

Impact of Covid-19 Pandemic on Construction Sector of Nepal

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Abstract:

Background: The construction sector across the globe has been tremendously affected by the spread of COVID-19 virus. The issues of contractual obligations, availability of resources, deliverables, health and safety measures and project delays or cancellations are major concern for construction industry. The study was focused on the identification of the impact spectrum and analyzing their significance for in case of Nepal.

Materials and Methods: This methodology is based on the web questionnaire survey. The questionnaire was sent to 180 respondents from September 3rd to 28th September. 150 responses were received and have been analyzed descriptively; Relative Important Index (RII) and qualitative analysis were used for conclusion and recommendation.

Results: The study unveiled that mainly three construction sector issues had been identified which had been affected by COVID-19. These factors are 'delay' in construction project with RII value 0.911, 'financial and cash flow problem' with RII 0.863 and 'shortage of skill labor' with RII value 0.845 respectively. Similarly, the highly impacted contractual issues identified in construction sector were time extension, cost escalation, claim and disputes respectively.

Conclusion: For the smooth running of construction activities during covid-19 and in such pandemic that might be arose in future, the Government and concerned authorities should prepare possess guidelines about the price escalation, health safety guarantees of all staffs and workers, which makes easy to tackle such pandemic in future and ensure the timely completion of construction projects maintaining cost and quality.

Key Word: Covid-19, Impact, Construction, Safety

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I. Introduction

The World Health Organization (WHO) declared a novel coronavirus outbreak a pandemic on March 11, 2020[1]. On 24 March 2020, the Government of Nepal called a complete lockdown of the country restricting all the activities and movement within the country. The major economic activities in construction, transportation, hotel, restaurants and other public places were closed for functioning. The Government of Nepal issued a notice to continue construction activities in the site following safety guidelines on 10 June, 2020[2].

The global economy is currently distressed with severe decline in business activities in construction sector including airlines, restaurants, hotels and internal tourism sector. Millions of people have lost their jobs. The COVID-19 global pandemic has the potential to destroy individual livelihoods, business industries and the entire economics [3].

The construction sector across the globe has been badly hit by the spread of COVID-19 virus and issues of contractual obligations, availability of resources, deliverables, health and safety measures and project delays or cancellations has been growing concern [4].

The impact of covid-19 on construction is yet to come due to the uncertainty of the current situation. A study conducted by Samantha Brown et.al in US found that from March to April 2020, nearly one million construction workers lost their jobs, of which 55.1 % were temporarily laid off. The absence from work due to personal medical reason in construction increased 70 % from March to April 2020. [5]

The impact study of Covid-19 on UK construction industry showed that 46 % employee temporarily worked remotely, 15 % were still site based, 23 % had been furloughed and 16 % had lost their job. Significant cash flow issues and delays were the main issues in construction site. Many of the delays in construction were due to other parties including contractors, materials and clients. Five C's i.e. create culture, control systems, courageous decisions and combat mental health and care for employees were recommended to help the construction employers and employees work safely for smooth running of the construction industry. [6]

Similarly a study conducted in Malaysia identified 14 impact factors of pandemic on construction project i.e. suspension of projects, work force shortage, time overrun, cost overrun, financial impact, supply shortage, interruption of planning and scheduling, restriction of movement on the work and travel bans, shortage

of materials to support running projects and sudden fluctuation of material price, interruption of contractual terms (legal issues), socioeconomic impact, impact on accomplished activities, uncertainty of survival and impact on research and technology. The most impacting factors on the construction sector were suspension of projects, labor impacts and job loss, time overrun, cost overrun and financial impact. The suspension of the project was the most affected factor of the pandemic occurrence due to the restriction of the movement and shortage of supply [7].

In the Jordanian GDP, the construction industry and civil engineering project contribute major role. Due to covid-19 pandemic, the engineering design office and ongoing construction projects terminate abruptly all onsite construction work and to work to home for the design engineer [8].

Understanding the impact and analyzing their significance for study in case of Nepal is also a crucial task for academic research. The research paper presents the assessment about current situation that the construction companies facing after the lockdown over country. The purpose of this research was to identify impact of covid-19 in construction sector in Nepal and provide solutions to the government for improvement of situation.

II. Research Methodology

This study is based on the web questionnaire survey. The questionnaire was designed by conducting a literature review (from recent published article, reports etc.) and exploratory interview with some selected experts from the construction industry for selecting study variables including contractual issues variables. Then the questionnaire was sent to the construction sector practitioners working in Nepal all over the country, including general manager, project engineer, site engineers, contract engineers, contractors and construction site senior staffs. The questionnaire was sent to 180 respondents from September 3rd to 28th September out of which 150 responded. Three types of questions were included in this survey i.e. factual questions; opinion questions and open ended questions.

Factual questions query information about objective situations (respondent's age/sex/experience/role in the organization). Opinion questions query the respondent's opinions on a variable based on Likert-type format. Open ended questions about the respondent's suggestion for improving working situation (qualitative aspects) during covid-19 in construction sector. The identified variables were examined and ranked by Relative Importance Index (RII) which was computed using equation. To determine the ranking of different factors from the viewpoint of contractors, the Relative Importance Index (RII) was computed using RII Equation below [9].

$$RII = \frac{W}{A*N} \dots\dots\dots(i)$$

Where, *W* is the weighting as assigned by each respondent on a scale of one to five with one implying the least and five the highest. *A* is the highest weight and *N* is the total number of the sample.

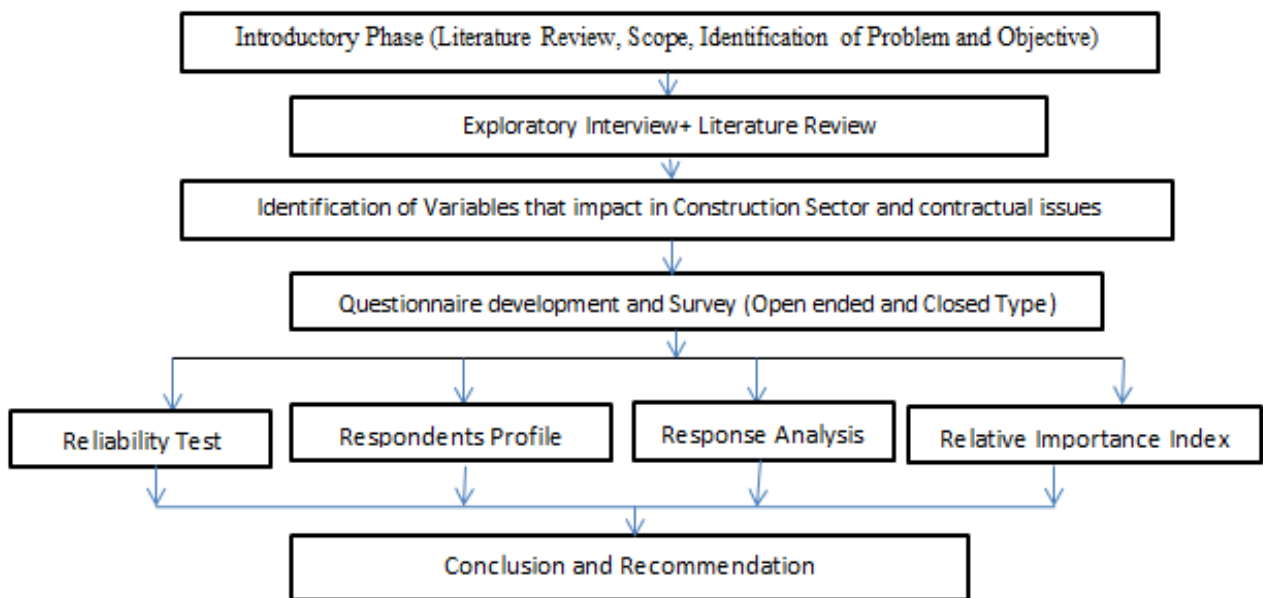


Fig.1. Research methodology Flowchart

III. Result

This study focuses on mitigation strategies to manage problems in the construction sector due to covid-19 and providing some solutions for government as well as private sector. Based on the content of the questionnaire, the analysis was divided into three sections: respondents profile, response analysis and Relative importance index. In the qualitative prospectus, feedback from the respondents has been summarized. Microsoft Excel 2016 was used for data recording and statistical analysis.

A. Identification of Variables

After the study of recent literature related to covid-19 and exploratory interview to the selected stakeholders of construction sector, ten variables were selected for the impact assessment and they are; movement of Labor/Travel bans, Loss in profit, Chances of delay, Financial and cash flow problems, Shortage of skilled labor, Construction labor productivity, Additional cost in site management, Loss due to Idle condition of resources, Potential site closure and Quality of construction work. With these variables, four major contractual issues were also identified and they are: Time extension, Claim, Dispute and Cost escalation.

B. Respondent Profile

This section presents the demographics of participants for the study. Table 1 shows the demographic data of the respondents involved in the survey which includes Gender, Role in the organization, age group and year of experiences. Most of the respondents were in between age 25-35 years and most of the respondents having responsibility as a site engineer.

Table 1: Demographic data of respondents

Category	Item	Frequency	Percentage (%)
Gender	Male	138	92
	Female	12	8
Role of participant in the organization	General manager	16	11
	Project Manager	35	23
	Contract engineer	11	7
	Site Engineer	75	50
	Contractor	13	9
Age group	0-25	23	15
	25-35	114	76
	More than 35	13	9
Years of experiences	0-5	71	47
	5-10	61	41
	10-15	13	9
	More than 15	5	3

C. Reliability Test (Cronbach's Alpha)

Reliability test was conducted in the beginning of the section analysis to check the reliability of data before they were analyzed. The reliability coefficient normally ranges between 0 and 1. The value closer to 1 indicates the greater internal consistency reliability of the criteria in the scale. The Cronbach's Alpha is 0.9 with 15 variables was found and considered good internal consistency. Cronbach's alpha coefficient is calculated as:

$$\alpha = \left(\frac{k}{k-1} \right) * \left(1 - \frac{\sum_{i=1}^k \sigma_i^2}{\sigma_t^2} \right) \dots\dots\dots(ii)$$

Where, *k* is the number of items in a scale, σ_i^2 is the variance of *i*th item and σ_t^2 is the variance of the scale (total) scores [10].

Table.2. Determination of Reliability coefficient (Alpha)

Total item	15.00
Sum of item variance	8.50
variance of total score	45.13
Alpha	0.90

D. Response Analysis (Descriptive Analysis)

This section presents the responses of respondents in percentage basis for five different scales with respect to ten identified variables. In the case of 'chances of delay', the Table 3 shows that maximum respondent responses very high impact i.e. 61% and followed by financial and cash flow problems, shortage of skilled labor

and others as shown. Only a few respondents' responses feel very low impact of covid-19 on construction in which they involve i.e. 0-7% for different variables and 21-61% responses high impact.

Table.3. Response Analysis for variables

	Very High	High	No Impact	Low	Very Low
Movement of Labor/Travel bans	30%	59%	1%	7%	3%
Loss in profit	28%	57%	7%	7%	0%
Chances of delay	61%	36%	2%	1%	1%
Financial and cash flow problems	45%	47%	5%	3%	1%
Shortage of skilled labor	41%	49%	4%	4%	2%
Construction labor productivity	21%	48%	9%	15%	7%
Additional cost in site management	37%	51%	5%	6%	2%
Loss due to Idle condition of resources.	29%	59%	6%	6%	1%
Potential site closure	19%	61%	9%	9%	2%
Quality of construction work	21%	38%	25%	11%	6%

E. Relative importance index analysis

This part includes the analysis of the data collected through a questionnaire survey. Descriptive analysis was used to evaluate degree of impact by calculating relative importance index (RII). Relative index analysis was used to rank the criteria according to their relative importance for impact. Table 4 shows the ranking results for each variable by using the relative index analysis using excel software application. Table 4 shows least and most impacted variable with respect to covid-19 on construction sector from the prospectus of respondent's opinion. Due to covid-19, in this research parameter 'chances of delay' was identified as most impacted variable i.e. having high RII and similarly parameter 'quality of construction' identified as least impacted in the construction industries.

Table 4 Relative Importance Index

SN	Variables	RII	Rank
1	Movement of Labor/Travel bans	0.811	7
2	Loss in profit	0.812	6
3	Chances of delay	0.911	1
4	Financial and cash flow problems	0.863	2
5	Shortage of skilled labor	0.845	3
6	Construction labor productivity	0.723	9
7	Additional cost in site management	0.828	4
8	Loss due to Idle condition of resources.	0.817	5
9	Potential site closure	0.769	8
10	Quality of construction work	0.713	10

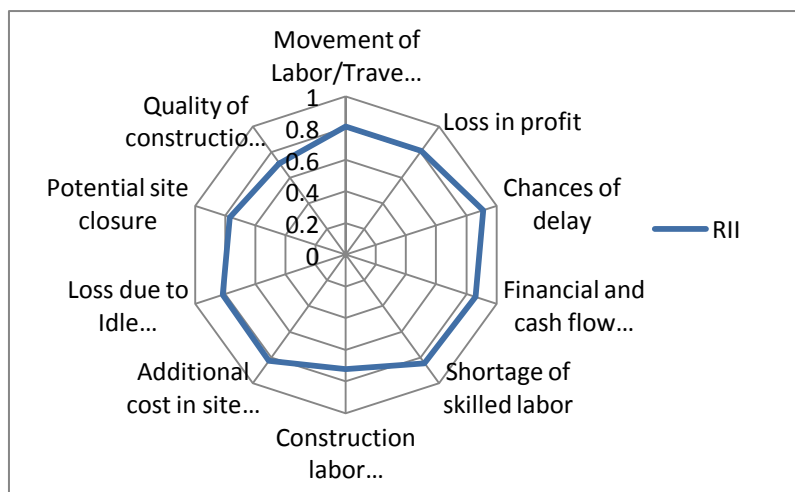


Fig.2. Radar Chart for RII

F. Contractual Issues

The study found that the highly impacted contractual issues were time extension, cost escalation, claim and disputes as shown in figure. 50 % of the respondents responded that, time extension was the very highly impacted contractual issue which indicates that most of the construction projects need time extension for the successful completion of projects in time.

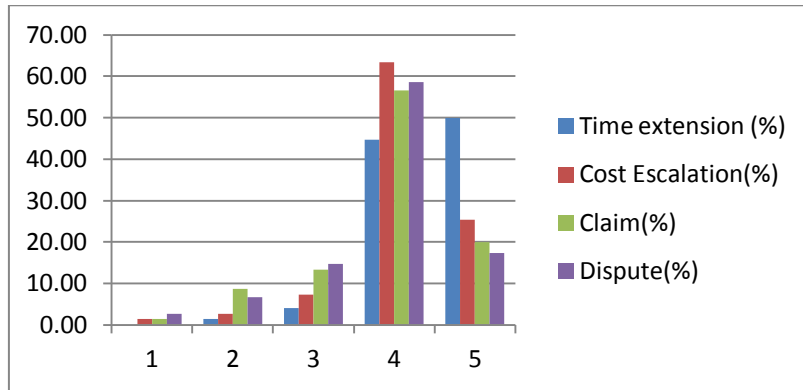


Fig.3: Percentage Variations of responses on contractual issues

IV. Conclusion

Till date the whole world is suffering from covid-19. Construction sector is related to many business activities so without proper planning and action it can't be back to original conditions. The study found that 'chances of delay' and 'quality of construction work' were the most impacted and the least impacted variables in construction sector. The RII value determined for variables indicates the rank for improvements according to the priority based on scale of impact i.e. chances of delay in project is ranked in first and need to be addressed first.

Government of Nepal must facilitate in delivering construction material for construction sites. There must be mutual understanding between clients and contractor about the price escalation, health safety guarantees of all staffs and workers. Specially, contractors need strong support from local government for management of labor and materials to the site. From the prospectus of respondents, it is necessary to provide soft loan, include necessary additional cost in BOQ and must go online to claim running and other bills. All the stakeholders including government have to work in proper coordination and can improve the working environment with the adaptation of control measures for coronavirus.

From the suggestion from respondents, some strong recommendation for government that need to be implemented and these are mainly: price adjustment, clean out construction management issues, no lockdown for construction, need strong support from local government, online billing system, time extension for project and so on. For smooth running of construction activities during covid-19, it is necessary to use PPEs, masks, sanitizer and maintaining social distance and applying other proper safety measures. To meet the target of project, working in two or more shifts with maintaining social distance at site may be better option.

Result shows that only a few respondents' responses feel very low impact of covid-19 on construction in which they involve i.e. 0-7% for different variables and a high percentage respondent's 21-61% responses high impact. This result indicates the most of the contractors were suffered and having high negative impact in construction activities due to covid-19.

The construction industry and civil engineering projects contribute largely to the national GDP of the country, so it is necessary for government as well as private sector (FCAN-Federation of Contractors Association of Nepal) must focus on improving situation after lockdown and improvement must be on the basis of ranking of variables as identified.

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