

Construction Delays and Project Failures due to the Biological Pandemic of COVID-19 and Lockdown Effects

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Abstract

A biological disaster can be as risky in the construction sector as a natural hazard. In the past, a lot of damage in the construction industry has been observed in the pandemic of different biological disasters. Currently, the whole world is suffering from the coronavirus COVID-19 crisis, and it has left an imperishable effect on construction industries around the world. The construction due to the pandemic, with widespread restrictions on the movement of people and enforcement of partial or full lockdown since March 2020 has suffered badly. The coronavirus has harmed the construction industry, prompting project delays, cancellations, and layoffs yet it remains difficult for most firms to find the skilled staff and labor to hire within the appropriate cost budget. In Pakistan, a lot of construction projects have been postponed and suspended due to the current scenario. This paper presents survey-based research on the impacts of COVID-19 on the construction industry of Pakistan. In this paper, 100 people associated with the construction industry have been interviewed and surveyed for this research against different aspects of project delays and construction costs resulting from the spread of coronavirus. The results of the survey are presented in graphical form and conclusions were derived. Imposed lockdown, limited workforce, and lack of knowledge of digital technology are found to be the most critical factors for project delays and halts while an increase in the material cost is the main root cause of the increased cost of project and cost for the safety of employees has been observed as the least contributing factor on the cost of a construction project.

Index Terms: Construction Sector, Biological Pandemic, Project Delays, Financial Losses, Lockdowns.

I. INTRODUCTION

The construction industry plays a vital role in the economy and the financial business of a country. The US Bureau of labor statistics shows an overall contribution of 5% employment in America [1]. According to International Labor Organization, the construction industry employs 74% i.e., the world's total construction industry contribution in low-income countries is very high [2]. Hence it can be said that the construction industry is much more important in developing countries compared to high-income countries of the world. A delay in a construction project can be a disaster for the client as the cost of projects fluctuates and may increase. These delays are due to factors such as political disorders, a technical clash of architects and structural consultants, and natural hazards. Meanwhile, it has been reported that slow decision-making, changes to orders, poor contract specifications, and financial constraints are the main root causes of unnecessary delays in construction projects [3]. These unnecessary construction delays may lead to the failure of the project causing millions of financial losses, besides, a lot of unemployment for daily wage laborers. In developing regions of Pakistan, India, and other countries of South Asia, the construction industry

employs millions of unskilled labor for loading and unloading the materials. The majority of these laborers are working on daily wages scheme and cannot afford a single holiday without working. Natural hazards like earthquakes, storms, and floods have brought a disaster for such labor families in the last 50 years and several people become homeless as well. The current situation of coronavirus, COVID-19 has left a deep and imperishable sign in almost every business and technology sector all over the globe. History shows many similar biological disasters in the past affecting the financial, social, and technical growth of the world. The construction industry has been affected directly by such types of biological disasters and this research will elaborate on all these impacts which have been gifted by them.

II. LITERATURE BACKGROUND

There are claims that in the USA, the current COVID-19 has resulted in the unemployment of 975000 people from the construction industry. The unemployment ratio increased from 4.7% to 16.6% [4]. In the past research has explained how the biological disaster of avian flu, bird flu H5N1, black death, and Spanish influenza has affected the economy of Europe and almost destroyed all the technology industries of that time [5]. The recovery

period and demand-supply gap are the most influential factors in the downfall of a country's economy. Research has evaluated the effects of Spanish influenza 1918-1920 in Australia and concluded that the 'labor demand exceeds the supply' situation resulted in 1919, especially in the construction industry [6]. The labor demand was at its highest peak due to the unavailability of skilled workers and most of the labor force was got affected by Spanish influenza. Now recent research illustrates the effect of the current coronavirus pandemic on the construction industry and claimed that it has affected the personnel involved on-site directly while office personnel indirectly. For office personnel, remote work from home has been encouraged but it is not an easy task for efficient and controlled work progress [7].

Recent research on construction risks during the coronavirus pandemic suggests some of the key factors which need to be considered to avoid project failures. These factors are consideration of financial impact while in planning, site safety, and security during a pandemic, control in supply chain management, consideration of cost fluctuation due to shutdowns, strikes, and government orders [8].

Some analysts have researched how a biological pandemic i.e., COVID-19 is affecting the construction projects and resulting in delays. These factors are a nuisance to the public services, temporary suspension of work on sites, and insufficient numbers of the workforce as a result of the travel ban in different countries. Due to this travel ban, labor and technical staff cannot be imported from different regions of the globe [9].

The impact of Covid-19 on the construction industry of India, Russia, China, Italy, UK, UAE, and Australia, has been researched, suggesting several key factors and mitigation policies [10].

Specific SOPs for construction works during the COVID-19 waves in the United Kingdom have been designed to avoid project failures [11]. Thorough research has found the financial crises as the most hazardous impact of COVID-19 on the construction sector in Malaysia [12].

Like other regions of the world, Pakistan has suffered a lot of economical and life losses. The construction industry of Pakistan is entering the catastrophic disaster of construction delay and suspension of projects. The majority of megaprojects have been suspended and workers are forced to get self-quarantine. All these scenarios caused unemployment, business losses, and the fall down of the construction industry. Here, survey-based research has been conducted to evaluate the progress of the construction industry in the last 6 months. The objective of this research is to identify the impacts of a biological disaster on the construction industry and its consequences.

III. METHODOLOGY

Survey-based research was conducted with a sample size of 100 respondents from Pakistan's construction industry. The people involved in construction practice have been given some questionnaires irrespective of being technical or non-technical personnel. Employees from all the stakeholders of the construction industry have been interviewed including builders, contractors, structural

consultants, and architects. These questions were related to expected delays, health hazards, unemployment, and safety measures in the construction project. All the results obtained from this survey have been recorded and presented in graphical figures. The survey form is attached in the appendix at the end.

IV. RESULTS AND DISCUSSIONS

Results are made with respect to. time delay and financial crises, as under:

A. Delays in the Project Timeline

Figure 1 shows the key factors influencing the unnecessary delays in construction projects due to a biological pandemic. These factors include the lack of workforce, financial barriers, material supply hindrances, disruption of public services like buses and utilities, and the remote working of official tasks. Due to the pandemic, the majority of employees and laborers have taken leave from the office and are not available to work on a regular basis. The material supply gap refers to the situation of client demand and late supply of material from the plant, including steel, cement, and aggregates; due to the COVID-19 lockdown, the supply of material has been affected badly in Pakistan. Financial crises include the situation when a firm has to pay their employees, unnecessarily paid leaves and its financial budget has been stuck on various orders of material; due to corona issues, the international business is not going in perfect harmony that's why financial crises are arising rapidly. Public services disruption is well understood with the affected schedule of buses, super-marts, and other utilities; for example, internet supply and its related complaint working are taking a longer time than in the normal days and many other issues. Home office and remote working is the situation where an employee cannot put his/her best efforts and input. This might be due to the family priorities of their parents and kids. Similarly, compared to an office environment, facilities cannot be the same at home like power supply, internet options, provision of high-speed laptops, etc. Therefore, all these factors have been inquired from the randomly sampled personnel, and the most important factor is found to be the supply gap in material, and disruption in public services stands second.

The above two most crucial parameters of supply gap and public services disruption have been now evaluated with reference to the work-force strength and the implementation of lockdown in Pakistan. Figure 2 shows the causes of the two most important factors, which have been disturbed in the current scenario of COVID-19. The supply of material has been affected more due to the strict implementation of lockdown in the cities and the unavailability of working officials has ended with the consequences of disruption in public services.

Figure 3 shows the root causes of delays that have been reported due to working remotely at home. Since all the employees are not well trained with digital technologies and some hindrances of power failures occur daily in Pakistan, thus it also results in the suspension of projects temporarily. Compared to the developed countries where the concept of home-office has worked significantly,

Pakistan has failed to implement the similar phenomenon of remote working from home due to several issues which only exist in under-developing countries like Pakistan, India, Nepal, etc. Load shedding for a longer period has affected the working efficiency of people at home which is under control while they were working at offices. Therefore, domestic issues at home stood first in the barriers to working at home for most of the interviewed personnel. Figure 4 represents the reasons for the insufficient workforce available for work during the pandemic of coronavirus. The survey showed that only less than 10% of workers got affected by coronavirus directly but the major reason is turned out to be the situation of lockdown imposed by the Government. Due to the implementation of a forced lockdown, peoples were unable to go to the offices and their working sites and resulting in a negative impact on work efficiency. It has also been observed that approximately 30% of people are protecting themselves by avoiding unnecessary traveling and outings to avoid the COVID-19 spreading and thus it is one of the factors which affects the availability of employees. But, this is only the case with the government employees or with those who got the paid leaves from their employer or who got an opportunity of working from home otherwise the concept of self-quarantine may affect the financial status of the affiliated person.

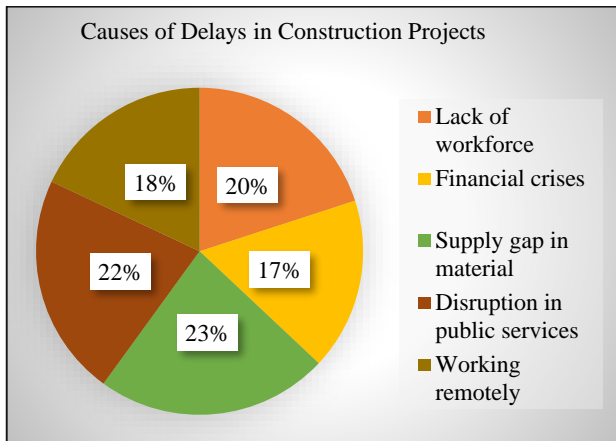


Figure 1: Main Causes of Delays in the Construction Project during COVID-19

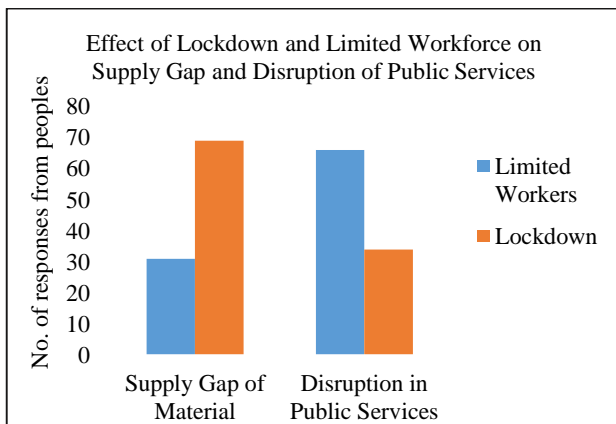


Figure 2: Effects of Workforce and Lockdown on Demand-Supply Gap and Disruption in Public Services

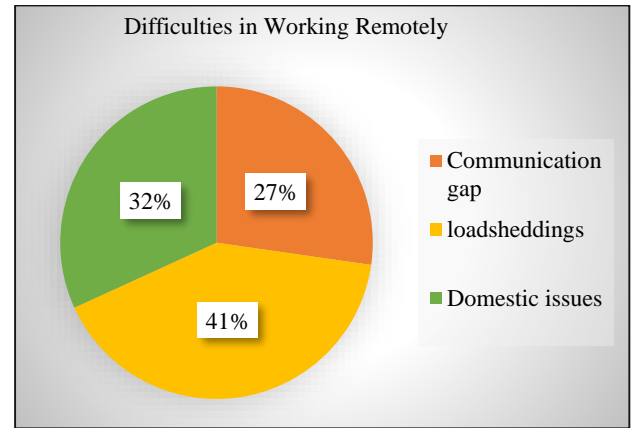


Figure 3: Causes of Difficulties in Working Remotely from Home

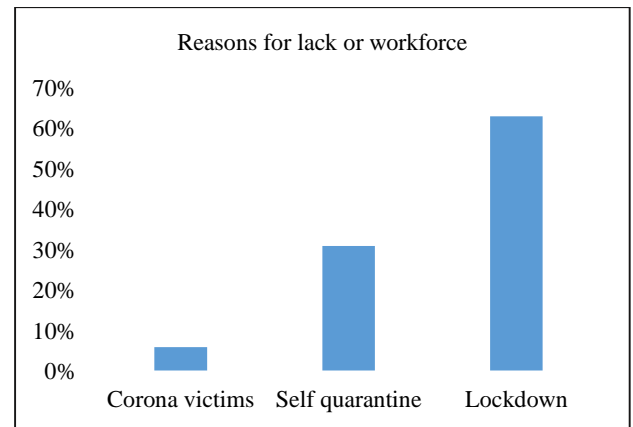


Figure 4: Root Causes for Unavailability of Sufficient Workforce

B. Financial Aspects

Figure 5 shows the reasons for the increase in the overall cost of the construction project. Among 100 peoples who got interviewed in this survey, 53 persons believe that fluctuation in the material cost in a pandemic is the major factor and preventive measures for staff safety and security is found to be the least sensitive parameter. Due to the lockdown situation, the transportation of material from the plant to the construction site is taking a long time to get delivered thus resulting in an increase in its delivery cost as well. Moreover, in some cases, laborers are also demanding a little higher wages to work regularly irrespective of putting their lives in extreme danger of getting diseases and therefore they demand a bit higher wages per hour as well.

Figure 6 shows the status of employment in Pakistan during a biological disaster of coronavirus. According to the survey for technical staff, only a few people have lost their jobs but 37% of personnel complain about getting a reduced salary from their employer and the majority are getting full salary even in this pandemic but they are assumed to work efficiently. But in the case of laborers, almost 50% have lost their jobs and 39% got the jobs on reduced salaries from their companies and hence creating a situation of extreme poverty in the country.

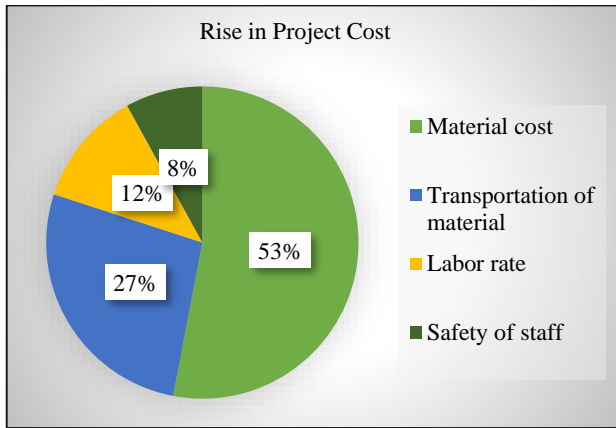
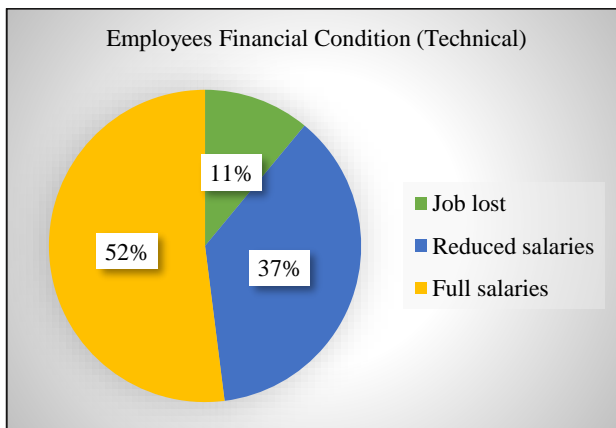
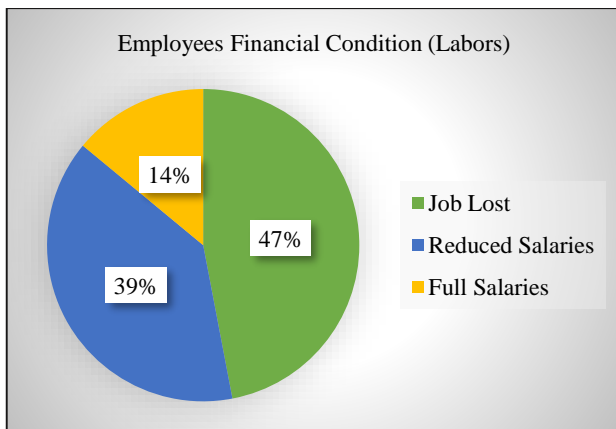


Figure 5: Reasons for the Increase in the Overall Cost of the Project



(a)



(b)

Figure 6: Employment Condition during COVID-19 (a) for Engineers and Technical Staff (b) for Labors

V. CONCLUSIONS AND SUGGESTIONS

It can be concluded that the delay in construction projects results in financial crises for employees leading to an increase in the overall cost of a project. A forced lockdown by the government and a limited number of workers are found to be the main root cause of getting delays in the project timeline which is a bit depressive for clients and contractors. Also, the communication gap and power failure are the most difficult issues which affect the efficiency of technical staff who are working remotely from home. These communication gaps are due to digital knowledge in-competencies.

In terms of financial aspects, some employers have reduced their employee's salaries instead of firing them indicating an optimum way to survive this pandemic. The cost associated with the safety and security of staff members was found to be the least important factor. Therefore, every employer is advised to take care of all such preventive measures. These safety measures include the provision of safety masks, sanitizers, and a medical camp on-site for employees. The key factor for accelerating the overall cost of the project is found to be the increased cost of construction material and for this issue, the local government should take some serious action against vendors and suppliers.

This research suggests the key factors to avoid the delays in the construction sector such as:

- Regular working hours need to be designed and scheduled with an alternate day work concept.
- Implementation of the home office concept, careful monitoring tools for working hours must be used to make it more useful. In addition, some mandatory facilities for mobile phones, and laptops must be provided to the concerned staff to avoid the issues associated with technology access.
- Hygiene and safety measures are minimum in the financial cost exceedance hence all the firms are suggested to opt and provide such measures in their offices.
- For laborers, it is suggested to provide them jobs at least with reduced salaries or government should solve this issue as soon as possible.
- Productivity optimization tools must be taken into consideration for keeping the balance in employees' financial issues, construction delays, and all other problems.

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Authors Contributions

Samiullah Bhatti's contribution to this study was the concept, technical implementation, and project administration. The methodology to conduct this research work was proposed by Farhan Haider along with paper writing, correspondence and formatting according to the Journal's requirements. Data collection, data compilation, validation, and supervision were performed by Umar Ali Siddiqui.

Conflict of Interest

There is no conflict of interest between all the authors.

Data Availability Statement

No testing data is available in this paper.

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APPENDIX: QUESTIONNAIRE SURVEY FORM

Impact of Corona Pandemic and Lockdown on Construction Delays and Project Failures

This survey is a part of a research project conducted to assess the effects of the biological pandemic of COVID-19 and its associated lockdown on the construction industry. The major focus is laid on the root causes of delays in the construction timeline and project failures. Moreover, the negative impact at the micro-level of employment and financial scenarios is also under discussion. All the data is purely used for research and your information will remain highly confidential. Your feedback will be highly appreciated.

Thank You.

* This form will record your name, please fill in your name.

1. Please write your Designation.

2. Your Company/ Employer Name?

3. Category of your employer firm?

- ☐ Client
- ☐ Architect
- ☐ Consultant
- ☐ Contractor

4. In your opinion, what is the major root cause for the delays in a construction project during this pandemic?

- ☐ Lack of workforce/ unavailability of employees
- ☐ Financial crises due to pandemic
- ☐ Demand supply gap of construction material
- ☐ Disruption/ Nuisance to the public services
- ☐ Working remotely fromhome

5. What do you think is the major cause of the unavailability of employees?

- ☐ Government imposed lockdown
- ☐ Self-Quarantine of people as a safety measure
- ☐ Being victims of corona disease

6. Which of the following factors is the prime cause of an increased project cost and financial crises?

- ☐ Material cost
- ☐ The cost of transportation of material to the site
- ☐ The demand for an increased laborrate
- ☐ The cost associated with the safety measures of employees

7. What do you think is the major cause of the demand-supply gap in construction material?

- ☐ Lack of workforce
- ☐ Imposed lockdown

8. Disruption in public services is caused by?

- ☐ Limited workforce
- ☐ Government imposed lockdown

9. What hindrances are causing difficulties in remotely working from home or going with the home-office concept?

- ☐ Communication gap with colleagues
- ☐ Load shedding and power failures
- ☐ Domestic and personal issues at home

10. The negative impact of the pandemic on employees' financial status is resulting in?

- ☐ Totally job lost
- ☐ Getting a reduced salary and working from home
- ☐ Getting full salary