

Strategies Used by the Sri Lankan Construction Industry to Overcome the Challenges Posed by the Covid-19

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ABSTRACT

The global outbreak of the COVID-19 pandemic has thrown the world's political, social, economic, religious, and financial structures into disarray. COVID-19 has a broad range of effects on numerous industries, including construction. Sri Lanka as a developing country is also affected by the pandemic and many sectors of the Sri Lankan economy such as construction, education, tourism, imports and exports, agriculture, and health etc are experiencing negative consequences of the pandemic. Construction industry as one of the key sectors of the economy was also severely affected by the COVID-19 global pandemic in various ways. Construction companies and government institutes are taking action to face these challenges. This study describes how COVID-19 impacts the local construction industry throughout the construction process. Furthermore, the impact was evaluated with regard to several aspects namely, financial, human resources, supply chain and logistics, legal, and completion and handover of the project. The strategies which are used by the construction industry participants to face the challenges of the pandemic are also discussed. A mixed research approach was used in the study and questionnaires which comprised of both qualitative and quantitative questions were used as a data collection tool. This research revealed new knowledge about the construction industry in relation to the COVID-19 pandemic. The study's most important finding was that the spread of the virus influenced the entire construction process. The pandemic had a major impact on the construction stage as well as the human resources aspect of the industry.

KEYWORDS: *COVID-19, Construction Industry, Sri Lanka, Strategies*

1 INTRODUCTION

The COVID – 19 epidemic has been the world's most serious health emergency in the recent past. Many nations have entered deep recessions, and many global value chains have been severely disrupted as a result of demand and, in some cases, supply shocks, which have sent reverberations across supply chains with negative multiplier and accelerator effects (Tumwesigye et al., 2020). According to Tumwesigye et al., 2020 current economic recession is the most catastrophic synchronized global economic downturn since the Great Depression, which extended over 216 nations and territories worldwide. As of 12th October 2021, there have been 237,655,302 confirmed COVID-19 cases, with 4,846,981 deaths worldwide (World Health Organization, 2021).

The virus's influence on society and the economy can be seen in the worldwide lockdowns, labour mobility restrictions, travel bans, airline suspensions, and, most notably, the economic slowdown (Shafi et al., 2020). Three transmission channels are predicted to account for economic losses in the global economy: supply chain, demand, and the financial sector. Businesses, local consumption, and foreign commerce will all suffer as a result of these channels (Aladejebi, 2020).

Global economy relies heavily on construction. The impact of COVID-19 pandemic on the construction industry is unprecedented (Fairlie, 2020), regardless of the scale of its operation. The construction industry, which has always been a major contributor to the local economy, was also forced to slow down. It is evident that, almost every construction project got delayed or disrupted as a direct result of the pandemic. All plans and projects have been postponed until further notice (Gamil and

Alhagar, 2020). According to Shibani et al., 2020, in the UK, COVID-19 has had a considerable impact on the construction sector, resulting in the cancellation of several projects and the extension of others. As a result, building businesses have suffered significant losses due to people's unwillingness to invest in residential construction or commercial development. Furthermore, Shibani et al., 2020 claimed that due to a shortage of funds from clients and banks, construction companies are experiencing financial difficulties and the pandemic has caused several projects to be halted owing to the scarcity of building supplies because of the lockdown, which rendered supply chain bottlenecks.

According to the Central Bank of Sri Lanka (CBSL), COVID-19 posed a considerable impediment to the delivery of services and development activities related to the country's economic and social infrastructure. The island-wide lockdown had a significant impact on public transportation and the ports sector was also damaged by the global logistics chain difficulties that resulted from the global adoption of lockdown measures (Central Bank of Sri Lanka, 2020). Despite having a negative Gross Domestic Product (GDP) growth rate of 3.6 % in 2020, Sri Lanka slowly and steadily recovered from the adverse scenario. The country has managed to secure a GDP growth rate of 4.3% in the 1st Quarter of 2021 (Department of Census and Statistics, Sri Lanka, 2021). However, once again with the sudden outbreak of the 3rd wave in late April 2021, the construction industry began to contract towards the 3rd Quarter of 2021. As per the recent statistics, GDP from the Construction Industry decreased to 137,391 LKR million in the 2nd Quarter of 2021 from 154,286 LKR million in the 1st Quarter of 2021. This illustrates the downfall of the country's economy due to the impact of the pandemic.

To contain the spread of the virus, several government restrictions and laws have been implemented, which unfortunately have a negative influence on the construction sector. Interruption of the supply chain and resources, project quarantine because of positive cases, project delays, and terminations are only a few of the consequences (Hansen, et al., 2021). Significant delays and disruption of construction activities have a negative impact on both the contractor and the client. Many labourers had to abandon construction sites and look for other sources of income. Contractors now have an extra burden ensuring workforce safety, while maintaining the smooth flow of work. In relation to the adverse economic impact, cash inflows to the contractors were restricted, leading to more financial issues. Also, many small-scale construction sites came to a standstill. Even though many sectors have embraced online job execution, building projects cannot be completed online since employees must be present on-site to achieve productivity (Amoah, et al., 2021). According to Pathirana, 2021, most existing projects have been suspended or postponed, and local clients and contractors are operating their companies with insufficient financial reserves, positioning them in difficult situations and exposing their market shares to rivals. It is critical that debts to suppliers are paid on time to maintain an uninterrupted supply chain and continue the work process.

To overcome this situation many regulations have been newly imposed on construction projects by the Construction Industry Development Authority (CIDA), which is the industry regulator in Sri Lanka. According to this, social distancing, dividing shifts, disinfecting the premises, working from home, limiting non-essential activities, monitoring people's health, and quarantine are newly added precautions and unfortunately, those measures are not favorable for the construction sector (Vithana et al., 2020). Maintaining a minimal carder on-site with required distances, accommodations, and spending on additional Personal Protective Equipment (PPE) drain contractors' finances and keeping a sizable carder on site with no work in progress is a challenge for construction companies (Pathirana, 2021). Construction projects require a constant supply of resources and an intake of workers at various phases of the project (Vithana et al., 2020). Also, the industry has traditionally had the largest payment waiting lines, which will be further aggravated due to economic instability (Kawmudi et al., 2021). Pathirana, (2020), states that the substantial depreciation of the local currency against the US dollar signaled the economic impact of the pandemic on Sri Lanka. This has negatively affected the industry because it has added an extra cost.

Given the above backdrop, only a limited number of studies have been conducted on the impact of the pandemic on the construction industry, particularly in the Sri Lankan context. Contractors, material suppliers, and clients play important roles in the industry, and the current situation has forced all three parties to deal with issues such as completing projects on time, expecting supplies on time at the right price, and, most importantly, ensuring that the final product or completed project meets set goals (Pathirana, 2020). Therefore, this research is focused on identifying the existing situation in the Sri Lankan construction industry with respect to the Covid-19 pandemic. This paper will be beneficial

to the stakeholders in the construction industry to identify the impact of the pandemic on the Sri Lankan construction industry, the strategies which are used in the construction industry to overcome the challenges posed by the pandemic, and to explore the effectiveness of the existing strategies.

2 METHODOLOGY

Research design comprised of both qualitative and quantitative approaches. A questionnaire was used as the data collection tool, which contained both open-ended and closed-ended questions. The study sample comprised of forty (40) participants from the local construction industry, representing the key professional segments namely Architects, Engineers, Project Managers, Quantity surveyors, and senior employees of technical grades. The sample represented a random segment of the construction industry in terms of stakeholders such as consultancy organizations, contractor organizations, interior design offices, and specialized sub-contractor organizations. Selective sampling techniques were used to decide the participants for the study focusing on all the professional categories who are currently engaged in the local construction industry. The criteria for selecting participants for the study were based on research findings by Fei and Khan, (2015) who listed the following qualities and tangible criteria for experts:

I. Age should be 19-60 years.

II. A minimum 1 year of experience and participation in the construction industry is needed.

Based on that scenario, participants were selected above the age of 19 years and more than 1 year of experience in the construction industry.

Statistical techniques were used to analyze quantitative data. Since advanced data analysis functions of Microsoft Excel have proven their robustness as a useful tool in data analysis, this study has utilized the features of the same to perform relevant calculations. The qualitative data was evaluated using thematic content analysis. Thematic analysis is a popular method for evaluating qualitative data on unexplained phenomena (Maguire and Delahunt, 2017; Creswell and Poth, 2018). It is a technique for defining and analyzing data based on themes and relative frequency. It is also a platform for organizing and analyzing data in order to come up with clear conclusions and outcomes (Vaismoradi, Turunen and Bondas, 2013). Accordingly, thematic content analysis was performed under five main themes.

3 RESULTS

The impact of the COVID-19 pandemic on the Sri Lankan construction industry was evaluated in two aspects; (1) Construction process perspective (2) Other aspects related to the construction industry.

3.1 Impact of Covid -19 Pandemic

Every participant acknowledged that there was an impact on the construction industry due to the pandemic. 73.8% (n=31) acknowledged that there was a major impact, 23.8% (n=10) acknowledged that there was a moderate impact and 2.4% (n=1) acknowledged that there was a moderate to minor impact on the industry.

In order to get first-hand experience on the impact level of the COVID-19 pandemic, the participants were asked whether their company was affected by the pandemic. 95.2% (n=40) of the participants responded positively and only 4.8% (n=2) of the participants said that their companies were not affected by the pandemic. The responses from the latter group of participants were again excluded from the study.

Out of the first group of participants, 47.6% (n=20) said that there was a major impact, 31% (n=13) said that there was a moderate impact, 16.7% (n=7) said that there was a moderate to minor impact and 4.8% (n=2) said that there was a minor impact due to the COVID-19 pandemic.

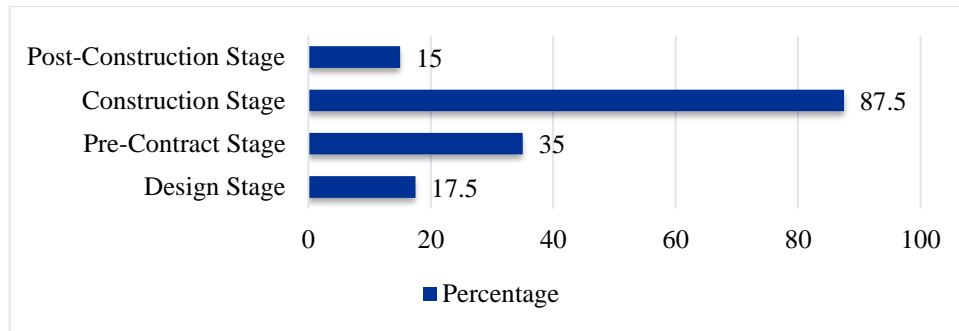


Figure 1: Impact level of COVID-19 in different stages of construction

Source: Analysis of the research findings

According to the respondents' point of view, when considering the construction process, the construction stage was severely affected by the pandemic. Pre-contract, designing, and post-contract stages were affected in descending order.

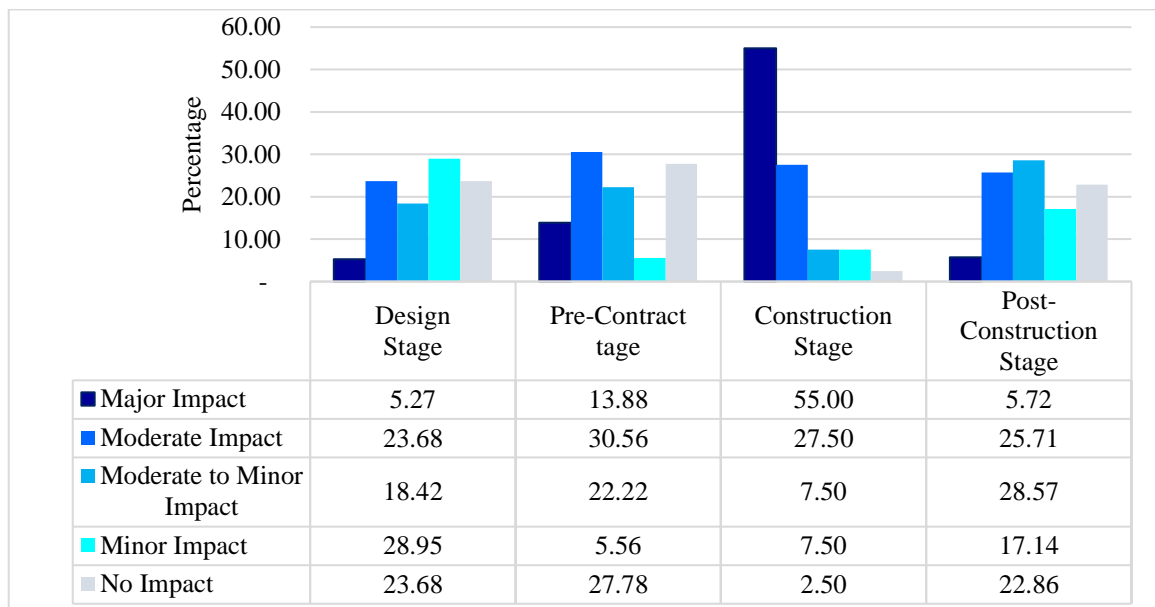


Figure 2. COVID – 19 Impact level analysis based on the construction stages

Source: Analysis of the research findings

3.1.1 Impact level of the design stage:

As per figure 2, the impact level on the design stage of a construction project reveals that the majority of the respondents claimed that there was a “minor impact” (28.95% responses), while an equal number of respondents claimed, a “moderate impact” and “no impact” (23.68% responses), followed by 18.42% claiming “moderate to minor impact”, while 5.27% claimed a “major impact” due to the pandemic on the design stage of a construction project. All the descriptive answers of the responses above were thematically summarized into the following facts: Design stage of construction was impacted due to 1) Inability to attend pre-bid meetings, meet clients in person due to travel bans, curfew, isolations, and lock down, 2) Unable to proceed with design development and finalize designs due to communication difficulties and architectural designers affected by the virus.

3.1.2 Impact level of the pre-contract stage:

According to figure 2, the impact level on the pre-contract stage of a construction project reveals contradictory results, while the majority claimed that there was a “moderate impact” (30.56% responses), followed by 27.78% of respondents who claimed, “no impact”. The rest of the respondents

claimed, “moderate to minor impact” (22.22% responses), followed by 13.88% claiming “major impact”, while 5.56% claimed “minor impact” due to the pandemic on the pre-contract stage. Thematic analysis revealed the following key points on the impact level of the pre-contract stage of construction such as 1) Difficulties in meeting with relevant parties to get approvals, 2) Fluctuations in the material prices and doubtful market conditions in terms of materials. 3) Necessary documents (such as BOQs) could not be finalized on time, 4) The Government and most of the companies were not working smoothly, 5) Official staff was affected by the virus and it caused delays in the tender process.

3.1.3 Impact level of the construction stage:

According to figure 2, the impact level on the construction stage of a construction project shows consistency in the study results, while the majority claimed, a “major impact” (55% responses), followed by 27.50% claiming a “moderate impact”. The rest of the respondents claimed, “moderate to minor impact” (7.50% responses), followed by the same level of responses for a “minor impact”, while 2.50% claimed “no impact” due to the pandemic on the construction stage of a construction project.

Major issues described in the descriptive question could be divided into two (2) main parts as workforce issues (related to labourers) and material supply difficulties. With respect to labour issues, construction sites were unable to manage their work due to the lack of labourers. Considerable numbers of labourers were either being quarantined or affected by the disease, while others were not reporting to work at sites that were in locked-down areas.

Material acquisition issues were encountered due to late or postponed shipments and transportation issues occurred when transporting through lockdown areas. Shutting down of construction sites to contain the spread of the virus and delays in the construction period were due to some axillary issues mentioned by the participants which occurred mainly from the above two main reasons.

3.1.4 Impact level of the post-contract stage:

According to figure 2, the impact level on the post-contract stage of a construction project also showed some contradictory results in the study, while the majority of the respondents claimed that there was a “moderate to minor impact” (28.57% responses), followed by 25.71% respondents claiming that there was a “moderate impact”. The rest of the respondents claimed that there was “no impact” (22.86% response), followed by 17.14% responses for a “minor impact” while 5.72% claimed that there was a “major impact” due to the pandemic on the post-contract stage of a construction project. As per the participants’ responses, descriptive answers given by the participants on the impact level of the post-contract stage revealed that deliver bills and the invoices were taking time to process due to work schedule delays and construction time delays in projects, and clients took more time to settle bills.

3.1.5 Impact of COVID-19 on other aspects of the construction industry:

Another set of questions was posted for the participants from another point of view to identify the impact of the COVID-19 pandemic on the Sri Lankan construction industry. Here the impact was evaluated in the financial aspect, human resources aspect, supply chain and logistics aspect, legal aspect, and completion and handover of project aspect.

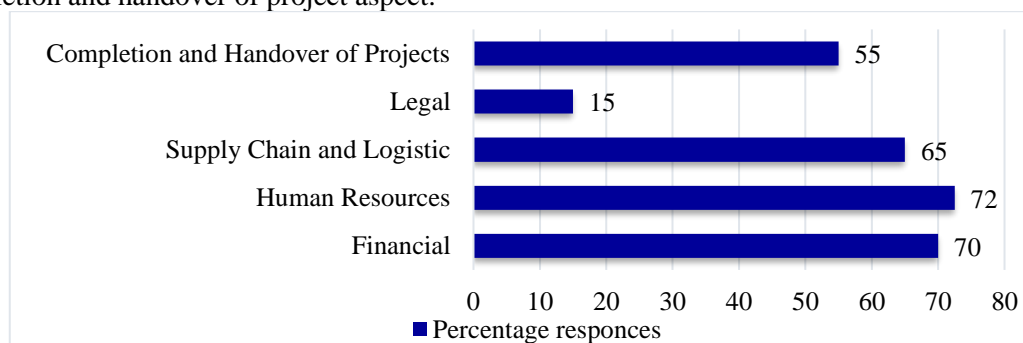


Figure 3. Impact levels of other aspects
Source: Analysis of the research findings

Figure 3 clearly portrays a significant impact on the financial aspect of the pandemic, which was followed by the human resources aspect, supply chain and logistics aspect, completion and handover of projects, and legal aspects in descending order.

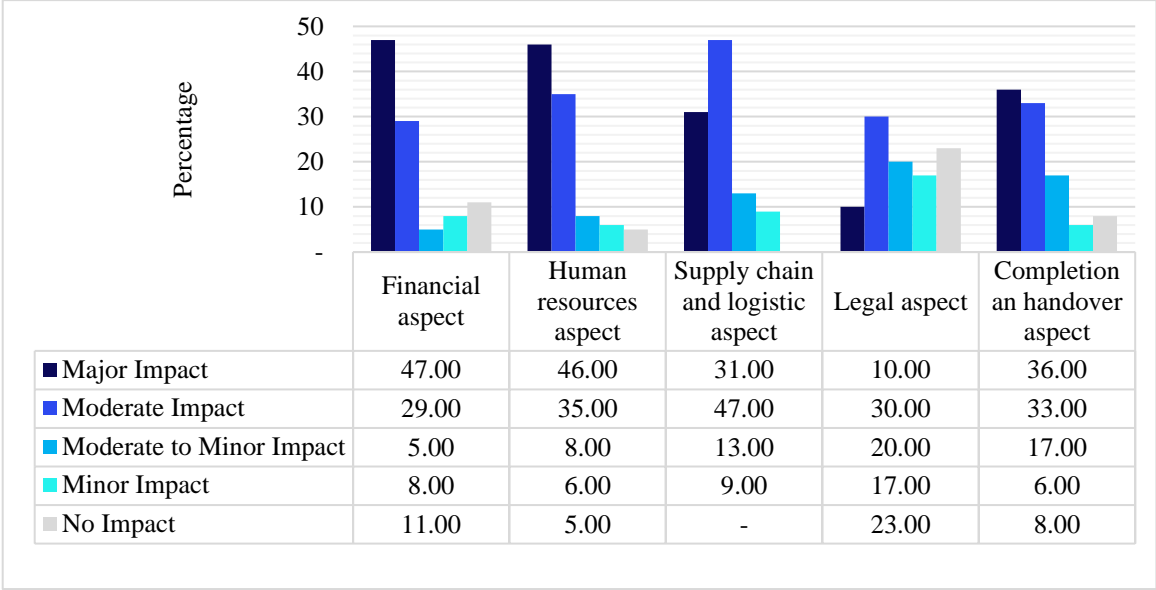


Figure 4. COVID-19 impact level analysis based on other aspects

Source: Analysis of the research findings

3.1.6 Impact level of financial aspects:

The thematic analysis performed on the impact level of the above responses on the financial aspects of the construction industry highlights the following areas: clients not paying bills on time due to project delays, cost overruns due to time delays, cash flow interruptions in the companies, the sudden increase in material prices and labour charges, delays and deductions in staff salaries and delays in other payments.

3.1.7 Impact level of human resources aspect:

Thematic analysis done on the human resources aspects of the construction industry highlight the following areas: labourers and the other staff were not able to report to construction sites and offices due to lockdowns and travel bans (like travel restrictions across districts) and only limited staff was allowed to report to work to minimize the spread of the virus. Most companies had introduced shift-based working hours to reduce the number of workers and staff gatherings. Due to the minimum number of workers in workplaces, projects could not be managed within the original timeline. Due to the disturbances in their personal cash flows, most workers showed a lack of motivation and did not report to work. On the other hand, several construction companies reduced the number of workers to control expenses, while others introduced work from home concept for office workers, and these initiatives also did not work well in many instances in terms of construction companies. Despite all attempts to prevent the virus spread, many construction workers and staff members were affected by the virus.

3.1.8 Impact level of supply chain and logistic aspect:

Thematic analysis of the supply chain and logistics aspects of the construction industry revealed the following areas: price increase due to less availability and high demand for materials, country regulations on importing foreign luxury items, import bans, shipment, and delivery delays as problems by supply chain and logistic divisions of construction companies.

3.1.9 Impact level of legal aspect:

Thematic analysis performed on the legal aspects of the construction industry highlight the following areas: while the delays in the tendering process due to the non- functioning of government and private sector companies were the main reason, normal construction work could not be carried out smoothly by adhering to new regulations as claimed by other participants; necessary approvals from various authorities could not be obtained in a timely manner, whereas many construction companies had to renegotiate with banks about the existing loan schemes and other financial problems.

3.1.10 Impact level of completion and handover of projects aspect:

The thematic analysis done on the impact level on the completion and handover of project aspects also highlight the previously mentioned reasons to have impacted the completion and handover of projects aspect as well.

4 DISCUSSION

4.1 Strategies and methods currently used to mitigate the adverse impacts of the COVID-19 pandemic

Unlike previous studies performed on the same subject domain, this research was focused mainly on the identification of the impact of the COVID – 19 pandemic on the local construction industry in two main aspects namely, the construction process perspective and six other aspects related to the construction industry namely, financial, human resources, supply chain and logistics, legal aspect and completion and handover of project aspect. The results of those two aspects complement each other. In terms of the construction process perspective, research focused mainly on four stages of the construction process namely, design stage, pre – contract stage, construction stage, and post–construction stage. Results proved that the construction stage of the construction process was heavily impacted by the pandemic, while the design stage, the pre – contract stage and the post–construction stage were also impacted in descending order.

During the construction stage, all the companies encouraged workers and staff members to strictly follow the government regulations (COVID-19 rules and regulations) on health and safety to prevent the spread of the disease. Companies provided accommodation and other facilities to the workers including transportation for the staff, shift-based, and roster-based work schedules were implemented to reduce worker gatherings. Several companies encouraged staff to work additional - hours to cover the targets.

The introduction of online meeting platforms with clients, consultants, and staff members to make decisions in the design stage and encouraging work-from-home concepts were the methods used by many construction companies in their design stage. Occasionally, some companies tend to store materials beforehand in the pre-contract stage to avoid delays during construction and purchasing materials from proximity was the other option adopted by the companies in the pre-contract stage. As the strategies utilized in the post-construction stage, contractor and sub-contractor bills were settled electronically through various online and fund transfer platforms.

When analyzing the impact level on all other aspects of the construction industry, study results proved that the human resource aspect created a major impact on the construction industry (72%), while the financial aspect (70%), supply chain, and logistics aspects (65%), completion and handover of project aspect (55%), and legal aspect (15%) also created a considerable impact. The following strategies were utilized by the responding companies to mitigate the effect of the pandemic in terms of all other previously discussed aspects of construction projects. In terms of the human resource aspect, construction companies tried to safeguard the human resources of their organizations by establishing work from home concept, reducing the number of workers at a time, implementing shift-based and roster-based work schedules, and providing transport and other facilities to workers. With respect to the financial aspect, obtaining financial facilities from banks to stabilize the cash flow, reducing the labor force, and deducting salaries and other allowances of the staff members were the strategies utilized by many. Under the supply chain and logistic aspect, companies consider strategies such as advancing material imports, maintaining buffer stocks, minimizing the transportation of materials, and using

alternate materials available at the market. In terms of the legal aspect of the construction companies, securing relevant approvals to travel across districts, negotiations with banks for rescheduling of existing financing facilities, negotiating with clients and other relevant parties on time extensions, and tender document clearance at the earliest possibility were the steps taken by many participants. Further, construction companies had negotiations with clients on the tenor of the project and processed on-time extension requests as well.

Apart from these, participants proposed new strategies which could be used to overcome the effects of the pandemic. Implementing Building Information Modelling (BIM) designs for the projects, carrying out accurate estimations and forecasting of the material requirement to store construction materials in buffer quantities, and carrying out off-site pre-fabrication activities to prevent delays were among those proposals.

The findings of this research further strengthen the results of previous studies and proved that the construction stage of the construction project was severely hampered due to the pandemic in the Sri Lankan construction industry. It also reinforces the previous knowledge on the fact that human resource and financial aspects of the local construction industry were mostly impacted while supply chain and logistic aspects closely followed the same.

5 CONCLUSION

The study identified the ways in which the COVID-19 global pandemic affected the construction industry in Sri Lanka which was evaluated in two ways: construction process point of view and the whole construction industry perspective. In terms of the construction process point of view, it could be concluded that the construction stage of the construction process is severely affected by the pandemic. Workforce issues and material supply interruptions were the main reasons. Pre-contract, designing, and post - construction stages were also affected in descending order. When considering the other aspects pertaining to the entire construction industry, results statistically proved that the human resources aspect was severely affected due to the pandemic. This was due to many reasons including lockdowns, travel bans, quarantine of labourers, the limited number of labourers and staff, shift-based working hours etc. The financial aspect, supply chain and logistics, completion, and handover of projects, and the legal aspect of the construction industry were also affected due to the pandemic. The results of these two ways of evaluation tally with each other and this confirms the validity of the results.

Existing strategies used by the construction industry participants to overcome the challenges posed by the pandemic were also identified broadly. The Analysis proved that most construction organizations implement various strategies to face the challenges posed by COVID-19. Several construction companies introduced online working platforms such as Zoom® and Microsoft Teams® meetings. While many promoted the work from home concept for their executive staff, some companies provided staff transportation facilities. Few others appointed designated staff members to visit construction sites occasionally to minimize social gatherings. With respect to the labour force, strategies such as reduction of the number of workers in the sites, shift-based, and roster-based working systems, and offsite pre-fabrication systems were introduced. To eliminate project delays, some companies-maintained buffer stocks to manage material requirements. Survey participants also suggested that the measures like proper costing, estimation, and accurate forecasting of material requirements, and proper storage facilities could prevent wastages. The use of BIM designs by the construction project participants to disseminate information among relevant stakeholders was also suggested, while this could also be used to identify risks of the projects in advance.

Due to the prevailing pandemic situation in the country, physical interviews with survey participants could not be utilized as a data collection tool. Meeting research participants on their own sites was impossible and meeting them via online meeting platforms could not be done since most of the professionals experience tight working schedules. If an opportunity prevailed, physical interviews might clarify matters more clearly with more justifications. This could be highlighted as the main limitation of this study.

In conclusion, the study has vividly found the impact of the COVID-19 pandemic on the Sri Lankan construction industry, the strategies which are currently used by the companies to minimize the effects, and the effectiveness of these strategies in a descriptive manner.

The results of the study would help private and government sector organizations and future entrepreneurs to easily identify the impact of the COVID -19 pandemic on the construction industry in Sri Lanka and methods that could be used to mitigate the impact today and to lessen any detrimental effects in the future. Furthermore, novel research could be carried out to find more effective strategies which could be used by the construction industry stakeholders when facing a pandemic. Case-control studies, and simulation studies can also be explored as optimum methods for this kind of research.

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