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EFFECT OF COVID-19 in CONSTRUCTION & ENGINEERING INDUSTRY

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Abstract -India is one of the countries which have a fast paced growing economy. It is believed that India could emerge into a self-sufficient developed nation way back in the past but the reality is that India is still in the list of the developing nation. The construction industry is one of the highest contributors of Indian economy.In today's globalised 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. Because of the inherent nature of business activity, some industries may unwittingly prosper under the pandemic, while some would weather the storm, albeit with much difficulty, but of the hardest affected, construction and engineering sector is definitely on the wrong end of the curve. This Master thesis analyses both positive and negative impacts COVID-19 in the Indian Construction industry.

Key Words:pandemics, COVID-19, construction industry .

1.INTRODUCTION

In Indian subcontinent, as of 30 March 2020, according to the Ministry of Health & Family Welfare (MoHFW), a total of 1071 COVID-19 positive cases (including 49 foreign nationals) were reported in 27 states/union territories. These include 99 cases that were cured / discharged, one person who has migrated and 29 deaths. Hospital isolation of all confirmed cases, tracing and home quarantine of the contacts is on-going. In India, spread of the initial disease could be traced mainly to the foreign nationals who visited the country as tourists from the disease affected countries and secondly due to the mass immigration of Indian nationals from abroad; due to the fear of infection. As the pandemic outbreak in India was on-going, the Government of India took stringent measures to limit the cases by far in that stage only, by initiating a major lockdown pan-India and also by shifting the immigrants to the special quarantine facilities prepared by the Indian Military directly from the airports and seaports for a minimum of 14 days. Community health teams were also launched to spread awareness about the chances of spread and precautionary measures that one can use to protect themselves and others. During the early stages of the pandemic in India, this study was focused mainly to assess impact of COVID-19 in Construction industry and Engineering The lives of people were drastically affected with lock-down and fear related to the disease's potential effects and transmission. The fear due to the contraction of COVID -19 is on the rise because of the death tolls and global spread. Hence, this study attempted to find the initial impact of COVID-19 among general public; and understand its relationship with construction industry. This can potentially help policy makers in formulating comprehensive interventions. The infrastructure and construction sectors, which are primarily responsible for India's growth story, are already facing the headwinds from the COVID-19 pandemic and cannot expect to be insulated from its damaging impact. Further, the unorganised and fragmented nature of the construction sector is likely to exacerbate this effect. Investment in capital projects drives the demand side of the construction sector, and hence the impact of the COVID-19 pandemic on Gross Value Added (GVA) and employment could be significant in the near to long term. The demand for construction projects has already fallen due to poor business sentiments, lower operating surpluses and incomes, diversion of funds for COVID-19 management, and credit and liquidity problems. While low economic activity in other sectors will impact construction services through forward linkages, a fall in construction output will also have a multiplier effect through the sector's backward linkages, creating a vicious cycle in overall economic activity. Impact of the COVID-19 pandemic on the construction GVA and employment under different investment and economic scenarios. The methodology uses income and employment multipliers based on input-output analysis. As per estimated impact on GVA and employment corresponding to a range of possible scenarios. COVID-19 pandemic is likely to reduce investment in construction related projects in the range of 13 to 30 per cent, which has a significant impact on GVA and employment in this sector. Construction-related GVA and employment are expected to reduce between 15 to 34 per cent and 11 to 25 per cent respectively when compared to pre-crisis projections for FY21 the cost impact of the ongoing COVID-19 pandemic on construction projects, considering essential aspects, such as manpower, plant and machinery, and material and their net impact on overall construction..

2. LITERATURE REVIEW

COVID-19 pandemic looks set to change the way many of us work for good, but for civil engineering, it also affords the opportunity to fully embrace implementing digital software into working practices - and to optimise remote working where possible. Further development of digital technologies could help the sector deal with future pandemics and global catastrophes."What we're trying to do is reduce the amount of time people spend on site," Sensate co-founder and chief data

officer Harry Atkinson told NCE. “This means that people can make decisions on the project remotely – if they've got up to date and real time information, they can work remotely.”And last year, during the National Digital Twin Day it was cited by the National Infrastructure Commission that there is the potential to unlock an additional £7 billion per year in benefits across the UK infrastructure sector through digital process and in addition to financial efficiencies, the NDT will bring benefits to society and the environment. Meanwhile Bachar Hakim, Head Pavement Design and Asset Management & Transportation at AECOM says the industry should adapt its skills to react to the current crisis."Working remotely with good digital infrastructure might be easy for designers, consultants, educators and students but more difficult for large construction site workers and network maintenance operators," says Bachar. "Hence, the first priority is to improve the digital infrastructure and communication skills, followed by offsite construction and automation."We hopes that we don't lose focus on outstanding issues like mitigation and adaptation to climate change; as well as the impact of GHG emissions."On a positive note and on a global scale, We're faced with economic uncertainty but as civil engineers we should ensure that decarbonisation remains a vital agenda item.The construction industry with no exception have been severely affected by the COVID-19 pandemic and there is no study exclusively reported as the date of May 2020 focusing on the impact of the pandemic on the construction industry hence this study is aimed to discover the effects.

3. METHODOLOGY

The research was conducted to understand the impact of COVID-19 on overall construction sector cost and essential aspects – manpower, plant and machinery and material. It was observed that projects which belong to select sectors, including power generation, real estate and transport could see a steep increase in overall project cost due to an increase in the manpower and plant and machinery costs, in comparison to other sector projects.While the impact on the supply chain is based on the opinions of construction sector professionals, the actual impact would depend upon multiple factors, including the cost-benefit analysis of alternative supply chains identified for the risks mapped against tier one and tier two suppliers across the world.

Sectors	Manpower	Plant & Machinery	Raw Material	Net Impact*
Real Estate	▲	•	▼	▲
Urban Development	▲	•	▼	•
Oil & Gas	▲	•	▼	•
Metals & Mining	▲	•	▼	▼
Manufacturing	▲	•	▼	•

▲increase in cost .Neutral/ No change Cost ▼Decrease in cost

Sectors	Manpower	Plant & Machinery	Raw Material	Net Impact*
Power Sector				
Generation	▲	•	▼	▲
Transmission	▲	▲	▼	▲
Distribution	▲	•	▼	▲
Water (supply, sanitation and treatment) & Irrigation	▲	•	▼	•
Transport				
Railways & Metro	▲	▲	▼	▼
Ports	▲	•	▼	•
Roads	▲	▲	▼	▲
Airport	▲	•	▼	•

Sectoral impact on the 3 Ms i.e., manpower, materials and machinery due to the COVID-19 pandemic.

Construction sector snapshot for the previous year and for the baseline scenario (estimates are at constant prices (2011-12)

The construction gross value added (GVA) in India was INR 10.51 trillion in the financial year 2019-20 and expected to

grow at 4.9 per cent to INR 11.02 trillion11 in the current financial year.The impact of the COVID-19 pandemic on the GVA and employment of the construction sector has been studied under four different investment scenarios corresponding to four different economic scenarios using income and employment multipliers based on input-output analysis. The extent of reduction would further vary based on the duration of the lockdown period.

Table 1: Construction sector snapshot for the previous year and for the baseline scenario (estimates are at constant prices (2011-12).

Year	Investment in Construction Projects (INR trillion)	GVA for construction sector	Employment (Million person year)
FY 2019-20	29.41	10.51	95
Baseline scenario for FY 2020-21	32.24	11.02	102

Analysed each of the following scenarios and estimated the impact on investment, employment and Gross Value Added (GVA) in each of these scenarios.

Table 2: Description of various scenarios for which KPMG analysed the impact on the constructions sector.

Scenario	1	2	3	4
GVA Growth (%)	3.5	1.6	3.5	1.6
Lockdown period up to	03 May 20	03 May 20	30 June 20	30 June 20

Baseline scenario: GVA of India is assumed to be growing at 6 per cent, while the GVA of the construction would be growing at 4.9 per cent (Assumption: Average year-on-year growth rate of construction sector is 4.9 per cent from 2015-16 to 2019-20 in terms of GVA). There is no COVID-19 pandemic consideration in this case.The investments in the construction related projects in all sectors are estimated to reduce by 13 per cent, 14 percent, 29 per cent and 30 per cent9 respectively for each of the scenarios with respect to that of the baseline scenario as presented in Table-1.

The corresponding fall of GVA is estimated to be 15percent, 16 per cent, 33 per cent and 34 percent respectively while that of employment is estimated to be reduced by 11 per cent, 12 per cent, 24 per cent and 25 per cent* respectively in each of the scenarios. In India where the unskilled workers depend on the construction sector for employment, the reduction in employment by approximately 1 crore person years needs to be acknowledged and addressed. Figure-1. % Reduction in investments, GVA & employment for with respect to baseline scenario.

COVID-19 pandemic is likely to reduce investment in construction related projects in the range of 13 per cent to 30 per cent, GVA of the construction sector between 15 per cent to 34 per cent and employment of the construction sector between 11 per cent to 25 per cent as compared to the baseline scenario of FY 2020-21.

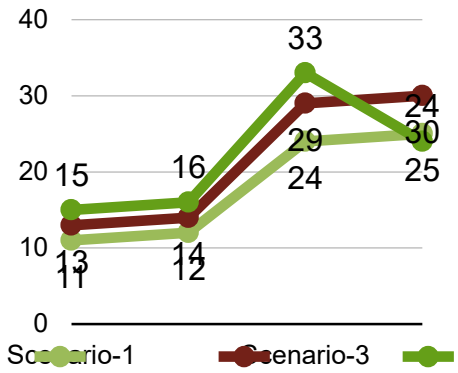
4.RESULT AND ANALYSIS

The accurate impact of COVID-19 pandemic is nearly impossible to predict, but any prolonged slowdown in Indian or global economic and manufacturing activity is likely to have significant ramifications for material costs. If reduced construction activity due to virus containment efforts causes a major reduction in demand for materials, the reduction in demand may weigh heavily on material costs.Materials which have displayed a downward trend in the last year may be expected to continue that trajectory, with additional fall of five per cent to ten per cent, whereas materials maintaining their growth may rise slightly in the range of one per cent to three per cent.Impact on the prices of manpower due to the COVID-19 pandemic induced supply shortages.

Table 3: The likely impact of COVID-19 on the overall project cost is as follows:-Impact of COVID -19 on overall project cost

Lockdown Period	Optimistic Case	Likely Case	Pessimistic Case
Up to 03 May 2020	1.59%	2.43%	3.28%
Up to 30 June 2020	2.94%	3.61%	4.28%

Summary of Impact Assessment-Under development projects are the worst hit with a minimum impact of two to three months, which may be controllable with measures outlined in the recommendations section Due to a delay in the construction period from the lockdown, there would be an



additional interest cost on the working capital loans taken, which will be borne by the developers or the contractors depending upon the risk sharing mechanism The labour costs for skilled workers are expected to rise by 20 per cent to 25percent while that for the semi-skilled and unskilled workers are expected to rise by 10 per cent to 15 per cent Revised standard operating procedures duly incorporating social distancing, personal protective equipment and hygiene would drive up project cost in the short term Implementation costs may not vary much for linear projects like irrigation canals, pipelines, transmission lines, roads, etc., but for non-linear projects the costs may rise by 2 per cent to 5 per cent.The projects dependent on specialised equipment, electronics and specialised materials are more likely to be hit by disruptions to the supply chain largely due to the force majeure clauses. The recovery of liquidated damages would not be possible for the developers unlike certain sectors, such as solar projects where the pandemic as a part of Force Majeure Clause (FMC) is not included in the Power Purchase Agreements (PPA) with some of the major solar power developers in India.

5.DESCRIPTIVE ANALYSIS

Table-4:IMPACT OF COVID-19 ON DEMAND & SUPPLY SECTORS

Category	COVID-19 Impact on Supply (FY21)	COVID-19 Impact on Demand (FY21)
Construction of buildings	High	High
Civil engineering - Roads / Railways and Projects	High	High
Specialized construction activities	High	High

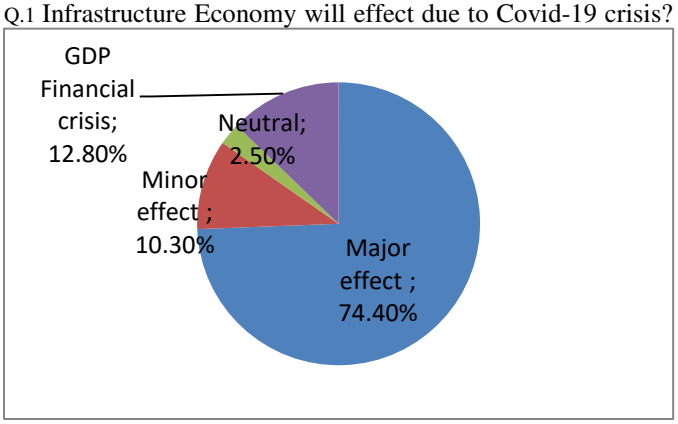
Source-FOCUSED INTERVENTIONS FOR 'MAKE IN INDIA 'POST COVID-19LOCAL SOLUTIONS TO GLOBAL CHALLENGES POLICY AND TECHNOLOGY IMPERATIVES MAY, 2020

ICRA has ratings outstanding for 142 entities (excluding the non-cooperation entities) in the construction sector. About half of the live ratings in the construction sector are in the investment grade. About 11% of the entities rated in investment grade are on negative outlook.Reviving the construction sector post COVID-19 Point of View.What has transpired since last few weeks?

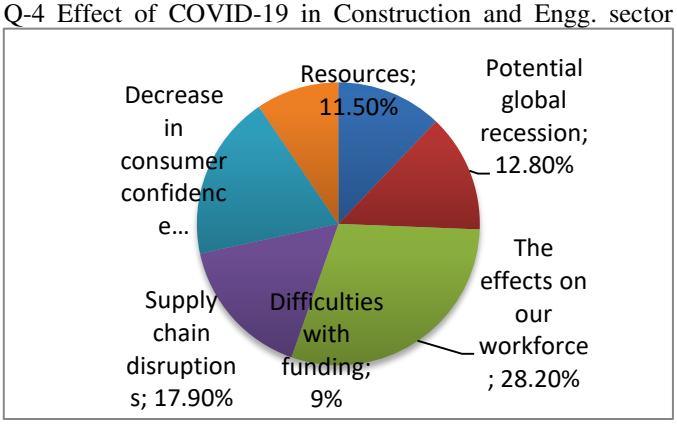
- Project status: In advance stages of construction
- Capital expenditure: INR60 billion (approximately)
- Labour deployment: Over 4,500 labourers with over 100 pieces of plant and machinery.
- Labour status: 60-65 per cent are in reverse migration mode with 30-35 per cent on a lockdown at site in labour camps
- Supply chain status: Some of the critical offshore equipment are being sourced from overseas, which are either in manufacturing or dispatch phase, deliveries of such equipment to the site location will be impacted
- Contractual impact: Some of the vendors may invoke claims due to COVID-19 leading to additional cost to the Project Owner
- Schedule impact: Over-run of at least 2-3 months. Detailed assessments need to be conducted only when the restrictions are lifted, and preliminary conversations indicate timelines could be extended given supply chain and workforce disruptions
- Cost impact: Estimated in the range of 4-5 per cent of the total project cost, however more clarity will emerge once detailed assessments are completed. We examine a real, live project to outline the impact that the COVID-19 crisis is having on the construction sector in India.

Unlike sectors like financial services, retail, manufacturing or IT, construction engineering sector requires the physical presence of a large workforce – both skilled and unskilled – in concentrated circles. There are, generally, low levels of technology integration in such projects, which fall even lower in government and public sector projects.

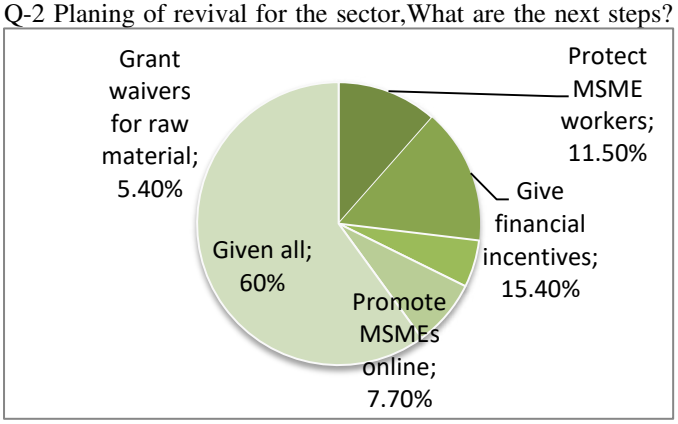
Q.1 Infrastructure Economy will effect due to Covid-19 crisis?



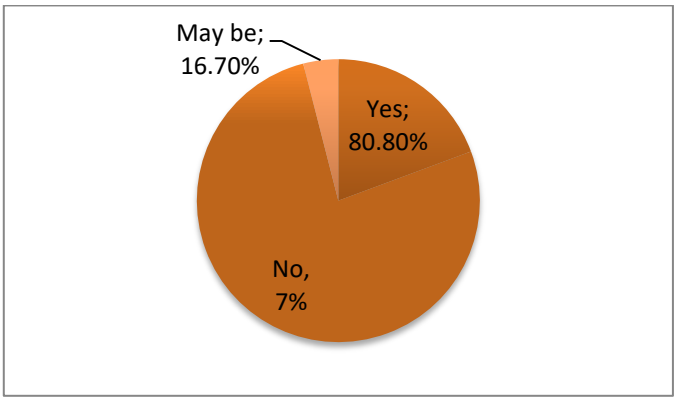
Q-4 Effect of COVID-19 in Construction and Engg. sector



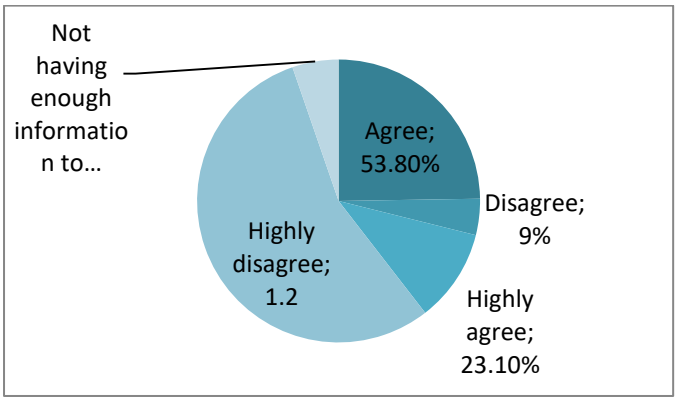
Q-2 Planing of revival for the sector,What are the next steps?



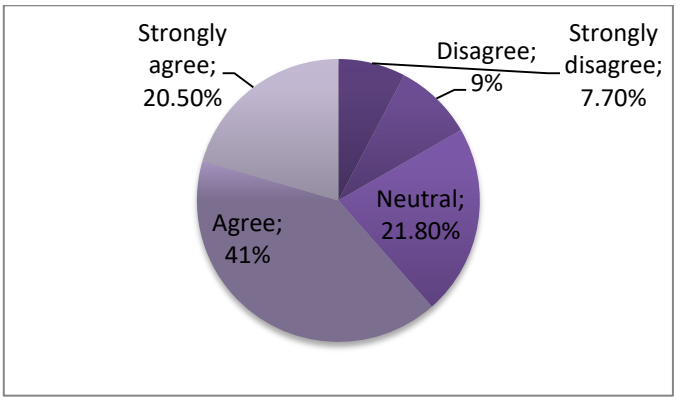
|Q-5 Project will take long? Does project will impact due to COVID-19 crisis *



|Q.3Recovery of Construction industry Adopt to the a "new normal" in construction, Using virtual meeting, working from home office , Developing new technology/Solutions, Spreading up new Construction Technology, Targeting new decides. Via technology Telework, Distancing*Q-4 Supply chain and demand, Shortage of labour will be impact? *



Q.6 Employee health and safety effect due to COVID-19 crisis? In construction site labour use mask or safety key, job sites will be cleaner and safer Pre COVID and after COVID crisis *



After analysing the Google form questions, a few points are extracted from the transcription, which includes the following:

i. The pandemic has entirely suspended the construction industry and only a few projects are still running which are considered essential for medical facilities expansion to cope with the high demand for spaces. The work under this situation lay based on difficulties in terms of the requirement for accelerated completion of the project and the restriction of movement. Additionally, workers and technical engineers are aware of the infectious disease and need to work with full consciousness and scrutiny.

ii. For project participants who work off-site are required to be prepared with a complete list of tasks, maintain constant communication with all subcontractors, establish daily video meetings, manage all the orders, constantly reviewing shop drawings, coordinate with all the stakeholders for updates, and maintain proper communication with people onsite.

iii. The way the construction industry was managed has to be modified to suit contingency time where it should accommodate all the needs to deal with all the sudden crisis.

iv. Construction planning and scheduling are likely to be significantly impacted during the crisis. Hence, planners and schedulers should have backup plans in case of shut down.

v. There are many impacts of the sudden shut down of projects.

CONCLUSIONS

At present, the land and development enterprises are less influenced contrasted and different ventures. However long the world doesn't enter an incredible melancholy, the circumstance will surely improve in the second 50% of 2020 and slowly recuperate, so we should be completely ready for this.This article has examined and surveyed the outcomes of pandemic COVID-19 on the development business either private or public segments. It is statically demonstrated that the most affecting variables are the suspension of undertakings, work effect and employment misfortune, time overwhelm, cost invade, and money related effect. From the meetings, it was featured that the financial effect is critical to all the task partners and the workforce. The venture engineers strive to moderate the effect by diminishing the quantity of laborers on location and urging offsite work to evade and slow the spread of the infectious infection. The temporary workers are additionally inescapable to confront legitimate issues because of the individuality of legally binding terms which is brought about by the suspension of the venture and abrupt variance of material cost. These unexpected effects are unquestionably hazardous to keep up the flood of the undertaking progress. While, ventures that are as yet running because of the pressing need to extend clinical offices are additionally reasonable to numerous difficulties, for example, deficiency of laborers, the ascent of materials cost, and lack of materials and flexibly chains. The discoveries of this article are starting to the development business partners and policymakers to comprehend the effect of the unanticipated and uncontrolled pandemic on the development. This will assist with improving the designs to adapt to any experienced circumstances.In terms of industry, for unfamiliar engineers, there might be acceptable chances to purchase land; for financial specialists, there may significant speculation openings; for counseling firms, ability is generally significant, so it is imperative to hold ability. Straightforwardness and close correspondence are much more significant during this period, just as abstaining from moving business pressure legitimately to representatives. Actually, during this period, we can do things that we ought to have done previously however frequently disregarded, for example, programming learning and utilization, information base structure, market experiences and investigation, industry research, and so on., so representatives can utilize this period to reinforce themselves and plan for future chances. Nonetheless, one must defend against the inescapable by receiving restorative measures in time. The initial step is to assess the agreement clause(s)to determine the degree of liabilities upon penetrate and the last advance is to proactively embrace all measures to moderate the risk by ideal conjuring the right legitimate precept.

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Survey Link

https://docs.google.com/forms/d/e/1FAIpQLSflzSgc0Pq7QGWRGg51n-4u1nGvL5UwS8cmlx5ctkglXxH9rQ/viewform