

Analysis of Impact of Pandemic (Covid-19) on Infrastructure Project

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Abstract. In today's globalized world, there is hardly any place that has remained unaffected by the severity of the Novel Coronavirus or the Covid-19 pandemic. Almost every commercial activity is suffering at the hands of the ruthless Covid-19. Construction sector is also highly get impacted due to corona virus and the lockdown effects. Government of India has imposed a lockdown like many nations, restricting the movement of people and gatherings. In the construction sector, hordes of workmen toil together to meet the timelines. However, due to the restrictions put in place by the Government, all the construction activity and most of the business activity across the country has halted. This paper observes infrastructure project in Pune-PCMC region and describes the impact of the Corona virus on the construction industry and also explains remedial measures that how it is possible to continue construction work in this situation. This will help our country to cope up with the financial crises and help to reduce the unemployment in our country.

Keywords: COVID-19, Pandemic, Corona virus, Impact, Construction, Infrastructure Project, Economy, Pune-PCMC-region, Remedial measures, Civil Engineering.

1. Introduction

Construction is key to the global economy and it has been significantly affected by Corona Virus. The COVID-19 pandemic has devastated the world of work. Its impact, which varies across sectors, has been significant in the construction sector. As construction is sensitive to economic cycles, construction enterprises and workers are particularly vulnerable to the drastic decline in economic activity resulting from the pandemic. Increased health risks associated with COVID-19 have exacerbated decent work deficits in the sector. Pandemic will reduce investment in **construction industry** by 13 to 30 percent, which will probably **affect** gross value added and employment. The number of unemployed in **India** has risen to 27.11% due to **Corona virus (COVID-19)** Before the pandemic, the construction sector accounted for around 7.7 per cent of global employment, with projections for 2020 indicating that it would contribute to 13.4 per cent of global GDP. In the context of the current crisis, however, falling revenue and increasing project delivery challenges have led to the sector's contraction in most markets, with a corresponding negative impact on the labor force. Corona virus is an infectious disease therefore to stop the spread of this disease, the construction work has been temporarily stopped keeping in mind the concerns of the workers in the construction industry. As a result, construction industries are gaining nothing but losses, which have an impact on world economy. It has also disrupted the transportation system which has disrupted the supply of materials. Many construction companies are going through a financial recession so companies are laying off a lot of their workers. Overall, construction industry has taken a terrible turn.

1.1 Problem Statement:

Covid-19 is the highly contagious disease and it is spreads world widely. In India to stop the spreading of corona virus, Indian government had imposed lockdown and due to lockdown whole construction industry is hampered and went under financial crises and it also causes various impact on construction sector, This paper has observed the impact of Pandemic (COVID-19) in the construction sector on infrastructure project in PCMC –region PUNE, India and also we have recommend remedial measures that how to deal with the pandemic situation without hampering the construction activity and also not compromising with corona safety for the people so that we can easily resume our construction work. In this paper we studied the impact of covid-19 pandemic Situation on infrastructure project and all the required details are collected and recommend remedial measure according to it.

1.2 Goal and Objective of the project

The goal of this thesis is to make a holistic approach to evaluate the impact of Covid-19 Pandemic situation over a Infrastructure project progress and prediction of expected time at completion during the execution of the works by joining a wide range of understanding hazards later author will find out the remedial measures and techniques for improving the working methods and profitability of construction industry in India.

1. To workout the impact of covid-19 over construction industry.
2. To implement the project planning technique according to covid-19 pandemic as per Protocol laid by the Indian government.
3. To provide remedial measures over covid-19 pandemic situation that how to deal it and progress on project construction work.
4. To Improves efficiency of work and to save cost and life and maximize profitability.

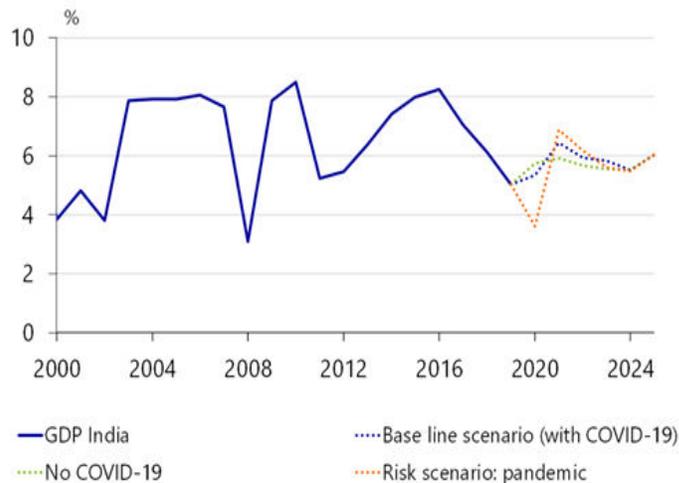
2. Methodology Adopted:-

This report presents a comprehensive structure for risk and human resource management especially related to Covid-19 pandemic situation how to deal with such situation and manage all the things without hampering the human life and by following the all government protocol laid. Manpower is a most important resource element in construction sector. In this report we use Resource Constrained Approach and also author have conducted a small survey to find out the problems what peoples are facing while resuming the work and their suggestion and remark which is useful for better project planning and framing the policies. for project planning and management and try to cope up with the situation and find the better way for success with increase business profitability in Indian Construction Industry for Infrastructure project in our study this research is carried out as beneath stages. Here we workout various Impact factor affecting on Infrastructure project due to Covid-19 Pandemic then we find out various remedial measures and how our proposed approach is better for Infrastructure projects in India.

3. The impact of COVID-19 on the GDP, construction sector and unemployment in India.

- GDP of India shrinks 23.9%
- The number of unemployed in India has risen to 27.11% due to Corona virus (COVID-19) in the first week

- The impact of the Corona virus on India's construction industry is costing estimated Rs. 30,000 crore every day. This pandemic will reduce investment in construction industry by 13 to 30 percent, which will probably affect gross value added and employment.



3. Impacts of COVID-19 on construction sector

As the covid-19 introduced in India it is very important to take necessary measure to stop spreading the novel corona virus into the country as our country is densely populated and we don't have plenty of medical services and equipment so government has put lockdown in India as it is the only solution. There are multiple consequences of the lockdown, which would further stretch the troubles for the sector like reverse migration, disruption of supply chains, amongst others. Cumulatively, the above circumstances would cause hindrance in meeting the obligations under the construction and engineering contracts and would lead to multiple legal wrangles for the industry post lifting of the current restrictions.

3.1 Supply chain management

Due to the lockdown effect The supply chain has been disrupted in various ways in different parts of the world as it is not allowed to cross any border of the country and even states and cities, even no one have to allowed to come out from their houses. Various construction materials are required during construction but due to lockdown these are not reaching at construction site which is hampering the construction work. Sometimes some construction material has to bring from various country and any other states' and hence it cannot possible due to lockdown. Due to which the required materials are not arriving so the work is off. It has not only shut down the construction industry, it has also damaged the livelihoods of those who bring these things in vehicles and the factories that make all these materials are also losing a lot of money because these are not being sold.

3.2. Transportation get Hampered

Due to lockdown all transportations in the country have been disrupted in all parts of the country. That's why no materials are arriving in the construction sector and no workers are able to come to work from their home. Hence it is not possible to continue the execution work and it stopped.

3.3. Shortage of Manpower

This corona virus is highly contagious disease and proved very dangerous to people when it is not treated timely and properly therefore, many workers are not willing to come to work site they are migrating from their work place to their hometown due to the fear of the disease, in execution work for labors have to coordinate to the many people and due to that there are huge chance of spreading this virus and also workers are unable to reach their workplaces because the transportation system is completely closed. it is not possible to make the workers work without any protection.

3.4. Financial problem arises

Labors are not available material are not reaching at site hence construction work is stopped. The companies are not making any kind of profit due to work stoppage in the companies and on the contrary more losses are being incurred and not only the company is losing money but also all the suppliers who are providing the required materials to different companies to be used in construction sector, all those suppliers are also incurring huge losses. Since the closure of the company, the supply chain has been shut down and the factories that produce goods have stopped production, resulting in many losses of them. Moreover, due to non-sale of factory-produced goods and closure of the construction sector, the government is unable to collect proper taxes from all these places which is having a direct impact on the country's GDP and when the country's GDP goes down, it affects the global economy.

3.5. Contractual Revisions

covid-19 is the literally an unexpected pandemic for construction industry and also for various industries due that government of India has decided to give more time to contractors that is six Months extensions for their project completion time without any penalties. It is based on a clause called 'Force majeure'. There are many rules mentioned in this clause, 'Large Scale Epidemic' is one of them. COVID-19 pandemic falls within this category. Different contractors put their different tools in different places for use in different machinery construction sector but as a result of this lockdown, all these equipment have been lying there for a long time. The companies have a contract with the contractors to work with all these equipment on the basis of some money and If the 'Force Majeure' Clause is mentioned in the contract then no compensation will be paid to the contractor by the agency due to delay. The result is a lot of financial loss when contractors stop working.

3.6 Increases in Unemployment

Companies are not able to make profit due to this lockdown and pandemic effects and they are suffering huge economic losses. That is why companies are not able to pay their employees timely and fully hence the company is laying off a lot of workers. Due to this, many people's jobs have been snatched away. Their families are also going through a lot of hardships as a result of losing their jobs. And this may increases the poverty in the country.

3.7 Curtailment of Government funds

Infrastructure project are owned by government and the funds required for the execution of Infrastructure project is given by the government bodies. Due to covid-19 pandemic situation government focusing on life saving relief program for the population and diverting the huge fund towards Covid-19 Emergency Medical Services. Government putting

their funds for creating jumbo Covid-19 Care center, increasing the no. of doctors and medical staff, vaccine, Vaccination Centers and hence less fund for Infrastructure Project.

3.8 No New Infrastructure Project Launched

Covid-19 disease is getting worse day by day now some new types of covid-19 introduced in era like Black fungus, White Fungus, Cream Fungus which is very dangerous to human life and we have to be more and more ready for the new challenges induced by the Novel Corona virus. Hence government is focusing on it and they have not introduced any new Infrastructure Project this year.

3.9 Government Offices are running with fewer employees

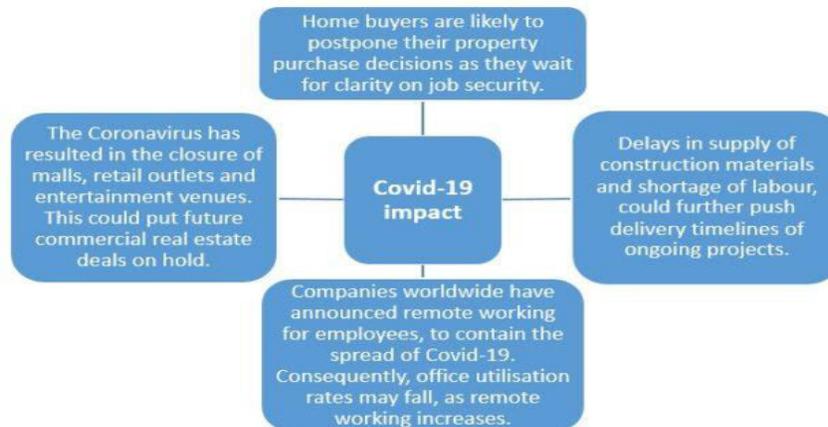
As per government Covid-19 protocol private offices, government offices laboratories, factories, companies are running with 25 to 50% manpower efficiency they are not allow to run with 100 % full efficiency of manpower and sometimes the closed situation which hampers the execution process. During execution lot more sanctioning, clearing of bills, land acquisition problems, signature of authorized person, Permission from the authorized agency or government body is required and we cannot move ahead without this which affecting the project duration.

3.10 Maintenance of Equipment and machineries

During the execution we requires so many equipment and machineries and this equipment and machineries requires their maintenance periodically and sometimes breakdown happens with it then for repairing some parts are required but due to closing of machine parts shop we cannot buy it which also creates obstruction in execution of work.

3.11 Many More Other factor

- ❖ Infrastructure project are dependent on climate we cannot continues execution work of project at rainy season. Due to lockdown situation progress of work is get hampered.
- ❖ Material quarries, Bitumen Plant, manufacturing precast unit plant are closed at rainy season which slow down the execution process.
- ❖ In Infrastructure project Third Party testing is very essential for every stage of the execution and due to lockdown most of the laboratories are closed and running with less employees which is also creating problem in progress of project work.
- ❖ In case of Infrastructure Project we cannot presume the quantity of material for stock because it is varying as per site condition and sometimes the land is also not available with us to stock a quantity of material so in case of lockdown we cannot store the material for the future execution work.
- ❖ Closing of petrol pumps: for running machineries like JCB, Dozer, Pump, Plants it required Petrol diesel and due to closing of petrol pumps also hampered the process of progress of execution work.



4. Data Collection:

in this paper author has conducted a small survey among all Engineer those who are working at site and those who are working at government sector and collected some valuable responses, the collected response are proved to be very useful for framing and designing the remedial measures and policies which can help to boost the efficiency of execution work in construction sector. The survey is conducted with the help of Google form 30 question have been asked to them some of yes/no types and they have to answer it all according to their experience at site and working condition.

Following are the question asked at survey conducted

- 1) Name
- 2) Name of currently working organization
- 3) Designation
- 4) Contact Information
- 5) Years of Experience
- 6) What are the Are problems you are facing due to Covid-19 at site?
- 7) Are you satisfied with your organization response to Covid-19 situation?
- 8) What is your important concern during covid-19 situation?
- 9) How much do you agree with the regular session being productive with your manager?
- 10) How can you improve your working style of construction?
- 11) Is your organization providing a covid-19 safe and healthy environment for working?
- 12) Is your Company is taking all the necessary preventive measure at working site?
- 13) Is your Organization conducted any online safety program on covid-19?
- 14) How comfortable do you feel returning to work in the office
- 15) Did all workers follow social distancing requirement at site?
- 16) Was the New government Covid-19 protocol discussed with all employees?
- 17) Were temporary toilets and wash station serviced?
- 18) Were commonly used area cleaned?
- 19) There are security cameras installed on the premises?
- 20) Is all security items are updated and meet all safety standards?
- 21) Is all security items are updated and meet all safety standards?
- 22) My safety at work should be the priority for my organization

- 23) The Organization / company safety initiative are frequently updated and conveyed to employees
- 24) External consultant and expert update you with covid-19 safety practices and government protocol
- 25) Is employees can easily voice any security concern if they have?
- 26) Are you vaccinated?
- 27) Is your Organization arranging any vaccination program for employees?
- 28) Is your Organization providing you any medical facility during covid-19?
- 29) Suggestions and Remark if any?

5. Recommended Remedial Measures

Uncertainty has been created all over the world for Corona virus. Work in all construction sectors has come to a standstill and in almost all countries the economy is going downhill. In this situation, some remedial measures have to be taken to revive the construction sector against this disease. Some remedial measures are discussed below.

5.1. By following all the Protocols and guidelines given by the WHO and the government

Vaccine for this disease has come on the market. So to avoid this infection, get yourself first vaccinated. Workers must follow all the guidelines of World Health Organization (WHO) and in addition, the rules issued by the government of each country must be obeyed. Companies also need to follow these guidelines.

5.2. Maintaining Covid-19 appropriate behavior

This disease is transmitted from person to person that's why it is not possible to gather many worker in one place. Therefore, according to the rules and regulations of the government, it is necessary to work within a sufficient distance between two people. In the office, the gap between the two seats should be increased.

5.3. By providing Covid-19 safety equipment's

When working in the construction sector, you need safety equipment such as helmets, safety shoes etc. but here the safety equipment is the equipment that is needed to protect against the transmission of the disease. So workers must wear mask to protect themselves. Workers must also wear gloves on their hands, personal protective equipment (PPE) on their bodies and worker must keep sanitizer. Sanitizer must be used from time to time to keep hands clean.

5.4. Workplace sanitization

Every place in the workplace should be well cleaned every day and the companies have to keep a bottle of sanitizer in the office. All new products or materials coming from outside should be sanitized.

5.5. By providing accommodation facility to the labors

After opening the company, Workers living far from the construction site will also come to work. Now they will not be able to travel from home every day because the vehicles are not running in that sense now. That's why companies should arrange accommodation for them when it comes to working with them. Those places have to be clean enough and have to be cleaned every day. Companies should also provide them with at least two meals a day. In addition, workers should maintain social distance in their place of residence.

5.6. By Arranging Alternate duties

Now it would not be right to work with all the workers together. That's why companies need to share responsibilities with each employee and the assembly is less if each employee is brought in a few days a week instead of every days

such rules must be introduced by the organization. In other words, if an employee comes to the office today to work, then that employee will come to the office again after one or two days to work and in the middle one or two days another employee will come to work and that employee will have another two days off.

5.7. Providing transportation facility

When the construction work starts, there will be a need for goods, so companies have to transport the goods from outside to get the supply. That's why government should be allowed to transport goods subject to certain condition. All heavy vehicles transporting goods will have to get a transport permit issued to the government in this lockdown. Only those drivers will be able to drive for transportation goods. Besides, the driver has to aware and does all the work according to the social distance.

5.8. By providing good Medical facilities

Every company has to make some medical arrangements in advance for each of their sites. When their workers enter the site to work, they will be allowed to enter only after daily thermal scanning test. In IOCER 2020 Journal of Physics: Conference Series 1797 (2021) 012054 IOP Publishing doi:10.1088/1742-6596/1797/1/012054 7 addition to this, the level of oxygen in the body will be seen with the help of pulse oximeter. If an employee is infected Corona virus while working, some of the medical expenses will need help from the company. Such rules should be made by the companies. Companies also need to organize occasional general checkup camp for employees.

5.9. Modular construction

Companies can use modular construction in such situations. Modular construction will cost much less and it will complete the construction very quickly.

5.10. 3D printing technology

3D printing or additive manufacturing is the process by which each layer accumulates to form physical objects. Everything can now be created with 3D printing according to the prototype. In Covid-19 pandemic situation, we can use this technology to create different types of home models, building models, bridge models etc.

5.11. Technology and software

Some coding software can be used in this situation in the construction sector. Construction work can be made much easier in this situation by using artificial intelligence(AI) and machine learning(ML). Using that software, employee will do all the digital work instead of notebook pens, so the work will be faster and in less assembly. Also AutoCAD, Staad Pro, Etabs, Revit etc. are used for designing and with these software, employees can design at home.

5.12. Remote working

Many sector workers are working from home for the lockdown. It is quite difficult to work from home in the construction sector. However, the company should try to keep employees away from each other as much as possible, so it is safe to work from home. So workers should work from home as much as possible such as holding meetings, filling out Google forms to get some information from labor, signing contracts digitally, making conversation or sending mails etc. Designing, planning or estimation and costing can also be done with software at home.

5.13. Financial package

The government should provide some financial assistance or some financial loan to the companies that are going through a severe financial crisis. The government's main goal should be for companies to resume work.

5.14 Arrange Vaccination Program

As vaccine is launched by India, but because of high demand of it, it is not possible for an employees to stay in long cue and spend the whole day to get vaccinated so avoid it company should arrange a vaccination drive for their employee.

5.15 Arrange online Safety Program for Covid-19

Every big and small firm should arrange an online Covid-19 safety program so that worker and employee should get aware of every safety measure of covid-19 and the what is covid-19 how we can deal with it what precautionary measure we have to follow to void to get infected. So it may help to people get safe at their own and it will increase the efficiency of work.

5.16 Safety at Its best

- Company should install a security cameras on the premises to control over the labor and to avoid the gathering of large number of people at one place also it help to maintain social distancing protocol laid by government.
- The entire security item is updated and meets all safety standards.
- There should be a security personal for managing Covid-19 appropriate behavior (CAV) at the premises 24x7.
- Safety of the labor and employees at work should be the top priority for organization.
- The organization safety initiatives are frequently updated and conveyed to employees.
- External consultant and expert update to all labor and employees with covid-19 safety practices and protocols.
- Employees can easily voice any security and covid-19 safety concern if they have.

5. Conclusion:

The COVID-19 pandemic has done a lot of damage to society. It's getting worst day by day as new types of corona virus introduced now like Black , white fungus, cream fungus which is very harmful and dangerous to the human being and the problems are getting worse day by day. It has affected the society as well as the economy of every country. The disease is spreading so fast that the government has been forced to lockdown. As a result of this lockdown, all transportation systems have been shut down, supply chains have been disrupted and workers are not able to come to the construction site even from home. That's why work in the construction fields has stopped and the construction workers have also faced extreme uncertainty. So construction companies are facing a financial recession. Companies need to start working again to end this financial crisis. That's why everyone should return to work in according to the guidelines given by WHO and the government. Construction companies need to take necessary remedial measures for their workers. Companies should keep an eye on whether it's easy to work with new technology or software and try to do most of the work from home. Not only the construction sector but other organizations should be aware of this and continue to work so that the economy will improve and unemployment will be reduced

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