was not in a great place before COVID-19 struck, having been slowed by flat capital expenditure and declining industrial production. The virus has since closed factories, with workers across the world sent home. It has exposed the fact that, despite a lot of hype over the years, advanced factory automation has not been substituted for human workers at scale.

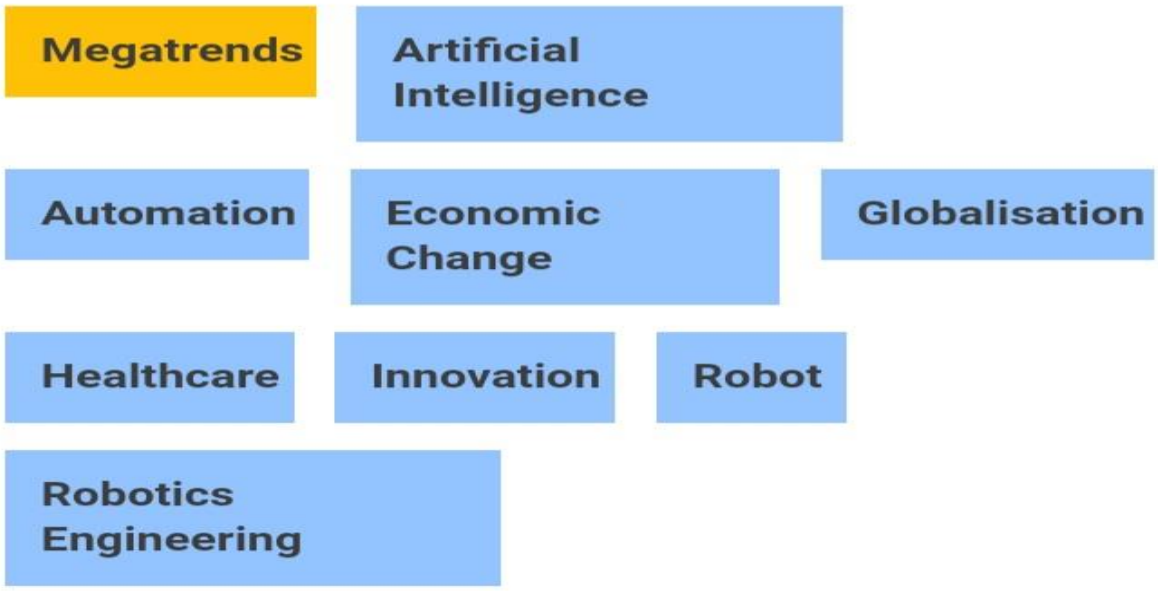


Fig. Automation sector

❖ **Recommended On Automation Sector**

1. The future of works.
2. Remote work future trends.
3. Remote working jobs.
4. VPN remote access software.
5. Work from home opportunities.
6. The hybrid workforce.

- ***Transportation sector***

The pressure on organizations during this coronavirus pandemic has shifted from moving citizens to keeping a core transportation system operational with a skeleton workforce to ensure freight and key essential workers can continue to move. A secondary effect of this shift is the sudden change in sources of revenue for transportation operators, with many experiencing an unexpected shortfall in their finances. Organizations will need to plan ahead to ensure that the transportation network will be ready for a return to normal operations when the coronavirus pandemic lockdown measures are lifted. Transportation organizations will need to ensure that transportation networks can continue to operate throughout the lockdown measures, striking a balance between reduced operations and providing enough capacity for key workers to be able to practice social distancing. Longer-term investment programs may need to be replanted and reprioritized in light of decreased revenue. Organizations will need to plan for the availability of key personnel to ensure that staff with critical skills and training are available throughout the coronavirus pandemic to keep networks operational. Commuting and traveling patterns may not recover to their pre–COVID-19 state once lockdowns are lifted.

The road transport sector is essential to social and economic development and guarantees mobility across jurisdictions and countries. But in order to curb the spread of COVID-19, many countries around the world have placed restrictions on domestic transit and/or closed border crossings for road freight transport services. Urgent action by governments, the social partners and parties to road transport

supply chain parties – including shippers, receivers, transport buyers and intermediaries – will be critical in addressing decent work challenges for these key workers to tackle the crisis effectively. This policy brief seeks to summarize the issues relating to COVID-19 and urban passenger transport workers. The brief discusses the mains impacts of the pandemic in the sector. It also includes information on the tripartite and sectorial measures that employers, workers and governments have taken to support the sector and its workers, and on the ILO's principles and tools, including international labour standards.

❖ **Recommended On Transportation Sector.**

1. Physical distancing in public transportation.
2. Measuring system resilience and it is ability to restoring functionality.
3. Contact tracing to reduce the risk of virus spreading in public transportation
4. Effectively managing crowding to reduce public health risks.

- ***Construction Sector***

The COVID-19 pandemic has had a significant impact on the construction sector, which is sensitive to economic cycles. Yet, on the upside, construction holds much potential to stimulate recovery, thanks to its potential to create jobs; and in turn, recovery measures can support the sector's transformation towards sustainability and digitalization. Tripartite cooperation and social dialogue, together with international labour standards, are key to promote a human-centred recovery of the construction sector from the crisis. Workplaces, particularly those that employ migrant workers and those in the informal economy, have taken centre stage in the containment of the COVID-19 virus. Since the ILO Centenary Declaration for the Future of Work, adopted by the 108th Session of the International Labour Conference (Geneva, 2019), emphasizes that safe and healthy working conditions are fundamental to decent work, we dedicate this policy brief to hand hygiene in workplaces. The main message is that all workers must have the facilities to wash their hands safely and adequately at work in order to prevent or reduce the spread of COVID-19.

- ***Health and Education***

Besides health and education workers, all public servants play a role in halting the spread and recovering from the pandemic. This is true regardless of their occupation: whether in the administration of the state like tax collectors, police or correctional officers; implementing economic and social policies like labour inspectors; providing services to the community like waste collectors; or supporting compulsory social security systems like social workers. As custodians of public goods, public servants are indispensable conduits for the recovery. The COVID-19 pandemic demonstrates the crucial importance of disaster preparedness and that private-sector partners cannot manage alone the scope of interventions needed now. This policy brief addresses issues relating to public sector workers who perform frontline duties in confronting the COVID-19 crisis in the name of the State, often described in statutes as essential services. The brief discusses their role in dealing with the crisis, the measures that governments have taken to support their work and the ILO principles and tools, including international labour standards, that protect them.

The COVID-19 pandemic is affecting public health and causing unprecedented disruptions to economies and labour markets, including for workers and enterprises in the forest sector. It has exacerbated existing challenges, with many enterprises and workers suffering as a consequence. In response, governments, employers' and workers' organizations, and other forestry stakeholders around the world, are collaborating to mitigate the impact of the pandemic with a view to protecting businesses and livelihoods, including through social dialogue and the promotion of international labour standards. While working to feed the world, many agricultural workers are unable to lift themselves out of poverty and food insecurity. As the pandemic spreads, the continued functioning of food supply chains is crucial in preventing a food crisis and reducing the negative impact on the global economy. Coordinated policy responses are needed to support agribusiness and the livelihoods and working conditions of millions of agricultural workers in line with relevant international labour standards.

- ***Tourism sector***

Tourism is a major driver of jobs and growth. But COVID-19 has dramatically changed this. The impact on tourism enterprises and workers, the majority being young women, is unprecedented. Timely, large-scale and, in particular, coordinated policy efforts both at international and national levels are needed in consultation with governments, employers' and workers' representatives, taking into consideration relevant ILO international labour standards.

- ***Automotive Industry***

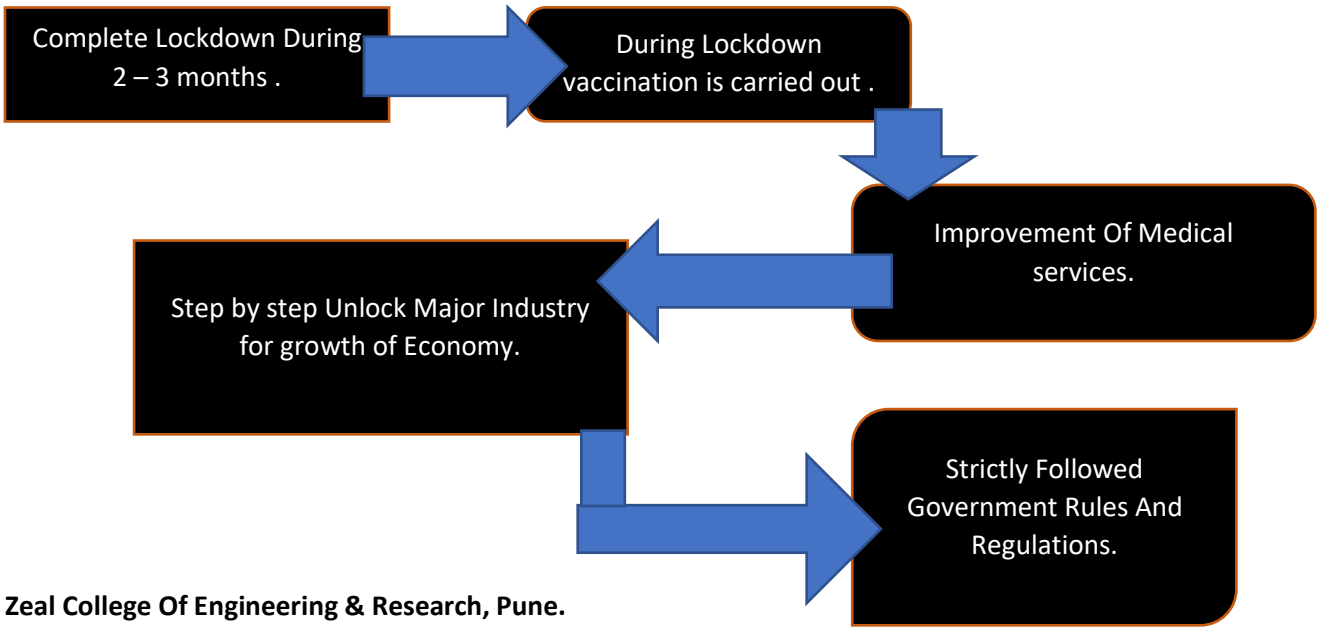
The automotive industry has been hit by a triple whammy: factory closures, supply chain disruption, and a collapse in demand. Just-in-time manufacturing processes have propagated the impact across the globe. Small and medium enterprises are among those hardest hit and millions of jobs are at risk. Automakers are key to kick-starting the global economy. Not only by producing life-saving ventilators and facemasks. Sustainable industrial policies and targeted support and are key to a lasting recovery – to building back better – with decent work for more women and men. footwear industries is unravelling, as workers are told to stay at home, factories close, and global supply chains grind to a halt. The cancellation of orders has hit thousands of firms and millions of workers particularly hard. We urgently need solidarity and joint action across the industries' supply chains. The ILO is committed to supporting governments in protecting the health and economic well-being of workers and businesses in the textiles, clothing, leather and footwear industries.

Strategy and planning

WHO is issuing the COVID-19 Strategic Preparedness and Response Plan (SPRP) for 2021 and accompanying documents as a package aimed at guiding the coordinated action that we must take at national, regional, and global levels to overcome the ongoing challenges in the response to COVID-19, address inequities, and plot a course out of the pandemic. Over the past year, much has been achieved by national authorities and communities with the support of WHO, donors and partners, and an unprecedented effort by the scientific community and the private sector.

The Strategic Preparedness and Response Plan 2021 (SPRP2021) builds on what we have learned about the virus and our collective response over the course of 2020, and translates that knowledge into strategic actions. This plan builds on achievements and also focuses on the new challenges, to mitigate, for example, risks related to new variants. The plan also considers the road we need to travel towards the safe, equitable and effective delivery of diagnostics and vaccines as part of the overall strategy to successfully tackle the COVID-19 pandemic

As leader of the global incident management support team (IMST) structure, the UN Crisis Management Team (UNCMT), and as a founder of the Access to COVID-19 Tools (ACT) Accelerator, WHO harnesses the world's technical and operational expertise to translate knowledge into coordinated action.



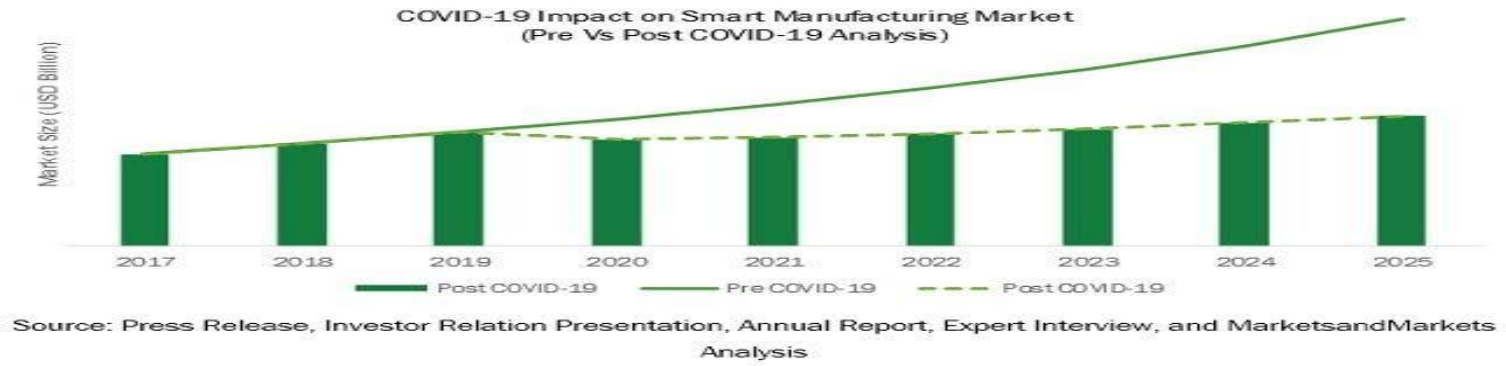


Fig. Effect on Manufacturing sector

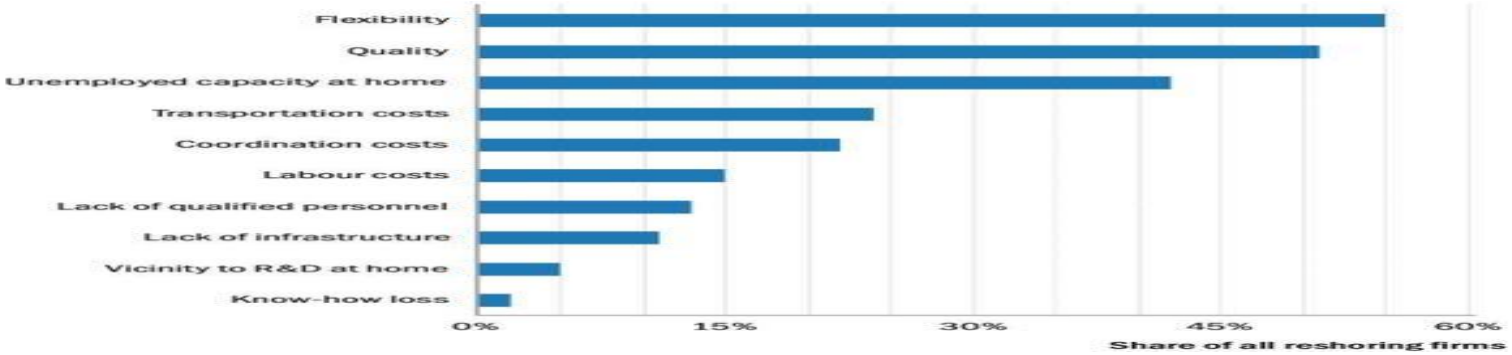


Fig. Effect On Automation Sector

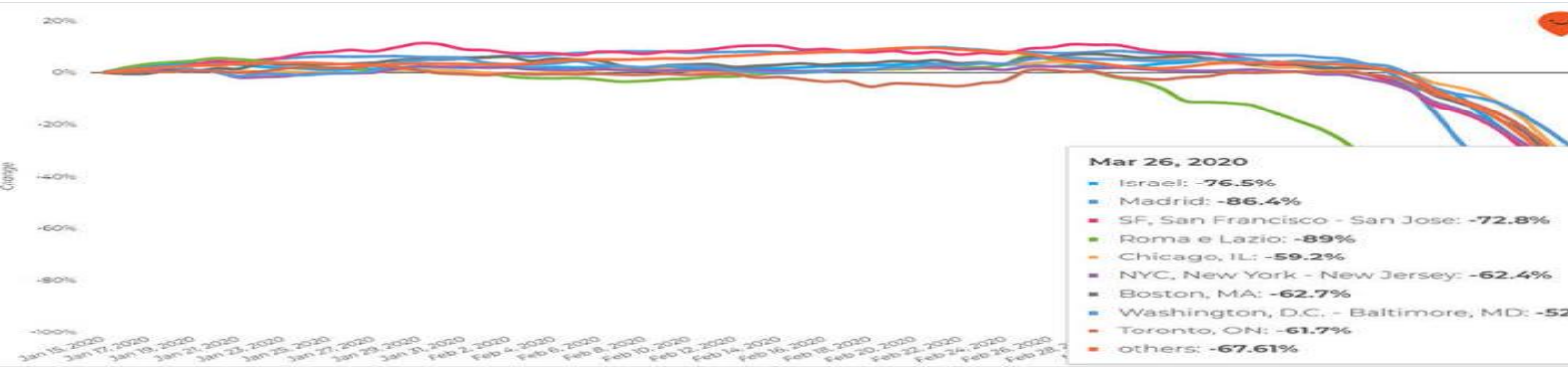
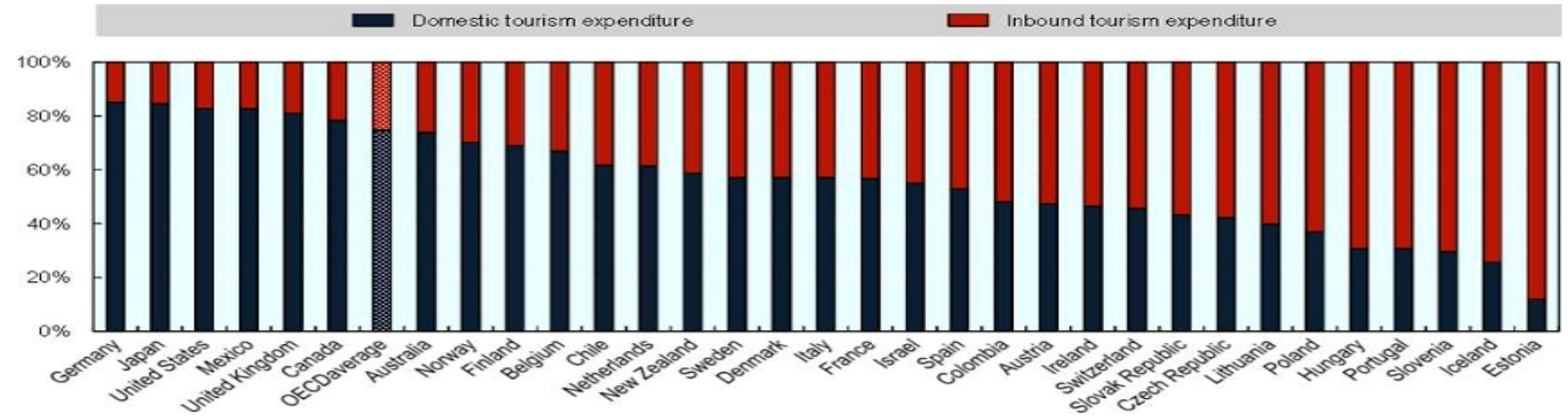


Fig. Effect On Transportation Sector



- **Fig. Effect On Tourism sector**

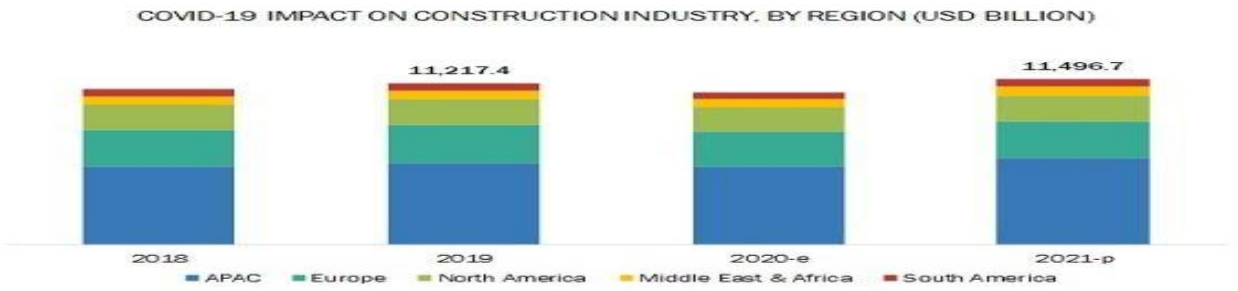


Fig. Effec On *Construction Sector*

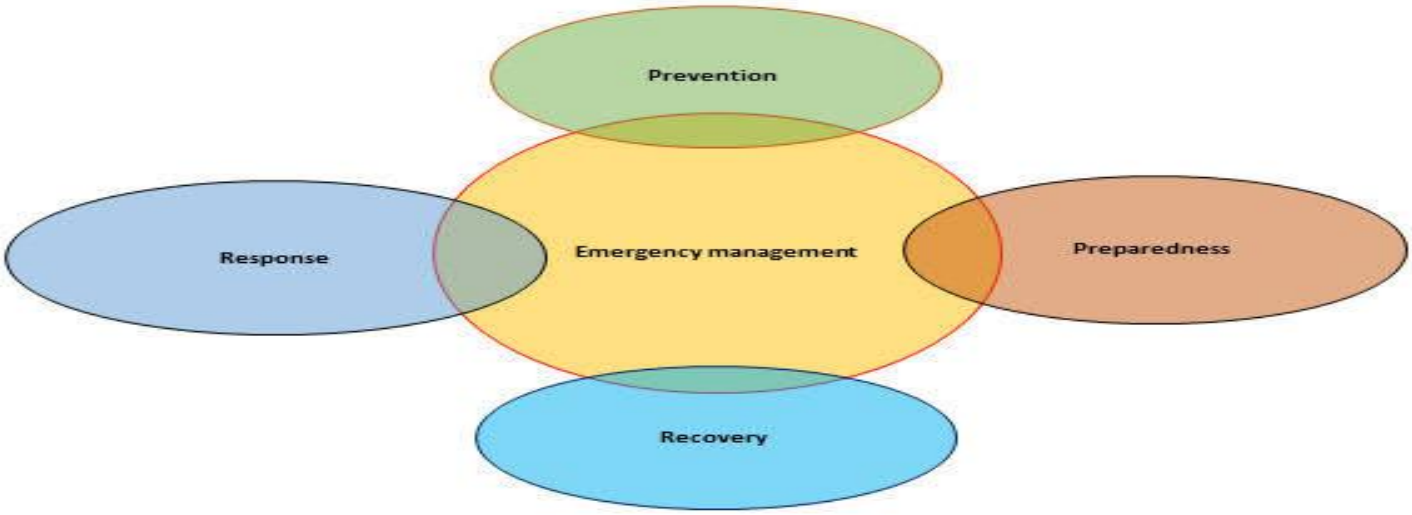


Fig. Engineering Resources for the COVID-19 Response

REFERENCES

1. Supply chain operations management in pandemics: a state-of-the-art review inspired by COVID-19 Muhammad Umar Farooq, Amjad Hussain, Tariq Masood, Muhammad Salman Habib Sustainability 13 (5), 2504, 2021.
2. An alarming retraction rate for scientific publications on Coronavirus Disease 2019 (COVID-19) Nicole Shu Ling Yeo-Teh, Bor Luen Tang Accountability in research 28 (1), 47-53, 2021
3. Multimedia Research for Response and Management of COVID-19 and Future Pandemics Shu-Ching Chen IEEE Multimedia 28 (1), 5-6, 2021
4. A CRISPR response to pandemics? Exploring the ethics of genetically engineering the human immune system Federico Germani, Sebastian Wäscher, Nikola Biller-Andorno EMBO reports 22 (3), e52319, 2021