



# A STUDY ON THE IMPACT OF COVID-19 IN CONSTRUCTION INDUSTRY

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**Abstract:** Construction industry is subjected to many challenges & has to become adaptable according to the changes in this present world. The recent challenge arisen was the Covid-19 pandemic & it's after effects in the construction sector. This study has been undertaken to analyze the impact of Covid-19 outbreak in construction industry by evaluating & comparing various factors related to construction industry before & after the pandemic. Theoretical analysis was conducted by evaluating various international journals and practical data collection was done by conducting a questionnaire survey. Selected construction firms were monitored & the major impacts of Covid-19 & their pros and cons were evaluated to arrive at better solutions to overcome such a situation.

**Index Terms - Construction industry, Covid-19, Impact, challenges**

## I. INTRODUCTION

Construction industry has come across various challenges in its stage-by-stage growth through these years. Due to the changing environment and the uncertain situations in this present world there is a need of adaptability in the field of construction industry. The recent challenge arose was the spread of the pandemic COVID-19. This study aims to analyze the major challenges arose in the construction sector due to the pandemic situation and to find out remedies for overcoming the adverse effects created by this situation.

COVID-19 is a novel type of corona virus that causes sickness. The World Health Organization (WHO) has declared the disease a pandemic due to its high contagious rate and human health consequences. The infected person may require hospitalization and intensive treatment in a few cases, and some may die. According to reports, the pandemic began in China and quickly spread over the world. Following the global spread of this unique virus, the World Health Organization (WHO) has designated coronavirus disease of 2019 (COVID-19) a pandemic. COVID-19's spread poses an unprecedented threat with unforeseeable economic implications. The coronavirus pandemic, also known Construction workers, like employees in other unorganized sectors, were particularly heavily hit due to the restrictions imposed as a result of the Covid-19 pandemic. As construction activities are carried out mainly by the assembly of a group of people the potential for the spread of the disease was high in the work sites. Also, the migrant labors became a source of spread of the pandemic in many countries. Construction workers, like employees in other unorganized sectors, were particularly heavily hit due to the restrictions imposed as a result of the Covid-19 pandemic. As construction activities are carried out mainly by the assembly of a group of people the potential for the spread of the disease was high in the work sites. Also, the migrant labors became a source of spread of the pandemic in many countries.

Worldwide several measures were implemented to reduce the rapid spread of this pandemic. The main method introduced was self-isolation and to avoid the spread various countries around the world introduced lockdown as a tool. Lockdown were declared in many countries by imposing many rules and restrictions like travel restrictions, closure of the educational institutions, suspension of construction activities, restrictions to social gathering etc. As a result, many challenges like construction delay arose in the construction sector due to these restrictions.

Our world is still under the threat of Covid-19 pandemic and there is a fear of further lockdown and restrictions. This study aims at finding out the major impact of Covid-19 in the construction industry by monitoring selected construction firms and evaluating the theoretical and practical data collected in order to arrive at better solutions to overcome such a crisis in future.

## II. RESEARCH BACKGROUND

Some challenges found due to the Covid-19 were workflow and supply chain disruption, new policy issues, workers' anxiety and review of COVID-19 vs Force Majeure in standard forms of the construction contract. However, in the areas of modern procurement planning, the requirement for virtual collaboration, and specific design considerations, new opportunities have developed (Ogunnusi M et.al., 2020). According to the data, the Covid-19 pandemic had a significant impact on construction enterprises dealing with both residential and commercial development due to lockdown and social isolation on work sites. Construction companies' strategies included keeping good relationships with their suppliers and ensuring the safety of construction crews.

- Delay in the delivery of construction materials due to lockdown.
- Delay in completion of construction project due to lockdown and other safety measure.
- Social distance was found to be a major challenge

(Abdussalam Shibani et.al., 2020)

The lack of a safe environment in the workplace, heavy workloads, home situations, and concerns about job stability often contribute to anxiety, depression, and even suicide (Apurva Pamidimukkala et.al 2021). Shared accommodation and construction worksites emerged as nexuses for COVID-19 transmission. (Wee Hoe Gan et.al., 2020)

The study found that the major impacts of COVID 19 are labour impact and job loss, the suspension of projects, time overrun, cost overrun and financial implications. While, projects that were still running due to the urgent need to expand medical facilities were also suitable to many challenges such as shortage of workers, the rise of materials price, and shortage of materials and supply chains (Dr. Yaser Gamil et.al., 2020)

Notably, the revenue and profitability, in a general sense, have decreased during the COVID-19 period, while most of the production and business costs had remained unchanged. Accordingly, many solutions have been implemented by construction enterprises such as cutting staffs; reducing workers' wages; reducing bonus and welfare regimes; reducing other costs (e.g. advertising, training); delaying in payment of wages and allowances to employees; negotiating on late payment of bank interest negotiating for advance payment; applying for a specific mechanism for businesses from the state (Van Tam Nguyen et.al. 2021)

A large number of construction projects in Saudi Arabia have been delayed and the causes of delay were summarized as follows:

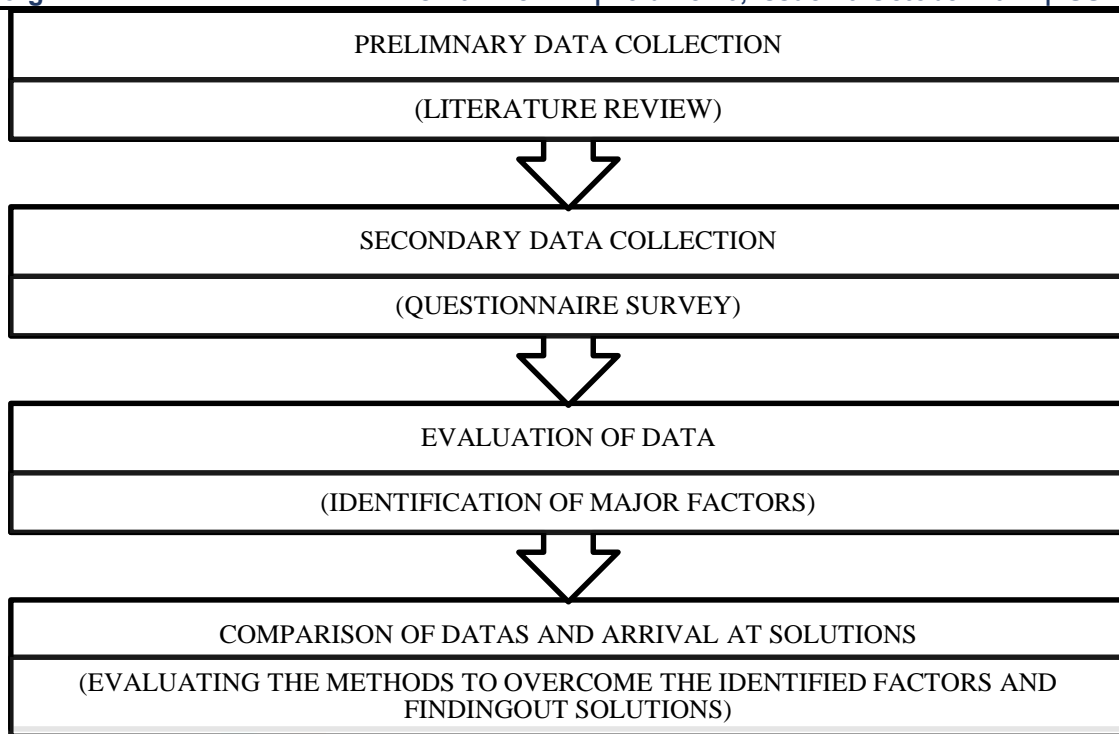
- Changes of building drawing during construction projects.
- Errors of building drawing during construction projects.
- Conflicts in work schedules of subcontractors.
- Delays in approval of shop drawings.
- Delays in payments to contractors.
- Inadequate labour skills.
- Labour shortage.

(Thamer A N. Alenezi, 2020)

The factors impacted the most by the pandemic are safety management measures, interpretation of the contract language, building materials prices, risk management practices, construction materials, construction labor, and construction sub-contractors (M. K. S. Al-Mhdawi et.al., 2021)

## III. METHODOLOGY

The methodology followed in this study is an integrated type incorporating both theoretical and practical research based on the topic selected so that accurate results can be obtained. Theoretical analysis was conducted through the literature survey by collection of various journals related to this topic and the most relevant among them were analyzed. Few common factors were identified from the journals and the factors are sort out. After that a framework for the questionnaire survey was developed based on the knowledge obtained from the literature review. After that practical information regarding the topic was collected through a questionnaire survey. The questionnaire survey was conducted in an integrated model of online and offline survey and incorporating the data collection in to a Google form. After completing the survey, the results obtained were compared with those from the literature review and the common factors were identified. The most sensitive factor among them was identified and arrived at better solutions to overcome that.



**Fig.1 Methodology Framework**

### 3.1 Preliminary data collection

The preliminary data collection was conducted through collection of journals. The literature review helped to analyze the study theoretically on a global basis as the journals from many countries were available. As the area of study is of current relevance there were lot of recent journals and studies available on this topic. After the literature review it was identified that most of the journals were evaluated on a theoretical basis. So, there is a need of practical evaluation of the topic and my study aimed to incorporate both theoretical and practical data collection and evaluation so that the deviation from the actual results can be excluded.

The literature survey helped to identify various factors which had a great impact of Covid-19 in the field of construction industry. The major factors identified from the literature review are construction delay, supply chain management, material management, cost overruns, labour shortage, social distancing challenge and workflow disruption.

### 3.2 Secondary data collection

The secondary data collection aimed at collecting the practical information related to the study area. An integrated model for the secondary data collection was developed. A framework of questionnaire was developed first from the knowledge obtained from international journals. After that a Google form was created and entered the questions and made it as a tool for conducting the questionnaire survey. The questionnaire survey was conducted in two phases. The first phase was through direct visit to various companies and conducting direct interviews with the company owners, site engineers and labors for collecting data from the private sector and also visited few grama panchayath offices for collecting data from the public sector. The data collection was through online mode using Google form as a tool for conducting the questionnaire survey.

Microsoft Excel was the software used to prepare the report of the questionnaire survey. The results obtained were analyzed and identified the major factors which had a great impact of Covid-19 in the construction industry.

### 3.3 Evaluation of data

The data collected from the literature review and the questionnaire survey was evaluated and a comparison made between the factors identified. After that finalized the major challenges created due to the Covid-19 pandemic in the construction industry. The negative factors or the challenges are only focused in this study as my aim of study was to formulate better solutions to these challenges.

## IV. QUESTIONNAIRE SURVEY

An integrated method was followed to conduct the questionnaire survey by incorporating the online and offline mode for the easiness of data collection and to execute during this pandemic situation. The tool used for conducting questionnaire survey is a Google form created by me by including the framework of questions already developed after the literature review. Direct company visits and visit to public departments like panchayath were conducted first and the Google form was send to them. They distributed it further to their employees. The labors were unaware of the technologies so I had conducted direct oral interviews with them in their regional language and entered the results into the Google form. The questions were more of objective multiple-choice type so it will be easy for the respondents to record their opinion without wastage of much time. The results obtained were tabulated and charts and graphs were developed by using the Microsoft Excel software.

**4.1 Section 1-Respondents profile**

- NAME:
- DESIGNATION:
- COMPANY/ INSTITUTION NAME:
- PLACE:
- E-MAIL ID:

**4.2 Section 2-Questionnaire**

1. What are the main construction factors affected or challenges arose due to COVID-19?
  - Construction delay
  - Cost overruns
  - Workforce management
  - Material management
  - Safety management
  - Supply chain disruption
  - Equipment
  - Risk management
2. What was the impact of the government measures on the construction sector?
  - Severe
  - Moderate
  - Minor
  - insignificant
3. What is the impact of COVID-19 on the construction supply chain operations?
  - Major effects
  - Minor effects
4. What are the main challenges that can be faced to keep the projects meeting the targeted objectives?
5. Did COVID-19 affect your project
  - Yes
  - Maybe
  - No
6. Do you consider permanent changes to your construction works and processes?
  - Yes
  - No
  - maybe
7. In the face of pandemic did you get any benefit from government?
  - Yes
  - no
8. In which way did COVID-19 affected your project[s]
  - full stoppage
  - partial
9. What is the current status of your projects
  - work returned with disruption and progress affected
  - work has not returned
  - work returned without affecting weekly progress
10. Reasons for suspension of work during COVID-19
  - government decision
  - business decision
  - personnel decision
11. What was the impact of COVID-19 on your work flow
  - severe
  - major
  - moderate
  - minor
  - insignificant
12. Rate the impact of lessons learnt from the impact of COVID -19
  - very significant
  - significant
  - average
  - minor
  - minimal

#### 4.3 Details of survey

The table below shows the respondents details.

Table 1-Respondents details

SL. NO	DESIGNATION	NUMBER OF RESPONDENTS	TOTAL
1	Company head	6	81
2	Site Engineer	51	
3	Assistant Engineer	6	
4	Labour	12	
5	Research Scholar	6	

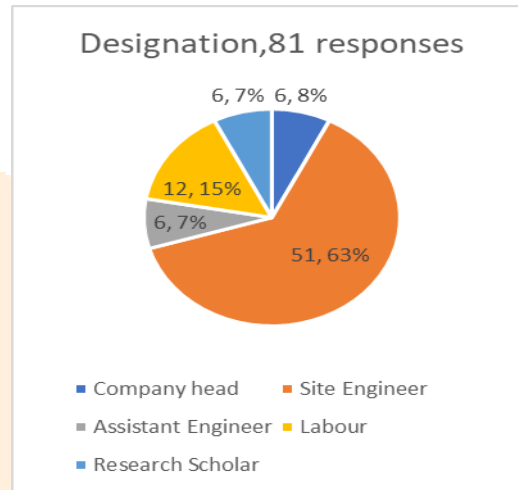


Fig.2 -Chart of respondents' profile

#### V. RESULTS AND DISCUSSION

The discussion area focuses only on certain important questions contributing to this study. The results obtained are given below.

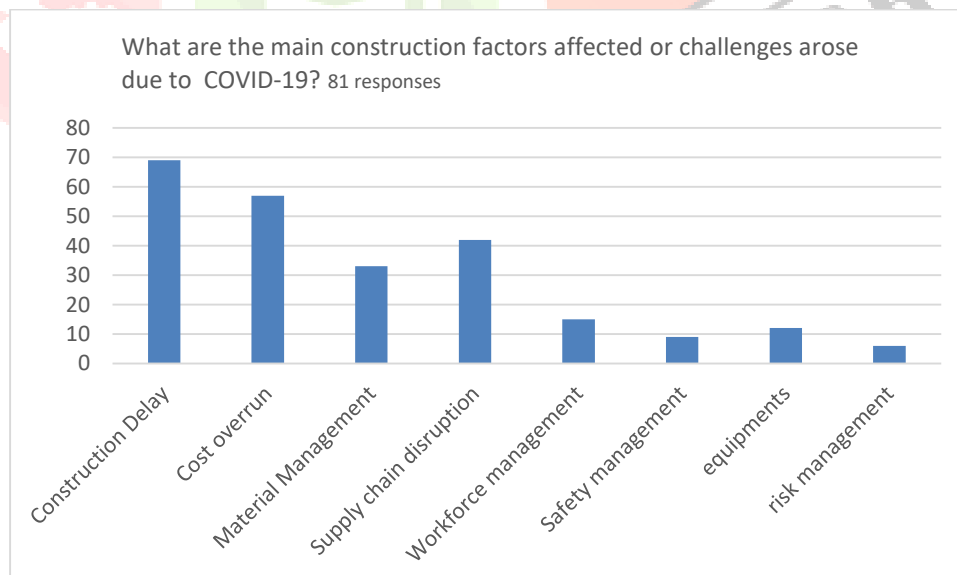


Fig.3-Response evaluation of question 1

Table 2- Response evaluation of question 1

SL.NO	FACTORS MOST CHOSEN	NO: OF RESPONSES
1	Construction Delay	69
2	Cost overrun	57
3	Material Management	33
4	Supply chain disruption	42

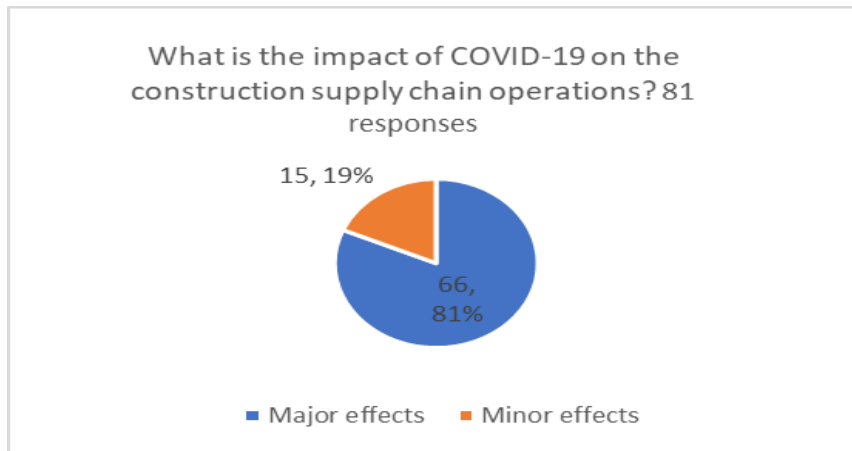


Fig 4. Response evaluation of question 3

Table 3- Response evaluation of question 3

SL.NO	OPTIONS	NO: OF RESPONSES
1	Major effects	66
2	Minor effects	15

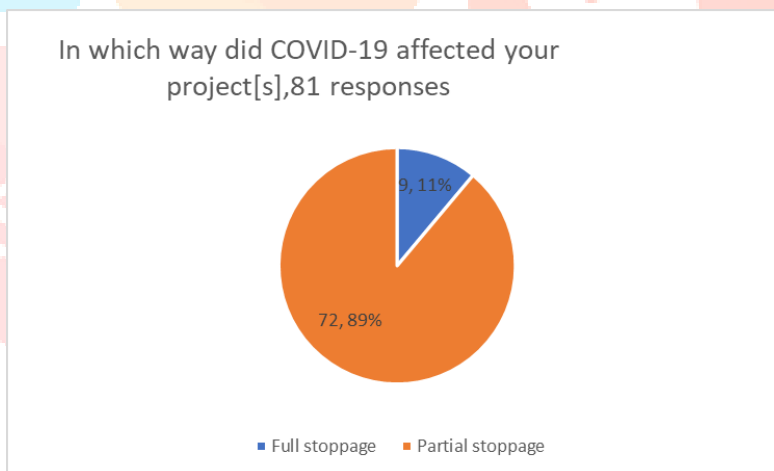
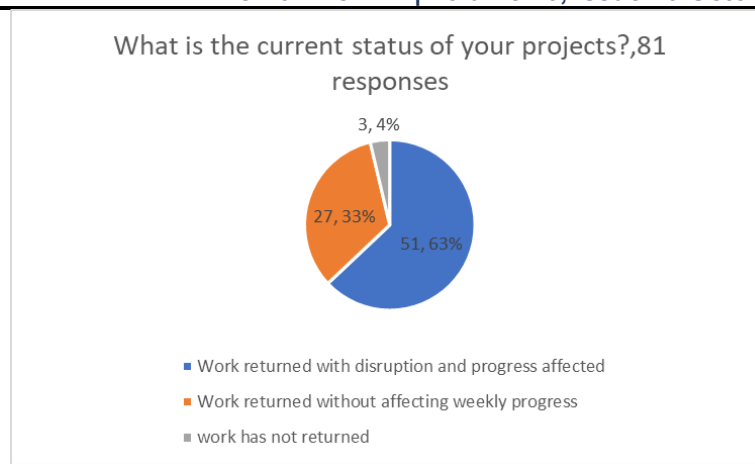


Fig 5. Response evaluation of question 8

Table 4- Response evaluation of question 8

SL.NO	OPTIONS	NO: OF RESPONSES
1	Full stoppage	9
2	Partial stoppage	72





**Fig 6. Response evaluation of question 9**

**Table 5- Response evaluation of question 9**

SL.NO	MOST CHOSEN OPTIONS	NO: OF RESPONSES
1	Work returned with disruption and progress affected	51
2	Work returned without affecting weekly progress	27

The results of the questionnaire survey show that both the private and public sectors were affected due to the Covid-19 impacts. Most of the construction projects were at a stage of partial stoppage during the lockdown period. Delay in material supply also affects the construction. Labour shortage was also a problem. Providing clean & hygiene accommodation for labours with minimum room share, which would help in reducing diseases was a great challenge arose due to the pandemic situation. Extra costs were involved in providing the safety measures like Sanitizer, masks, personnel protective devices etc. The impact of government decisions and the restrictions imposed during the lockdown period caused an adverse effect in the supply chain management which caused the material shortage and the works were affected. Even though the construction industry has been recovered from the early impact of the pandemic the weekly progress of the works has been affected.

The major factors which had the impact of Covid-19 are as follows:

- Material management
- Supply chain management
- Work force management

The major challenges created due to the Covid-19 pandemic in the construction industry are:

- Construction delay
- Cost overrun

## VI. CONCLUSION

Construction industry has to become more adaptable according to the changing situations. The Covid-19 pandemic had a huge impact in the construction sector which caused the disruption of the timely progress in the construction projects. The lockdown and the spread of the pandemic among workers caused a hibernation stage in the construction field during the early spread of the Covid-19 pandemic. After that construction sector came back to normal state by gradual improvement by implementing various measures to overcome such a crisis.

The impact of COVID-19 in the construction industry is evaluated through literature review and the questionnaire survey. As a result, among the many factors which arose as a challenge to the construction industry the major factors identified were: construction delay, material management, supply chain management, work force management and cost overrun.

The uncertainty in the project schedule can be overcome by usage of software's for the process of scheduling. Material management can be done by strictly following the vital, essential, desirable classification of materials for procurement and storage. Supply chain management disruption can be avoided if we concentrate on the locally available suppliers and domestic goods rather than depending on external suppliers so that travel restrictions can be avoided. Workforce management can be done by using machineries and also by adopting the modern technologies of construction like modular construction so that the manpower can be reduced to a great extent. The scope of modular construction technology has improved during the pandemic as the speed and ease of construction accelerated by using this method. Proper utilization of resources and implementation of online tools can be incorporated to develop a better model in the construction industry for carrying out the projects within the estimated schedule. By following the above measures, the construction delay and cost overrun can be avoided to a certain extent. Thus as a result of this study the major impact of Covid-19 pandemic in the construction industry were identified and arrived at certain solutions which would help in future circumstances.

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