

**COVID-19 INFLUENCES ON THE
PRODUCTIVITY OF CONSTRUCTION
PROJECTS**

LEKHA A/P S. BALAKRISHNAN

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COVID-19 INFLUENCES ON THE PRODUCTIVITY OF
CONSTRUCTION PROJECTS

by

LEKHA A/P S. BALAKRISHNAN

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Name of Student: Lekha A/P S.Balakrishnan

I hereby declare that all corrections and comments made by the supervisor(s) and examiner have been taken into consideration and rectified accordingly.

Signature:

Date : 04/08/2021

Endorsed by:

(Signature of Supervisor)

Name of Supervisor:

Assoc. Prof. Dr.

Date: Sharifah Akmam Syed Zakaria

5 August 2021

Approved by:

(Signature of Examiner)

Name of Examiner:

Assoc. Prof. Ts. Dr. Fatimah De'nan

Date: 6 August 2021

(Important Note: This form can only be forwarded to examiners for his/her approval after endorsement has been obtained from supervisor)

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COVID-19 MEMPENGARUHI PRODUKTIVITI PROJEK PEMBINAAN

ABSTRAK

Covid-19 adalah pandemik di seluruh dunia yang telah mengubah landskap ekonomi global. Wabak yang berterusan adalah penyebab utama kehilangan pekerjaan pekerja pembinaan. Kesan Covid-19 terhadap industri pembinaan dalam perspektif produktiviti dikaji dalam kajian ini. Dalam pandemik global Covid-19, industri pembinaan dan prospek ekonominya juga dipertimbangkan. Penyelidikan sekunder mengkaji pengaruh coronavirus bersama dengan faktor lain. Sampel tinjauan merangkumi lebih daripada 5 syarikat berkaitan pembinaan di Malaysia yang terdiri daripada 60 responden. Terdapat 29 soalan secara keseluruhan, dibahagikan kepada enam kategori. Eksekutif firma dihubungi melalui telefon atau WhatsApp dan diminta untuk melengkapkan soal selidik yang dikendalikan sendiri melalui platform tinjauan dalam talian. Kesan utama pandemik Covid-19 terhadap industri pembinaan dari segi perspektif produktiviti adalah tenaga kerja (kehilangan pekerjaan). Seperti yang diketengahkan oleh responden, "banyak pekerja kehilangan pekerjaan sejak pelaksanaan perintah kawalan pergerakan (MCO)". Sebilangan besar responden iaitu sekitar 53.3% orang menjawab sangat setuju dan 18.3% orang menjawab setuju untuk pernyataan ini. Aspek tenaga kerja dianggap sebagai kesan pandemik Covid-19 yang paling signifikan berdasarkan skor tertinggi dengan nilai RII 4.20. Adalah mustahak untuk membuat peraturan yang secara signifikan dapat mengurangkan kesan seperti kehilangan pekerjaan bagi pekerja, memungkinkannya bertahan dalam keadaan sukar ini dan memastikan kembali ke keadaan ekonomi yang normal.

COVID-19 INFLUENCES ON THE PRODUCTIVITY OF CONSTRUCTION PROJECTS

ABSTRACT

Covid-19 is a worldwide pandemic that has altered the global economic landscape. The ongoing epidemic is the primary cause of job losses of the construction workers. The impact of Covid-19 on the construction industry from the productivity perspective is examined in this study. In the global pandemic of Covid-19, the construction industry and its economic prospects are also considered. The secondary research examines the influence of coronavirus in conjunction with other factors. The survey sample included more than 5 construction related firms in Malaysia which consist of 60 respondents. There were 29 questions in total, divided into six categories. Firm executives were approached by phone or WhatsApp and asked to complete self-administered questionnaires via an online survey platform. The data was analysed by Microsoft Excel. The major impact of Covid-19 pandemic on the construction industry in terms of productivity perspective is manpower (job loss). As highlighted by the respondents, “many employees lost their job during this pandemic since the implementation of the movement control order (MCO)”. Most of the respondent which is around 53.3% of people answered strongly agreed and 18.3% of people agreed for this statement. Moreover, the manpower aspect was perceived as the most significant impact of Covid-19 pandemic based on the highest score with the RII value of 4.20. It is vital to enact regulations that would significantly reduce the impacts such as job losses for the workers, allowing them to survive this difficult situation and ensuring back to normal economy condition.

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LIST OF ABBREVIATIONS

FDI	Foreign Direct Investment
FEL	Front-end Loading
GCC	Gulf Cooperation Council
GDP	Gross Domestic Product
MCO	Movement Control Order
RII	Relative Important Index
SARS	Severe Acute Respiratory Syndrome
UK	United Kingdom

CHAPTER 1

INTRODUCTION

1.1 Background Study

The coronavirus (Covid-19) outbreak, dubbed a global pandemic by the World Health Organization (WHO), has become the major focus of the year, creating the uncertainty of the world's economy and disrupting the lives of many individuals, companies in a variety of sectors, financial markets, and supply chains. This novel coronavirus (Covid-19) pandemic, has posed new challenges to society, prompting people to rethink a broad range of activities, from work to recreation to simple travel and everyday tasks. Not only has this had an individual effect, but it has also had an economic impact on countries, bringing a variety of economic sectors to a complete halt.

In Wuhan city in China, Coronavirus which is known as global, this pandemic has been reported firstly in 2019 which is due to severe acute of respiratory syndrome (Construction Leadership Council, 2021). This disease does not only affect Wuhan, China but it spreads worldwide drastically whereby after some research about the coronavirus, the name Covid-19 has been discovered and the name is chosen because this virus was genetically related to the coronavirus which is responsible for the SARS outbreak in 2003 (WHO, 2020). As of April 12, 2020, data showed that over 1,780,714 confirmed cases had been found in over 210 countries (Worldometer, 2020). As a result of the current situation, the World Health Organization (WHO) declared the outbreak a pandemic on March 11, 2020 (Hansen, 2020).

This coronavirus which is known as Covid-19 disease has been one of the most trending topics in the end of year 2019 in Wuhan, China and in the year 2020 all over the world. Day by day, the Covid-19 virus develops drastically on all countries which cause very severe consequences. Generally, in terms of economy, many businesses all over the world face a direct impact due to the sudden outbreak of Covid-19. Since the main mode of transmission is currently understood to be through respiratory droplets, it is thought to spread through close contact with other people.

At the moment, the only resources available to prevent viral spread are the correct use of masks, the implementation of social distancing steps, and the practice of good hand hygiene (CDC, 2021). As the coronavirus spreads around the world, various governments have enforced and re-imposed strict lockdowns that include the closure of non-essential companies and the prohibition of non-essential gatherings in order to protect hospitals from being overrun by Covid-19 (OECD, 2021).

Economic behaviors involving human contact have been replaced by online activities, such as shopping, attending schools and colleges, and working from home, as social distancing remains the primary means of limiting the pandemic's spread (McKinsey, 2020). However, certain tasks that are critical to our community, such as construction activities are not possible to be fully performed during Covid-19 pandemic. As a result, the spread of Covid-19 has severely affected the construction industry, causing construction projects to be delayed or halted (Hussain et al., 2021). For example, according to a survey conducted by the Associated General Contractors of America (AGC), 28 percent of respondents (i.e., AGC members) reported that halted or postponed projects in the United States as a result of Covid-19 (ENR, 2020).

The construction industry has been hard hit by Covid-19 pandemic and is facing numerous challenges, including contractual commitments, resource availability, deliverables, health and safety controls, and project delays or cancellations. According to Alsharef et al. (2021), due to Covid-19 pandemic, the perception of economic change will have a major effect on the accommodation, domestic and commercial construction sectors. Since the Covid-19 is spread primarily through human contact, interactions among construction workers will be crucial during the reopening of construction projects. Especially in terms of the reality that social distancing programs aimed at preventing the spread of the virus can influence the number of construction workers permitted on the job, how these workers will perform their duties, and how project managers forecast a project's workforce.

In the construction industry, both staff and professional engineers are required to work on-site, either to conduct tasks or to ensure that the work is completed properly (Wassenaer, 2017). Construction sector differs from other industries in that it normally necessitates the participation of all project members on-site. As a result, it is important to understand how the construction industry responds to this unexpected situation (Ogunnusi *et al.*, 2020).

During the pandemic, the situation was made even worse by a lack of building materials, which had a negative effect on the construction industry (Ogunnusi *et al.*, 2020). Following the virus's spread, several countries began taking steps to limit people's travel, which has hampered development because it necessitates on-site work, because each team participant must be available to work, search, and track all work activities (Gamil and Alhagar, 2020).

Job losses are also a huge issue in the midst of the pandemic's worsening situation. During the Covid-19 crisis, millions of people have lost their jobs all over the world. All workers in the construction industry have lost their employment, and most small businesses are unable to pay wages during lockdowns (Vyas and Butakhieo, 2020). There is still lack of literature on the pandemic, especially in terms of its impacts on various aspects in the construction industry. Therefore, it is also vital to classify the effects and rate them according to their intensity (Stiles *et al.*, 2021). As a result, it is important to look at the epidemic's effects on the productivity aspects of the construction industry.

This study explores the recent literatures on Covid-19 pandemic and construction projects to analyse the impact of Covid-19 pandemic on the productivity of the construction industry. The main aim of this study is to identify the influences of Covid-19 pandemic on construction projects in the Malaysian construction industry and to analyse and measure the impacts of Covid-19 pandemic on construction projects from productivity perspectives such as money, cost, time, labour impact and shortage of supplies for construction.

1.2 Problem Statement

The Covid-19 pandemic has caused a national economic decline, in addition to the widespread health crisis. Drastic economic crisis in worldwide due to sudden outbreak of Covid-19 pandemic influences on productivity of construction projects in terms of projects implementations and delivery (Ghandour, 2020).

One of the most serious issues facing the construction industry during the Covid-19 pandemic is a lack of qualified labour. Lack of professional labour supervision is one of the essential factors impeding labour productivity, with a shortage of experienced workers a distant second, lack of construction project management experience, delay in payment of wages to labour, and inadequate communication, as well as bad weather conditions, according to a study conducted by Quezon and Ibanez (2021).

In addition, Covid-19 also lead to the restriction and reductions of construction activities at the site which cause the management of construction projects to reduce some of the project team members and postpone some of the projects. The pandemic of Covid-19 has reduced the number of activities that can be carried out at the project site (Ogunnusi *et al.*, 2020). The decline in employee numbers influences not only the time it takes to complete tasks, but also the consistency of the results. The project will take longer to complete as the workforce is reduced. In addition, the staff reduction requires the remaining employees to overwork in order to reach the deadlines (Ruiz-Torres *et al.*, 2015).

Moreover, during this pandemic, some businesses that relied on the importation of raw materials were unable to access the required production inputs (Strange, 2020). Regulations on the limitation of travelling activities are aimed at controlling the spread of Covid-19 pandemic. Many contractors were unable to import building materials which gave a big impact for construction industry due to lack of materials (Alsharif *et al.*, 2021).

Based on all these impacts, this situation shows that Covid-19 pandemic brings a huge impact on all aspects of life on a worldwide basis, especially from economic

perspectives. Based on various issues and problems that are faced by the construction industry due to Covid-19 pandemic, besides the early stage of studies on Covid-19 pandemic in relation to the activities of construction projects, this research was performed to study the Covid-19 influences on the productivity of construction projects from the perspectives of money, machines, manpower, material and time.

1.3 Research Objective

The following are research objectives for the study on Covid-19 influences on the productivity of construction projects from productivity perspectives:

- i. To identify the influences of Covid-19 pandemic on construction projects in the Malaysian construction industry.
- ii. To evaluate the impacts of Covid-19 pandemic on construction projects from productivity perspectives.

1.4 Scope of study

The effects of the Covid-19 pandemic on construction projects in the Malaysian construction industry were investigated in this report. The effects of the Covid-19 pandemic on construction projects were then assessed and calculated in terms of capital, materials, machines, time, and manpower. This study was conducted using a questionnaire survey to gather information about the views and perceptions of building projects stakeholders. Empirical data, also known as industry data, was collected from

the questionnaire survey. The data was then interpreted to provide useful results and conclusions. The main goal of this study is to figure out how to deal with economic downturns in terms of Covid-19's effect on construction projects and how people around the world deal with it.

1.5 Final Year Project Outline

This thesis is divided into five chapters and the contents for each chapter in this study are as following:

Chapter 1: This chapter covers the overview and background of this research. It gives a brief introduction about the sudden outbreak of Covid-19 and its impact on the construction industry. This chapter also describes the problem statement, research objective, and scope of the study.

Chapter 2: This chapter discusses the literature review on the influences of Covid-19 on the productivity of construction industry. Moreover, this chapter also provide explanations of the theories and research on the how the productivity of the construction industry in terms of money, material, manpower and machines are impacted.

Chapter 3: This chapter covers the methodology used to conduct this study. This chapter explains briefly about the questionnaire survey that was used to conduct this research and the content of the questionnaire.

Chapter 4: This chapter covers the outcome of the results and discussion part of this research. The experiment results obtained are elaborated further and analysed.

Chapter 5: This chapter covers the conclusion achieved from the observation and recommendations for the improvisation of this study in the future.

CHAPTER 2

LITERATURE REVIEW

2.1 The Covid-19 Outbreak

Before the name Covid-19 was identified, scientist found out that it is a main pathogen that will attack respiratory system which is known as coronavirus. In 2002 the outbreak of virus that severe acute respiratory syndrome is known as (SARS-CoV) while in 2012 the Middle East Respiratory Syndrome is known as (MERS-CoV) (Sharma et al., 2020).

This Covid-19 case is considered as a dangerous infection because it can diagnose with respiratory infection then can cause multi-organ failure as well as risk of death. This Covid-19 was first discovered in December 2019. Reports showed that around 108,837 deaths out of 1,780,714 Covid-19 cases on 12th April 2020. China is known as the main source of the spread of the coronavirus and in December there were most cases in China which is around 82,052 cases (Worldometer, 2020).

This Covid-19 infection spread from human-to-human through direct or indirect as well as whenever in contact with infected people such as via respiratory secretions or droplets which can spread when the infected person talks, cough or sneeze without covering their mouth and nose with mask (CDC, 2021) .Besides that, from some studies, it might take 5.2 days of incubation to show the symptoms of Covid-19. But it all depends on the age and immune system of the person infected with this infection (F.Stephen *et al.*, 2020)

Most of the countries reacted without any hesitation to prevent the spread of this Covid-19 outbreak with some mitigation measures such as lockdowns, business closure, application of travel bans from the most infected country and quarantine. In December 2020, the number of active Covid-19 cases was quite a lot, thus China took decision to do lockdown the whole country which consist of around 1.4 billion people especially in Wuhan, China (Altakarli, 2020). After lockdown, there were great reductions in the number of Covid-19 cases, thus other countries also implemented the decision and action of lockdown and quarantine as mitigation measures to prevent the spread of Covid-19 among people. At the beginning of the pandemic, more than 3.9 billion of people which is around half of the world's population, were under stay-at-home order (Sandford, 2020).

Thus, this scenario certainly impacted on the economy as well as all the educational system and all the works have been changed into online systems. At the beginning of the Covid-19 pandemic, which was in December 2020, there were no vaccine against coronavirus which make this infection as a dangerous global threat that cause many sectors including educational and construction system (Allain-Dupré et al., 2020)

2.2 Impact of Covid-19 on Global Economy and Construction Sector

The construction industry cannot be transformed or moved to a remote mode of operation due to its unique characteristics, making it one of the most susceptible sectors to coronavirus infection. At the same time, no decisions on a full construction ban were taken (Alandijany *et al.*, 2020), but construction work was almost completely halted in the United States, Italy, and Spain due to strict quarantine.

Some studies have been attempted to identify the impact of Covid-19 on the construction industrial sector and economy. There was drastic economic crisis in worldwide due to sudden outbreak of Covid-19 pandemic influences on productivity of construction projects in terms of money, machines, manpower, material, and time. Due to Covid-19 pandemic, there were about 30 countries that have been impacted in terms of economy and from the study, the gross domestic product (GDP) likely to be hit by 3-6% or might fall to 15% in some countries (Fernandes, 2020). These changes have impacted on the economy and also effected the productivity of construction projects. The study also highlights that in terms of economy, all the countries are negatively impacted and most of the people lost their jobs and countries that depend on the foreigner workers are most likely affected the most especially in construction sector in terms of the gross domestic product (GDP) (Jackson et al., 2020).

Another study shows that due to quick spread of Covid-19, strict restrictions have been applied by the authorities in many countries reduced the mobility of citizens which lead to shut down of many businesses and cause job loss and shortage of supplies and materials for industries (ILO, 2021b). From another perspective, from one of the studies, many sectors have been impacted negatively due to the influence of Covid-19 outbreak on the supply chain and it might take a longer time than expected to recover (Chowdhury et al., 2020).

On the other hand, this Covid-19 pandemic is one of the huge crises of the generation that not only affect one or two countries, but it affected the global economy which it may take many years to recuperate and the authorities should take precise decisions and actions to subsidize and create new strategies to prevent hardship in humankind (WEF, 2020).

Another study shows that, most of the sectors especially real estate and construction sectors have been affected hugely and the sudden declination has been recorded (Tanrıvermiş, 2020). The strict lockdown due to the spread of Covid-19 has drastically diminish the economic activities in many countries. Due to this Covid-19, the construction industry is also affected like other economic activities with no exception and there is no report on any study exclusively about the impact of the Covid-19 pandemic thus this study is mainly focused on the impact of Covid-19 pandemic on the productivity of the construction industry.

2.3 Impact of Covid-19 on the Construction Industry in Other Countries

This Covid-19 have been impacting each sector and field as it caused interruption on many major industries and businesses. One of the studies focused on the analysis of the impact of Covid-19 on the construction industry in Oman which is located at the southeaster coast of the Arabian Peninsula in Western Asia and the oldest independent state in the Arab world (Gonzalez, 2020). Oman is a country that is well known as an oil-rich producer and this country mainly focuses on oil extracts. Meanwhile, the construction industry is still considered as major contributor to Oman's economy sector. This Covid-19 has impacted the construction industry in Oman as well in many perspectives (Belwal *et al.*, 2017)

Oman is an oil-rich country, with oil and oil-related products accounting for most of its GDP. However, the building industry is a significant contributor to the country's economy. Due to the exodus of foreign employees, the Omani real estate sector and construction industry are in shambles. However, it is estimated that approximately 670 commercial property owners in Oman are suffering financially (Teck Ling *et al.*, 2020).

The key source of pressure emerged after several foreign workers left the country due to repeated government initiatives to replace them with locals (Hansen, 2020).

The Figure 2.1 below shows that based on a research in Oman, these are the main impacts of the Covid-19 on the productivity of Oman's construction industry. The study has explored how Covid-19 affected the construction industry in Oman in terms of vulnerabilities, risks, and losses (Ogunnusi *et al.*, 2020). Due to an increased in the number of Covid-19 positive cases in Oman, the whole states have been under restricted lockdown and travel ban which led to contractual problems, lack of supplies, labour border and economic impacts. The condition of expatriates in the construction sector of Oman is shown in Table 2.1:(Teck Ling and Chyong Ho, 2020)

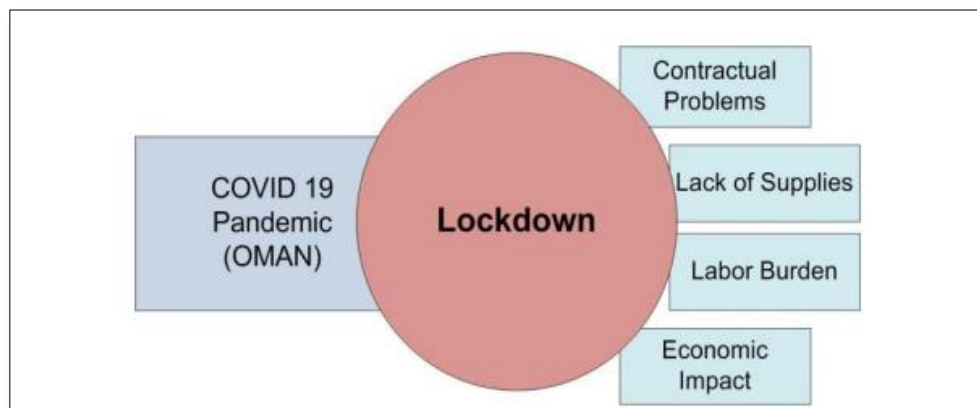


Figure 2.1 The Impact of the Covid -19 on the productivity of Construction Industry of Oman (Source: Teck Ling and Chyong Ho, 2020)

Table 2.1 below compares the numbers from January to April 2020 with those from the previous year. If countries announce further lockdown plans in the future, declines construction projects are expected to increase. The effect of this virus outbreak on the construction industry, which still suffers from project delays, will be more devastating. (Vyas and Butakhieo, 2020) investigated the effects of incidents in some Gulf Cooperation Council (GCC) countries in his recent report and according to the

report, annual accident costs in Oman are estimated to be around US \$ 415,00, with an annual economic burden exceeding US \$ 2.5 million.

Table 2.1 Number of Workers in the Construction Sector of Oman (Teck Ling and Chyong Ho, 2020)

2019		2020			
		Jan	Feb	March	April
Omanis	58793	57841	57901	57026	56505
Expatriates	490206	480108	479022	457483	454027

Despite the government's efforts to diversify the economy, the construction industry was expected to expand at a rapid pace. The construction industry is expected to expand by 6% between 2019 and 2024, according to Mordor Intelligence (2020). The sector, on the other hand, saw a 5.8% decline (Sturn, 2021). As a result, the building industry is experiencing its most difficult period as Covid-19 pandemic continues to bring challenging effects on every industry.

The rapid spread of the Covid-19 coronavirus infection across the globe poses two biggest challenges to the construction sector. The first challenge is the drop-in consumer activity as in the event of Covid-19 pandemic, the purchase of houses and properties is declining as developers might even be forced to shut down sales offices during the quarantine period (OECD, 2021). The second challenge is on the spread of coronavirus that could potentially impact the plans of construction projects to execute and complete construction projects on time (Gamil and Alhagar, 2020).

Global Data, a UK analytical firm, lowered its estimate for global construction volume growth in 2020 from 3.1 percent to 0.5 percent in April (Williams and Kayaoglu,

2020). Many countries are following this pattern of revising projections (in China, expected growth in construction volumes fell from 5.1 percent to 3.6 percent, and in Italy, from 1 percent to 0.7 percent). The following are the primary causes of the drop in construction volumes. Firstly, the agreement of developers or government bodies to halt the construction of individual projects (Elsayegh et al., 2020). Then, delays in the delivery of products and facilities as well as job displacement because of country-to-country border closures (Alsharif et al., 2021). Besides that, the termination of transportation ties - while China is the primary source of goods, Europe's labour force is made up of Eastern European countries (Anderton et al., 2021). Other than that, another reason that led to drop-in in construction industry is increased protection controls on health and safety aspects which also led to the reduction of labourers' productivity (Quezon and Ibanez, 2021). Apart from this, the contractors and supply suppliers face increased financial difficulties, even though the majority of firms are small businesses with limited stock and/or liquidity (Forsythe et al., 2020). Finally, the experts estimated that 30 percent of the European engineering and construction equipment manufacturers are on the brink of bankruptcy, with another 30 percent reducing production while in March 2020, it was anticipated that contracts in the Middle East will be reduced by 75%.

2.4 General and Adverse Influences of Covid-19 on the Construction Industry

Covid-19 influences on the construction industry have become more complex and the gathering and disseminating information on the industry's progress is important (Ogunnusi *et al.*, 2020). The following sections presents the details on Covid-19 influences.

2.4.1 Disparities Across States on Whether Construction Operations Are Essential or Non-Essential

Stay-at-home or shelter-in-place orders were issued across many states in the early months of the pandemic to avoid the spread of the novel coronavirus. A few nations, however, did not impose any such limitations. Construction businesses are considered necessary in most states; however, a few states consider construction activities to be at least partially non-essential (Alsharef et al., 2021). As a result, building activities were restricted in some states although they were not restricted in others. There was a lot of variation in the degree of restrictions among several states where construction activities were partially limited that have impacted construction companies (Araya, 2020). However, (La et al., 2020) stated that various restrictions had no effect on their projects as activities could be continued as usual, despite the implementation of a variety of new safety measures.

Due to the variation in the degree of restrictions across states, Araya (2020) stated that it was difficult to determine if a company was considered important or non-essential within the first few days as employers were unsure if they should continue their operations. In some states where the effects of Covid-19 were limited, there was still a lot of confusion on when construction would resume (Assaad and El-adaway, 2021). In addition, when Covid-19 cases increased in a particular area, new prohibitions would be imposed and the effects of Covid-19 are not limited to construction businesses only as upstream suppliers and the activities of many downstream entities were also harmed (Gamil and Alhagar, 2020). Many other sectors that support the construction industry, such as manufacturing, will suffer negative consequences (Iqbal et al., 2021). Various restrictions related to Covid-19 pandemic were crucial due to the risk of the virus spread

and its related uncertainties, besides other economic and negative effects (Zheng *et al.*, 2021). Despite these restrictions, there were organisations suggesting for the re-opening of the construction industry and to modify the content of construction businesses as being vital (Simpeh and Amoah, 2021).

2.4.2 Contractual Problems and Lack of Supplies due to Covid-19 Pandemic

The Covid-19 pandemic creates various effects in the construction industry, including the loss of manpower, a shortage of equipment, a rise in the cost of construction materials and a shift in demand (Ibn-Mohammed *et al.*, 2021). Due to the Covid-19 pandemic, it is difficult to complete most building projects on schedule and to fully comply all contract specifications (Araya, 2020). Definitely travel restrictions have impacted on the supply chain of building materials that is related to logistics especially in terms of to forecast the materials demand and supply (Nagurney, 2021). According to his research, various industries have experienced or expected delays in receiving materials and these delays tend to slow down the overall progress of project implementation and trigger major schedule disruptions. Delays were particularly noticeable when the supply chain included materials or raw materials from other countries (Tukamuhabwa *et al.*, 2017). Some building components were to be shipped from one particular location, but that the manufacturing plants in this location were closed due to the Covid-19 pandemic thus created commodity and raw material supply chain disturbances (Sarkis *et al.*, 2020).

Several upstream manufacturing units and trucking firms within the supply chain were considered non-essential even within one particular country, despite the fact that construction was deemed an essential sector in a number of states and some companies

were forced to shut down as a result of the pandemic (Uchegara et al., 2020). Material delivery delays can occur because some truck drivers are reluctant to cross state lines for fear of contracting a disease and also quarantining requirement imposed by some states (Sheffi, 2020). The social distancing and quarantining requirements imposed among the workforce within supply chain organisations can affect delivery time in a pandemic situation and projects are unable to predict the length of delays and this lead to material shortage (Brodeur, 2020).

2.4.3 Labor Burden Due to Covid-19.

According to the International Labour Organization (ILO, 2021), Covid-19 countermeasure has impacted approximately 2.7 billion jobs worldwide, or about 81 percent of the global workforce. The recession has resulted in an unprecedented drop-in economic activity and work hours: working hours are projected to drop by 6.7 percent in the second quarter of 2020, equating to 195 million full-time jobs (at 48-hour workweek). The sector is included in the list of sectors where workers are most affected by the impact of the crisis, according to the International Labour Organization's classification (ILO, 2021). Consumer demand is reduced as a result of quarantine steps, shop closures, order cancellations, and lower salaries, all of which have a direct impact on the workers' industrial sector. Furthermore, the Covid-19's negative effects trigger a shock in the proposal.

According to scholars, this is reflected in a reduction in labour supply due to a rise in mortality, malaise, and absenteeism for a variety of reasons, including its need to deal with children in school closure situations. Lower sales result from lower supply and demand, forcing businesses to take drastic steps such as pay cuts and staff dismissals

(Kabir, 2020). According to some estimates, the number of people who would be unemployed as a result of quarantine measures could hit millions in the near future. In Oman, the construction industry employs the majority of the workforce, which bears the brunt of labour shortages and unemployment (Belwal *et al.*, 2017). Due to the rapid spread of Covid-19, some countries have implemented additional checkpoints and imposed restrictions on major industrial supplies, thus some building programmes have been halted, while others have been postponed, resulting in significant financial losses (Guan *et al.*, 2020). In addition, unemployment rate would rise as a result of decreased construction activities, besides the scarcity of skilled workers in the building industry (Juricic *et al.*, 2021).

2.4.4 Economic Impact due to Covid-19

The results of the Covid-19 pandemic, unlike the situation in 2008, could be considerably worse for a variety of reasons. For starters, a crisis could have a broader effect, affecting Foreign Direct Investment (FDI) and capital spending in both developed and developing countries (OECD, 2021). Second, as a result of the enforced implementation and postponement of investment projects, the delay impact of FDI may be less important (Giroud and Ivarsson, 2020). Third, in the case of a financial market recession, businesses would be unable to meet their financial commitments, resulting in a drop in global investment flows due to the "domino effect".

Closure of commercial and industrial businesses, as well as building sites, delays the introduction of investment projects immediately (Sampson *et al.*, 2021). Some investment costs will continue to be borne by businesses (for example, fixed operating

costs), while other costs will be rejected. In Oman, the introduction of new investment ventures will most likely be delayed, and acquisitions will likely slow (Al Amri, 2021).

2.4.5 Delays in Inspections and Securing Permits

Based on the study by Biswas *et al.* (2021), there were also reports of major delays in inspections and obtaining permits. For example, one of the contractors interviewed said that there were setbacks in completing inspections and obtaining certification of work as everyone moved to the new way of working. More precisely, the contractor stated that the owner's representative was often unable to achieve the certification of finished project within the initial timeline (HSE, 2020). Owing to the difficulties and constraints of meeting in person, most inspection-related discussions had to be cancelled or postponed in several cases. There were also delays in obtaining permits from different government departments, according to the participants.

Indeed, several designers, architects, and project engineers said that government agencies lacked an effective and functional infrastructure to make such a rapid transition (McKinsey, 2020). The lack of adequate technology-related resources for these organisations as they grappled with making organisational improvements to the permitting process was also discussed. The permitting procedures were briefly halted in a few cases, according to the participants, before the government agencies were able to establish an online protocol for approving the necessary permits (OECD, 2021).

2.4.6 Suspension or Slowing of Ongoing Projects and Delay in the Start Date for New Projects

Given the widespread economic downturns and uncertainties induced by the pandemic, owners, investors, and companies were increasingly hesitant to invest in building projects and operations. As a result, a variety of programmes have been cancelled or put on hold for the time being (Brammah, 2013). McKinsey (2020) stated that many commercial property developers, in particular, are increasingly awaiting commitments from potential tenants before beginning customised construction operations.

In several other cases, study indicated that many private owners are demanding that construction activities be slowed or halted, citing financial issues with the wider market. According to one architect, the future of retail and commercial property is uncertain due to the growing number of people working, shopping, and learning online. Several of the owners were unable to finance the completion of new assets due to cash flow problems from existing properties (Alsharif et al., 2021).

On the other hand, new construction projects were particularly hard hit. Nearly 90% of projects in the Front-end Loading (FEL) process (i.e., pre-project planning) were placed on hold, according to one project engineer working for an industrial contractor (Alsharif et al., 2021). In addition, some projects that were in the bidding stage were cancelled or delayed. As a result of the pandemic, less proposals will be accepted and financed than in previous years, according to one of the participants (Giroud and Ivarsson, 2020). Owners in some cases demanded upgrades to the original design in order to improve occupancy protection. Concerns were also raised on whether design changes

would be needed in the post-pandemic environment to prepare for future events (McKinsey, 2020).

2.5 Summary

From the reviewed article, we can summarize that there are many impacts of Covid-19 to the construction industry in terms of money, machines, manpower, material, and time. Due to the suspension of the project during this Covid-19, many problems also arise such as interruption of planning and scheduling of the construction activities, time overrun, and cost overrun (Ghandour, 2020). Besides that, labour impact and job losing is also one of the impacts of Covid-19 to the construction industry. Due to restriction of movement on the work and travel ban, workers from other countries not able to cross the country border to work. Machines, and technologies also not able to import from other country for the construction activities. The shortage of materials to support the running project lead to sudden fluctuation of the material price as well (CONTRACTOR, 2021).

CHAPTER 3

METHODOLOGY

3.1 Introduction

In this chapter, the methodology utilized in the research topic is presented in detail. By following the research method as specified in this study, both problem statement can be attempted, and research objectives can be achieved. The secondary data collection, such as article, journal, thesis, news, etc. serve as the basis of understanding of the research topic. For primary data collection, a questionnaire survey was selected as the method of obtaining feedback from the survey respondents.

A questionnaire survey is considered as a prevalent and widely utilized research method for rapid and effectiveness assembling and interpreting data from a group of study. The questions were prepared based on the finding from literature reviews (adapt and adopt basis) to fulfil the objectives of this study. Survey forms were then distributed to stakeholders in the construction industry by distributing them using online platforms.

Data were statistically analysed using Microsoft Excel and presented it in the form of figures, tables, etc. In conclusion, this chapter shows how the whole study was carried out, from data collection methods to various analyses, with the focus of achieving the objectives of this study.

3.2 Flowchart of the Study

There are several phases involved in this research. Each step involved different information and various levels of knowledge to provide relevancy to this research. The flowchart of the study is shown below:

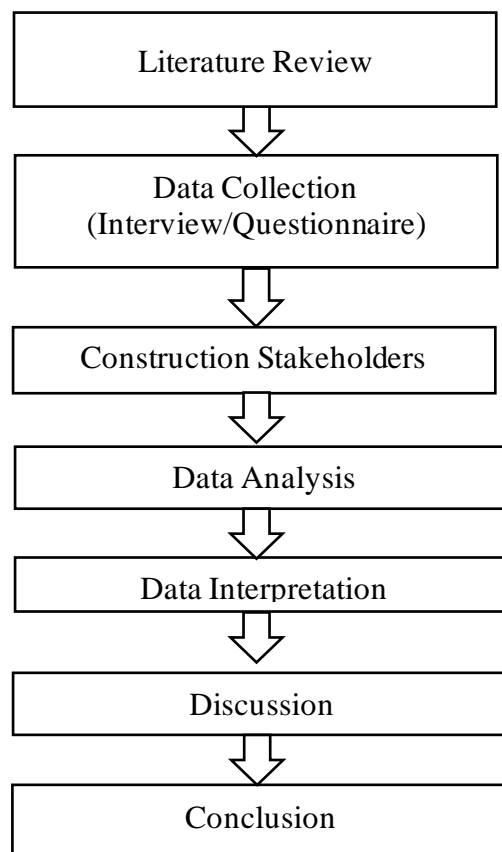


Figure 3.1 Methodology flowchart