Coping with the COVID-19 Pandemic: An Exploration of the Strategies Adopted by Construction Firms

Abstract

Purpose: The outbreak of Covid-19 pandemic has tested the resilience of the construction industry, putting the safety of workers and overall businesses at risk. This study explores the different strategies adopted by construction companies to protect the health and wellbeing of employees, security of the construction sites and projects, and keep the overall business operational amid Covid-19 pandemic.

Design/Methodology: A preliminary study that involves field study and survey research was used to collect data for the study. The results from the preliminary analysis served as inputs for constructing the questionnaire, which was analyzed using descriptive statistics, exploratory factor analysis and reliability analysis.

Findings: The results reveal that the key underlying measures put in place by construction businesses include restricted site access, support bubbling of office and site staff, enhanced hygiene and social distancing protocol, contract risk identification and mitigation, self-isolation measures and heightened construction site safety. Along with a further discussion of the underlying measures, the top-rated strategies that were adopted by construction firms are also discussed in the paper.

Originality/Value: As many construction companies remained opened handling essential projects amid the pandemic, the study presents the effective and efficient strategies that were used in ploughing through the trying times. This study provides the opportunity for construction companies that escaped early impacts of Covid-19 due to site closure and policy makers to learn from the strategies adopted by construction companies that were operational amid the pandemic.

Keywords: Coronavirus; Covid-19; Construction site; Coping strategies; Contract; Construction management; Pandemic

Introduction

On the 31st December 2019, the World Health Organization (WHO) Regional Office in China was notified of pneumonia cases of an unknown cause identified in Wuhan City, China Province of Hubei (McKibbin and Fernando, 2020). The Chinese authorities announced on January 7th, 2020 that they had discovered a novel virus identified as the causative agent for a cluster of pneumonia cases (Ghinai et al., 2020). The new virus was later identified by WHO as SARS-CoV-2 as a new type of coronavirus. Coronavirus disease 2019 (Covid-2019), caused by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), a new form of coronavirus and was reported by the WHO as a pandemic on 11 March 2020 (Li et al., 2020a). Approximately 16 million people were confirmed to have been infected and tested positive for Covid-19 as of July 26, 2020, with more than 640,000 deaths worldwide (WHO, 2020a). The local transmission of Covid-19 has been reported in many countries, and its transmission pathways and accompanied risk factors are of vital interest in controlling the pandemic. The most dangerous pattern and crucial contributor to the spread of the highly infectious disease is the work-related transmission. The characteristics and transmission patterns of the SARS-CoV-2 virus may lead to high transmission rates among workers (Lan et al., 2020). The management of Covid-19 is an emerging situation, which feeds on developing data, for instance construction activities data, to device the best course of action in responding to the pandemic. There are many parts and streams of activities to construction sites. During the Covid-19 pandemic, some frontline workers, like the healthcare, construction and groceries workers are hit the hardest by Covid-19 spread putting them at increased risk of infection. With the unchanging movement of employees, patients, vendors, health practitioners, contractors, suppliers, visitors in those industries, the hit may come as no surprise. During the pandemic, most companies around the world were expected to play major roles in their readiness and emergency response in fighting the spread of the virus. For a successful global management of the pandemic/outbreak, previous outbreak experience of construction companies will be an important piece through crucial involvement of their in-house occupational, health and safety practitioners (Fadel et al., 2020).

The 2019 coronavirus pandemic took the world by surprise and brought it to a halt.. The impacts of the Covid-19 pandemic since its first case has been undoubtedly significant, affecting virtually all sectors of the global economy (Fernandes, 2020) Construction and other businesses are all at standstill while millions of lives and jobs were lost to the ravaging pandemic. This unplanned situation greatly impacted the previously undoubted abilities of the construction industries to discharge contractual obligations and sustain their businesses. The construction business employers have additional responsibilities of ensuring that ongoing projects apply immediate and decisive measures to minimize the spread of Covid-19 in order to ensure continuity of business. In response to Covid-19 pandemic by the WHO (2020), governments around the world implemented several first-time measures. This involves but not limited to physical distancing, travel bans, large gathering bans and finally a complete lockdown enforcement where everyone stayed at home (OSHA CPL 02-00-164, 2020). Since the outbreak of the Covid-19 pandemic, construction stakeholders have struggled to understand its potential implications on projects particularly and construction businesses in general.

The pandemic is spreading around the world as at the time of this study and many construction-related matters continue to change, which affects contracting parties and their agreed terms on contracts. Many stakeholders involved in existing construction projects, reacting to the Covid-19 pandemic, issued or received force majeure claims. This leaves the stakeholders looking to embark on new construction contracts amidst the pandemic in a space of myriads of challenges of project

execution. There is an imperative need for synergy between the clients, contractors and workers in the implementation of the HSE guidelines on physical distancing for construction sites to protect all stakeholders on sites from the Covid-19 virus. For instance, on construction sites, access points, congregational/assembly areas and work zones are some of the areas where maintaining physical distancing may be difficult (Fadel et al., 2020). In the event of Covid-19 pandemic, there are challenges and difficulties in maintaining required activities and reasonable productivity levels. These changed conditions required by contracting authorities to be cognizant of these extraordinary situations or circumstances in order for construction companies to have enough time and space to put in place adequate measures against Covid-19 spread. In addition to the governmental interventions, majority of the construction industry coalitions provided plans to outline the steps that each and every employee and employers can or should take to reduce the risk of exposure to Covid-19. These plans generally outline ways to prevent workers' exposure to coronavirus, protective measure to be taken on the construction sites, personal protective equipment and work practice controls to be used, cleaning and disinfecting procedures and OSHA guidelines on what to do if a worker becomes sick, including recordkeeping requirements.

This aim of this study is to explore the different strategies adopted by the construction companies in surviving the rapidly spreading Covid-19 pandemic while doing business on and off construction sites keeping their workers safe and healthy. Whilst it is premature to investigate the impacts of such approaches taken, an understanding of the strategies employed will support the ongoing efforts of governments around the world in finding a lasting solution to the spread of Covid-19 generally in their nations and construction sites in particular. It will also assist in understanding the approach to be taken in tackling any future waves of Covid-19. The aim of the study is achieved through the following objectives:

1. Investigating the underlying strategies put in place by construction firms to mitigate the effects of Covid-19 on construction activities and business sustainability
2. Identifying top-ranked strategies deployed by construction business owners and other stakeholders in managing the Covid-19 pandemic on construction sites.

In order to adequately identify and evaluate the different strategies, guidelines and recommendations used by the construction stakeholders to properly manage the construction sites against the spread of Covid-19, quantitative analyses methods were employed in the study. In the absence of studies on strategies adopted by construction companies in managing the Covid-19 pandemic on construction sites, field studies were conducted, few available literatures on similar studies and many companies' technical and news articles were reviewed for different strategies used in avoiding Covid-19 spread. The different strategies implemented or recommended retrieved from the different sources were used in the questionnaire development to give room for comprehensive generalizability. The efficacy of the different adopted strategies to mitigate the virus transmission was explored for understanding using descriptive statistics and exploratory factor analysis. The section that followed presents the output of reviews into different sources for information on adopted strategies and their effects on mitigating transmission on sites. For the study methodology, the different stages of data sourcing, data collection, data description and justification, and data analysis were presented. Subsequently, the section was followed by the presentation and discussion of results from data analysis, and then its effect on the business of construction and its stakeholders amidst the coronavirus pandemic.

Lack of previous research studies on the topic and time constraint in obtaining data due to the initial effect of the pandemic are major limitations to the study. The future study should focus on construction industry building resilience against viruses that are highly transmissible and pathogenic so that the future effect will be minimised. Also, the data on the covid 19 virus spread on construction sites can be analyzed to determine if the deployed strategies worked. Another study could also look into the actual impact of the pandemic on project objectives: cost, schedule, quality and safety.

General guidelines and recommendations in managing Covid-19 transmission on construction sites

With some critical structures like health facilities or emergency shelters, construction activities are most likely continuing despite Covid-19 in place restrictions. It is the responsibility of those in charge of overseeing the construction site operations during the pandemic to ensure strict compliance with all set guidelines and recommendations to protect the workers and workplace against Covid-19 infection and spread. Many countries allowed construction to resume after the temporary halt with the strict condition of adherence to authorities' guidance for businesses in construction industry. The guidance incorporates the mandatory requirements for face masks with other specific requirements for all construction activities and the popular measures of social distancing, limiting gatherings, limit tool-sharing and staggering shifts. Also, in the guidance is the limits on the number of construction workers within an enclosed square footage of the project at the same time.

According to the recommendations from the WHO and International Labor Organization (ILO) for instance, based on past outbreak experiences and contingency plans by governments of the different countries, specific and imperative actions have to be taken (World Health Organization and International Labour Organization, 2018). Countries like China and Saudi Arabia took a better and rapid response, which apparently stemmed from their learnt experience since previous infectious diseases; SAR CoV in China and 2012 MERS-CoV in Saudi Arabia (Algaissi et al., 2020). Since the appearance of the Covid-19 and its impact on construction activities, there has been added twist to the project management pyramid of project cost, project schedule, project quality and employee safety. In tackling the spread of the virus at the construction sites, there need to be an expansion of the safety spectrum to accommodate new measures. Globally, project management teams are faced with myriads of project challenges where immediate and innovative solution are needed to be implemented to mitigate the risks associated with the coronavirus pandemic. In an opportunity to increase safety and welfare of workers, contractors are leveraging on innovative solutions such as the relocatable disinfecting chamber (modular walkthrough) to sanitize their workers before entering the sites (Mlynarek, 2020).

Going by the assumptions from many experts, construction business and activities will slowly return to normal months after Covid-19 was declared a pandemic by the WHO. Nevertheless, many clients and contracting business faced numerous challenges, which should be part of considerations for future projects. Some of these challenges to be considered are:

a) Establishment of new procedures, which include physical distancing, more PPE and safety procedures.
b) Creation of construction execution schedules in allowance for more man-hours to complete project activities in addition to staggering of teams and work locations.
c) Project cost increment as a result of additional requirements of safety and reduced productivity as a result of measures put in place to reduce workers on sites.

d) Increase use of technology and innovative solutions in executing some parts of the construction activities and reducing workers interference.
e) Utilization of home office and construction support staff to aid working from home and continuation of containment strategies in reducing person to person contacts.

Specific strategies, guidelines and recommendations adopted in the construction industry stakeholders in mitigating Covid-19 spread on construction sites.

In the early weeks of Covid-19 declaration as pandemic, only few countries have clarity and established clear communication on the steps to be followed at each stage of Covid-19 spread. Majority of the countries of the world were not part of them, owing to the fact that its new and transmits faster than any planned strategy at the time. In order to fight the Covid-19 pandemic, 3Cs preventive measures (**C***leanse your hands,* ***C****over face with mask and* ***C****onsider human distance*) need to be implemented by everyone at workplaces, grocery stores, restaurants, jobsites or marketplaces. In order to embrace the "new normal" in coping with the pandemic while studies are ongoing globally to stop it, incorporating the 3Cs as part of daily living is highly imperative.

Cleanse your hands

Recent studies have shown that the virus can be transmitted from people who are asymptomatic to Covid-19 as a result of the prior touching of surfaces contaminated with the virus thereafter touching their own mouth, nose and possibly their eyes. To protect workers on site against the virus, frequent and thorough cleansing of the hand have been recommended by WHO with soap and water or with alcohol-based sanitizer. Below are some of the actions that can be taken on site:

a) Frequent clearing and disinfecting of touched surfaces such as computer workstations, shared tools and equipment, machines, vehicles, handrails, ladders, doorknobs and potable toilets. The cleaning and disinfecting of frequently touched surface should be done at the start and end of every shift.
b) Limits should be placed on sharing tools on the sites if possible.
c) Proper hand hygiene practice as infection control measure. Workers should be reminded to wash their hands with soap and water for at least 20 seconds or use an alcohol-based sanitizer with at least 60% alcohol content.
d) Workers should pay attention to the following key times to clean their hands:
    i. At the start and end of work shifts and breaks.
    ii. After nose blowing, coughing or sneezing.
    iii. After using the restrooms
    iv. Before and after eating.
    v. Before and after taking off work gloves.
    vi. After putting on, touching or removing face coverings and other PPEs like hard hats, safety boots, etc.
    vii. Before donning or doffing eye or face protection (safety glasses, goggles, etc.)

Cover face with mask

The use of fabric face coverings (masks) in construction work is one of the prevention steps in the Occupational Safety and Health Administration (OSHA) guidelines applicable to the construction

industry on how to avoid the spread of COVID-19. The new guidelines explain the distinctions between face fabric coverings, surgical masks and respirators. This also warns workers not to wear surgical masks or facial cloths when breathers are needed (OSHA, 2020a). One of the recommended social protection alongside hand cleansing in the fight against Covid-19 spread is the covering the respiratory channels with facemask. In recent documented studies, it was reported that substantially high proportion of asymptomatic and slightly symptomatic Covid-19 infections are transmissible as well as the severe role of droplets from respirations and surface contaminations in spreading the virus (Chowell et al., 2003; Li et al., 2020b; Peng et al., 2020). As the pandemic rages on, the use of the facemask usually promoted in the healthcare sector as part of infection control protocol becomes a part of global recommended protective measure in breaking the transmission chain of Covid-19 (Linton et al., 2020; Sun et al., 2020; You et al., 2020; Zhou, 2020; Zou et al., 2020). Before the spate of Covid-19, face mask (respirator mask) have always been deployed as part of the PPE to workers in the construction industry to prevent them from high risk of toxic dust inhalation, which could lead to respiratory problems. It must be mentioned that the respirator mask does not offer protection against microbes (Goh et al., 2020). While airborne transmission is yet to be proven (Ong et al., 2020), Covid-19 has been reported to transmit from man to man through talking, coughing, sneezing or even breathing in aerosol droplets. The face mask has thus been proven to be an effective methods of preventing the aerosol spread of Covid-19 (Li et al., 2020a; Parry, 2020; Riou and Althaus, 2020; Shereen et al., 2020).

On construction sites, high quality face masks are especially important where workers are mostly in close contacts. This makes face coverings a critical component of the contractor's Covid-19 plans and are imperative for situations when it is extremely difficult for workers to maintain the recommended 6 feet distance apart. Due to shortage of the OSHA recommended face masks for the construction workers, the agency recommended alternatives that provide equal or greater protection in comparison to the N95 mask. These recommended alternatives are non-disposable, elastomeric powered, air purifying NIOSH-approved respirators such as N99, N100, R95, R99, R100, P95, P99 and P100 masks (OSHA, 2020b). According to a study (Konda et al., 2020a, 2020b), there exist options that have similar performance efficacy with the N95 face mask such as the doubly-layered 600 thread per inch cotton in addition to an hybrid of cotton and polyester spandex. Inasmuch as most facial coverings will help in containing the respiratory droplets, there are characteristics to look for in a face covering in order to maximize construction site safety from Covid-19. Some researchers studied the effectiveness of different masks employing flow visualization in the laboratory using laser light sheet and a mixture of distilled water and glycerin to simulate synthetic fog to make up cough-jet content. They found out that well-fitted homemade masks with multiple layers of quilting fabric, and off-the-shelf cone style masks, proved to be the most effective in reducing droplet dispersal (Verma et al., 2020).

Consider Human Distance

The COVID-19 pandemic has greatly changed the working climate, indirectly affecting gender differences, and increased risk of suicide as a result of lockdown, social isolation and economic crisis (Aldila et al., 2020). In majority of the countries where the spread of the virus triggered explosive

growth, policymakers called for physical distancing and limits on travel, widely known as lockdowns, to limit the spread of COVID-19 outbreak (WHO, 2020b). It should come as no surprise that workplaces in a pandemic like the Covid-19 pose a high risk of virus infection.

An example is the case in Korea where most of the group infections developed in a high-density and narrowly-spaced workplace where transmission is aggravated. Nationally, one of the most effective preventive strategy used by Korean authorities is social distancing alongside personal grooming, cough etiquette, open declaration of sick leave information and guidelines to reduce daily life interactions. With the higher rate of infection recorded at workplace, Korea developed and implemented workplace social distancing policy, which was instrumental in the prevention of large outbreak in their workplaces (Kim, 2020). Also, in Singapore, with the movement of Covid-19 infected people, many workers in the casino, construction, jewelry, retail, tourism and transportation industries were infected in their workplace (Koh, 2020). The government of Kenya was also quick to respond with nationwide implementation of social distancing, imposition of curfew and provision of proper PPE (availability of 24hr clean water, soap and face masks) in informal settlements with high population density like Kibera, the largest in Africa (Aluga, 2020). Unlike some other countries, country like Malaysia was not adequately prepared to fight the Covid-19 pandemic mainly because of its internal political crisis and its erroneous belief that the virus would not spread easily on its soil (Shah et al., 2020). However, the government thereafter took many actionable steps to contain the spread and protect the health of its citizenry as soon as there were records of Covid-19 cases and deaths (Majid, 2020).

Methodology

The study investigates the coping mechanisms adopted by construction firms to mitigate the impacts of Covid-19 on both construction activities and business sustainability. To carry out the studies with minimal disruption to the participants who were just readjusting to life in lockdown, and to reach out to a wider audience within a reasonably short period, quantitative approach was used in the study. In order to identify measures to be included in the data collection instrument, a review of extant literature on previous outbreaks, epidemics and pandemics were carried out. This included the review of measures put in place by construction businesses during such outbreaks as Dengue disease, “Hong Kong Flu” pandemic and the Asian Flu, most of which spread across continents including Asia, Australia, Europe and the US (Chowell et al., 2003; Liang et al., 2018).

Once the previously adopted measures were established, guidelines put in place by governments across the globe were identified to strengthen the list of established coping mechanisms. As various companies were waking to the realities of the pandemic, companies’ websites were updated to reflect measures that were put in place to weather the storm of the pandemics. These sets of measures were reviewed from companies’ website to enhance the comprehensiveness of the list of measures. The Websites of the ten top construction companies in the construction index 2020 were reviewed. In addition, informal brainstorming sessions were organized with 6 construction professionals to establish how their various companies cope with the pandemics and mitigate its impacts on construction businesses. These brainstorming sessions, according to (Field, 2013) is an effective approach for establishing variables for measuring a construct. The list of factors from the four sources, which are past occurrences, companies’ websites, governments’ guidelines and brainstorming

sessions, are then combined and rephrased to fit rating scale with duplicate measures eliminated from the list of measures as recommended by (Field, 2013).

3.1. Quantitative Data Collection

Questionnaire was used to elicit broader opinion from construction industry practitioners, using the established list of factors. The use of questionnaire allows the research instrument to reach a wider audience within a short duration (Walliman, 2019), even as many nations went into lockdown. The questionnaire was pilot tested by 4 construction professionals to ensure its adequacy, reliability and suitability for providing answers to the research questions and ensure that its wording and presentation are appropriate. Based on the comments received, appropriate modifications were made to the questionnaire which consists of the potential measures put in place by construction firms as well as the demographical information about the respondents. The questionnaire consists of three sections, with the first being the background to the study and consent information, while the last section was used to collect information relating to the participants as summarized in Table 1. The second section contained the 29 factors presented in Table 2, which were put on Likert scale, as Nunnaly and Bernstein (2017) suggest that it help in summing up the average responses of each of the participants. To know the extent to which each of the measures were implemented as COVID-19 ravages the world, the Likert scale used ranged from 1 being "not considered", 2 being "partially considered", 3 being "considered but not implemented", 4 being "partially implemented" and 5 being "fully implemented". Online questionnaire administration was preferred and selected over other means such as face-to-face, by phone or papers (Creswell, 2014) as it facilitates the research instrument to reach a wider audience within a short period. Google Form, the free to use web portal that allows questionnaire links to be shared and the responses to be exported (Zaheer et al., 2020) was used as the platform for questionnaire administration.

A probability-based surveys using a list-based sampling frame is used via the web. The invitation to take the survey was made via LinkedIn message. This is similar to Couper (2000), the list-based samples of high-coverage populations. The questionnaire link was shared through professional-facing platforms. After a series of reminders, 103 responses were received from participants from UK across different job roles and various forms of construction organizations. Other responses from other countries are insignificant and not used in the analysis. The targeted population size of 100,000 construction professionals which means 101 or more surveys are needed to have a confidence level of 95% that the real value is within ±9.75% of the measured value. Table 1 presents an overview of the respondents, including their job roles and the size of organizations.

Table 1: Demography of the Respondents

3.2. Data Analysis

The purpose of the data analysis in the study is to identify the top-rated measures as well as the underlying measures put in place by construction firms to cope with the COVID-19 pandemics and mitigate its impacts on construction business sustainability. As a result, the returned questionnaires were analyzed using Descriptive Statistics, Reliability Analysis and Factor Analysis.

3.2.1 Descriptive Statistics

Descriptive statistics as a measure of central tendency is a suitable approach for establishing the relative significance of statistical variables (Field, 2013). The purpose of descriptive statistics in this study was to establish the top measures put in place by construction business to weather the storm of COVID-19. As such, the mean and standard deviation were computed for each of the measures on the questionnaire. Based on the ranking of the Likert scale, which ranges from 1 to 5, a higher means shows the relative significance of the measures as being widely implemented by construction businesses. Table 2 shows the means and ranking of each of the variables as well as the extent to which each of the measures was adopted by construction businesses to mitigate the impacts of COVID-19 on business continuity and sustainability.

As shown in the table, the key measures put in place by the construction businesses are:

- CM4: Introduction of Hand washing facilities at entrance and on site
- CM3: Self-isolation for workers who fall ill
- CM21: Site closed to non-business visitors
- CM19: Introduction of New hygiene protocols including for personal and site cleaning
- CM12: Project rescheduling to reflect the Impacts of COVID-19 on project plan

The top measures put in place by construction firms and businesses are further elaborated in the discussion section.

3.2.2. Quantitative Data Screening and Reliability Analysis

Prior to data analysis, two responses were found to be incomplete with significant data missing. As such, they were not included in the analysis, leaving 101 responses for data analysis. The internal consistency of the data contained on the questionnaire was evaluated using Cronbach's Alpha. According to Field (2013), this is especially important when using Likert scale on a questionnaire. As Cronbach's Alpha coefficient ranges from 0 to 1, a value above 0.8 shows that the data has an excellent internal consistency (Nunnally and Bernstein, 2017). Using IBM SPSS 26, the Cronbach Alpha coefficient for this study is 0.955, which shows an excellent reliability of the data. In addition, Cronbach's Alpha if item deleted was evaluated to determine whether all items on the research instrument are contributing to the overall reliability of the data. In this instance, any of the item with a Cronbach's Alpha if item deleted above the established value of 0.955 should be removed from further analysis (Yockey, 2010). However, none of the factors has its coefficient above the overall Cronbach Alpha coefficient, indicating that all items contributed to the overall reliability. Hence, all the factors were included for further data analysis as shown in Table 2.

Table 2: Results of the Reliability Analysis and Descriptive Statistics

3.2.3. Factor Analysis

To fulfil the research objective that seeks to understand the underlying measures put in place by construction firms to mitigate the effects of Covid-19 on construction activities and business sustainability, a factor analysis was carried out. This method of statistical analysis, also known as dimension reduction, is used for replacing a large number of variables with a few interpretable underlying factors that can explain the concept (Ajayi and Oyedele, 2017). According to Taherdoost et

al. (2014), it is essential that suitability of data for factor analysis is established using a number of statistical tests, including Bartlett's test of Sphericity and Kaiser–Meyer–Olkin (KMO). Field 2013) suggests that KMO value above 0.6, from a range of 0 to 1, is considered adequate, while a Bartlett's test of Sphericity coefficient is expected to have a value of less than 0.05. With a KMO value of 0.869 and Bartlett's test of Sphericity coefficient value of 1.524 E – 244, suitability of the data for factor analysis was confirmed. Meanwhile, factor extraction and rotation could be carried out in factor analysis using different approaches, including Principal Component Analysis and Principal Axis Factoring for extraction as well as Varimax, Promax and Equamax, among others for factor rotation. As suggested by Worthington and Whittaker (2006), Principal Axis Factoring and Promax were used for factor extraction and rotation respectively as these approaches assume error in consistent with social science. In addition, this approach is confirmed to be better in recovering weak factors (Winter 2012).

The result produced six categories of measures that are put in place by construction companies to mitigate the impacts of Covid-19 on construction businesses. The six factor components extracted a total variance of 67.145% and the components named using the major themes in the factors as shown in Table 3. Using the variables contributing to the component factors, the rotated factors were labelled, with their percentage of variance and Eigen values taken as a measure of their significance. The six underlying measures that were put in place by construction firms to minimize business disruption during the Covid-19 pandemic are:

i. Restricted site access
ii. Support bubbling of office and site staff
iii. Enhanced hygiene and social distancing protocol
iv. Contract risk identification and mitigation
v. Self-isolation measures
vi. Heightened construction site safety

Table 3: Component Labelling and Its Associated Criteria

Discussion

This section discusses the findings of the study. The first section discusses the top-ranking measures that were put in place by construction businesses to mitigate the impacts of Covid-19 onsite construction activities, while the next section discusses the findings of the factor analysis.

4.1. Top Coping Measures Employed on Construction Sites

To understand the main strategies adopted by construction site to mitigate the impacts of Covid-19 on construction businesses, the top-rated measures are discussed in this section:

4.1.1 Introduction of Hand washing facilities at entrance and on site

The introduction of handwashing facilities at strategic locations on site ranked highest in this study as a crucial measure to manage the Covid-19 spread on construction sites with a mean value of 4.59. This is in line with the recommendations and guidance of WHO (2020c), which puts hand hygiene as one

of the topmost effective actions to mitigate the spread of Covid-19 virus because hands spread the virus by touching infected people and/or contaminated objects or surfaces. The adoption of frequent hand hygiene by workers as part of their day-to-day activities is crucial in the fight against the virus transmission. Hand washing removes the virus and prevents people from touching their faces with contaminated hands (WHO, 2019). Two studies on severe acute respiratory syndrome (SARS) (Seto et al., 2003) and Covid-19 (Ran et al., 2020) epidemics proved the importance of hand hygiene as highly imperative in protecting workers from getting infected. During the Covid-19 pandemic, construction site safety was in the spotlight due to the nature of work done on construction sites, which encourages more people per square meter of space. In some countries, despite construction being most affected by the coronavirus pandemic, construction projects expected to be shut down proceeded, albeit, under heightened safety requirements.

As part of site control, construction companies are responsible in ensuring safe working conditions for the employees on a project site amid the coronavirus pandemic. The need for employees to wash their hands with soap and water, or alcohol-based sanitizer helps remove viruses and toxic materials from the skin and prevent the spread of Covid-19 on the project sites (Sickbert-Bennett et al., 2005). For site employees and visitors, communication posters are placed around the construction site to explain the preventive measures that applies before entering the site, such as correct procedure for handwashing or sanitizing. Communication posters are pasted at prominent locations like the site entrances, handwashing stations, bathrooms, eating areas and high-traffic areas on construction sites for effective message.

4.1.2 Self-isolation for workers who fall ill

Running a construction business during Covid-19 pandemic comes with associated risks, which can expose the employees to the virus if not properly managed. It is the responsibility of the employer to protect its employees from harm by taking reasonable steps in protecting them from the outbreak of Covid-19. This aligns with the UK government (2021) on Covid-19 risk assessment at site, which will be very helpful in managing risks and protecting site workers from coronavirus infections.

From time to time, risk assessment should be carried out and the outcome be shared with the workers on site so that everyone is well aware of the latest information and know how to respond to it (UK government 2021). In this study, another identified key measure in mitigating virus spread is for any worker who develops the symptoms of Covid-19 on or off site to return home and self-isolate, or seek medical care in case of severe symptoms. All surfaces and tools the sick site worker may have recently touched should be cleaned and disinfected to control the risk of virus spreading. For proper isolation, the construction companies must develop and agree on a response plan, which will include room identified for safe isolation, plan for safe transfer to a health facility and agree on the plan with the healthcare provider or health department in advance (WHO, 2020c). This is in line with the UK government (2021) guidance that is supported by law from 28 September that businesses may not require a self-isolating employee to come into work. Self-isolation of 10 days is applicable to any workers who have symptoms and those that have tested positive of COVID-19.

4.1.3 Site closure to non-business visitors

Apart from maintaining of physical distancing, shifts staggering and providing hand washing facilities, another preventive measure that proved to be highly effective in stemming the spread of Covid-19 virus on the construction site is restricting visitations to only business visitors. It is highly advisable to

encourage visits via remote connection except there is no other option and when visiting, the number of visitors at a time should be limited. In the event of a required site visitation, site guidance on physical distancing, wearing face mask and the imperative need to stay hygienic should be explained to the visitors before arrival. The visitation to construction sites (where necessary) must be recorded and maintained at a minimum duration to avoid contacts with other people on the jobsite. In addition, schedules for essential services and consultants' visits should be revised to cut down on site interactions and overlap between people. As part of their responsibilities, many consultants are required to visit active construction sites and carry out inspections or similar activities there. A monitoring surveyor, a quantity surveyor, a contract administrator or a building control inspector may be common examples. The reduced ability of the consultants to adequately supervise and inspect works on sites is a big factor that has weighed heavily on them as a result of the heightened level of required site safety for all site personnel. This aligns with the UK government (2021) guidance on managing contacts where visits via remote connection/working and limiting the number of visitors at any one time are encouraged; and where essential services and contractor visits are necessary, it should be revised to reduce interaction and overlap between people.

4.1.4 Introduction of New hygiene protocols including for personal and site cleaning

One of the topmost indices used in defining people's way of life is hygiene. In the workplace, cleanliness and personal hygiene are uncompromisingly important, hence are always included in the companies' policies. This is done not just for the company's reputation but more importantly for the health and safety of the employees and visitors. In the same vein, all construction sites should be hygienic and safe for both the employees and all the essential visitors against Covid-19 infections. In following the recommendations of the various ministries of health across the globe, all jobsites are advised to implement cleaning measures of areas common to workers to help minimize the spread of Covid-19. With the outbreak of Covid-19, there is need for new hygiene protocols/standards to be maintained at site and equally important is the appointment of designated team to ensure strict compliance. There is need for clear postings or visual cues such as markings or projections on the floors, walls and interfaces indicative to workers of the safe distances and provide reminders as to when they should change PPE or wash their hands as they go through the working environment. The UK government (2021) guidance support cleaning workplace before reopening and during operation by keeping good hygiene through the working day, minimise the risk of transmission in changing rooms and showers. Also, to reduce transmission through contact with objects that come into the workplace and vehicles at the worksite.

4.1.5 Project rescheduling to reflect the Impacts of Covid-19 on project plan

While many construction companies are grappling with the well-being of their workforce at site thanks to Covid-19, many site projects are specifically hit hard with workers absenteeism, disruption in the chains of supply and waning investors' confidence taking a heavy toll. There is need for a practical schedule where incomplete works are rearranged and resources reallocated in order for the project goals to be met amid Covid-19 spread management. The unexpected Covid-19 outbreak and its adverse effects on on-going construction projects scheduling created the need for project rescheduling for business to adapt to the new normal. In responding favorably to the Covid-19 crisis, project scheduling has to happen to complete previously scheduled activities and at the same time balance the competing constraints. Being a modification to an existing schedule, project reschedule

responds to disruptions and other changes, which include some uncertainties and unpredictable factors such as issues around environment and productivities that make sticking to schedule somewhat impractical (Liu and Shih, 2009; Vieira et al., 2003). In responding to unexpected events like that of Covid-19 pandemic, project schedules are adversely affected especially the critical path activities leading to financial loss through associated project delays. In June 2020 McKinsey reported in their analysis (Banaszak et al., 2020) that $8 trillion of capital delivery is expected to continue till the end of 2020, while the industry deals with three challenges. These challenges are changing guidance and restrictions to flatten the Covid-19 curve, possibility of bankruptcy and scarcity of cash and low cash reserve as economy and markets weaken. The coronavirus pandemic has a direct and severe impact on the construction projects and to mitigate the consequences of the pandemic on project execution, series of measures that allow for flexibility on project progress are required. Many construction projects faced untold difficulties due to the outbreak of coronavirus. More difficulties are faced in the implementation of preventive measures against Covid-19 for the survival of the construction businesses. With these new realities facing the construction industry, adapting by changing project plans and rescheduling project activities are definitely the best measures for the projects to stay profitable and avoid delays. This is confirmed by respondents in their response where the factor was revealed as one of the key measures put in place by the construction companies to stem the spread of the virus at workplace.

4.2. Underlying Measures for Mitigating the Impacts of COVID-19 on Construction Businesses

Based on the six-factor components extracted and rotated from factor analysis, this section discusses the underlying measures that construction businesses are using for mitigating the impacts of COVID-19.

4.2.1 Restricted site access

Despite the diligence by different countries in fighting the Covid-19 spread, construction sites remain high vulnerability areas due to the number of people working near one another. With the various government measures to flatten the coronavirus pandemic curve, ranging from school closure to remote working and personal freedom restrictions, enormous uncertainties were created for construction companies on how to implement the set restrictions bearing in mind the different site operations. Overtime, the governmental regulations vary as the Covid-19 cases grew from voluntary stay-at-home requests to large gathering restrictions and much later, compulsory nationwide lockdown quarantines. However, sites with construction projects deemed essential for public good are allowed to open albeit under strict compliance with public health regulations to safeguard the site workers against Covid-19 infections.

It is no surprise that the highest percentage of the total variance (44.827 %) was recorded with this factor grouping (restricted site access). It consists of four stringent measure suggestions as shown in Table 3 that should be implemented as sites open to greatly slow-down the spread of coronavirus on the construction sites. ‘Restricted site access’ as a factor name was imposed on the factor grouping as all the suggested measures point to adopting site access restriction as a vital component in combating Covid-19 spread among site workers. A key contributory factor to the component is ‘site closed to non-business visitors’ followed by, ‘site closed to non-essential workers’ based on the factor loading. One of the few most effective ways to slow-down the spreading of Covid-19 virus on sites is to restrict site access to all people except the most essential and business people. With high level of necessity, construction sites need to grant access to some people as a result of their strong bearing on the

ongoing projects, those people include project owner and future user, designers, subcontractors, service suppliers' competitors, general public, public administrators, regional development agencies, and other stakeholder. The growing number of Covid-19 infection cases triggered the need to reduce the access to the site through different strategies such as remote site meeting, stepping up hygiene protocols and site access denial to non-business visitors and non-essential workers. While the effect of the site restrictions in slowing the virus progressions and limit fatalities on the project sites will take time, the short-term effect of site access restriction to non-essential people will reduce person to person contacts to the site thus reducing the virus transmission.

4.2.2 Support bubbling of office and site staff

To help combat the transmission of Covid-19, it is better to limit all social and physical interactions between workers on site, albeit it is difficult. Those interactions are highly discouraged during the coronavirus pandemic, hence there is need to create a work bubble, where close contacts are kept with only team members at work. The idea of work bubble is similar to the support bubble first implemented in New Zealand where one household can join up with another household and live as though they live under the same roof relaxing the 2-meter guidance and can touch the same things (Graham-McLay, 2020). In theory, you accept to only have interaction with a select number of people and to maintain social dissociation with all others. The idea of support bubble or "quaranteam" is to overcome quarantine fatigues by allowing people to have close interaction with a very specific and exclusive set of people (Schumaker, 2020). As always in support bubbles, workers in the same work bubble still needs to maintain good hygiene, i.e. regular handwashing, sneezing into a tissue, etc. All the team in work bubble would isolate if anyone in the bubble shows symptoms of Covid-19. In this study, this factor grouping has the second highest variance (6.254%) with four suggestions on movements in and out of construction sites as shown in Table 3. The factor name, "support bubbling of office and site staff" was imposed on the factor grouping because all the measures suggest that the site workers need to stay within their work bubbles to support each other in stemming the transmission of Covid-19 on the construction site.

In a construction site context, the support bubble should comprise of people working together in the same site or office supporting each other to get the jobs done and helping each other stay mentally stable. As a guide, people in the same team could form work bubble where distance between them can be shorter than required, but for any other person or worker from another work bubble, the distance would be the recommended 2 meters apart. For site workers in the same bubble, it is important to understand that some actions will undermine the essence of the work bubble, like taking public transport, moving between different sites or between site and office or even between different sections of the same site. Although the work bubble idea certainly comes with risks, it is important for governments to compassionately impose restrictions. The idea of work bubble is a way to balance the exposure risks to Covid-19 with the need of the construction workers for social and physical interactions, which enables healthy vulnerabilities to help workers cope with the stress associated with the pandemic.

4.2.3 Enhanced hygiene and social distancing protocols

During the onset period of the coronavirus, the mechanism of transmission was largely unknown and in the same vein, the ability to do adequate testing of the infected victims was limited. With few options in the hands of the public health officials, maintaining physical distance from one another and washing both hands were the most feasible measures to stem the spread of the virus (Parr et al.,

2020). The construction industry before the outbreak of coronavirus has as part of their mandate to prioritize health and safety of the workers at sites. With Covid-19 around, the need to improve on the hygiene level and maintain the protocols of social distancing on the construction sites became highly imperative, which is in line with the guidelines and recommendations of the public health agencies. In addition, there were implementation of social gathering restrictions, safe working distance and hygiene protocol for the common facilities such as the eating areas, toilets, etc. as measures to slow down spread on construction sites. The requirement of enhanced hygiene is extended to others like the specialist contractors that need to move between multiple sites in order to keep the site operations running.

4.2.4 Contract risk identification and mitigation

This factor grouping consists of measures to be taken to identify and mitigate contract risk associated with the outbreak of Covid-19. Contractual risk is a major factor that contractors need to consider and examine as the Covid-19 virus spreads within the construction industry. Construction companies find themselves in difficulties situation as they deal with not only the health and well-being of the workers but their contractual obligations with the different parties associated with the projects in question. How the Covid-19 pandemic should be treated under existing construction contracts has attracted myriad of commentaries and interpretations from industry experts. Much discussions have been generated since the news about the Covid-19 pandemic broke about it being a *force majeure* or not. While the unforeseeable nature of Covid-19 pandemic can pass without much debate, the party to carry the risks and loses from the delay and cost overruns will be dictated by the guiding written agreements between contracting parties. In addition to the typical risks associated with every construction project, the present impacts of Covid-19 outbreak brought with it a whole new set of unimaginable risks prior to its emergence.

As part of the measures taken, expected to reduce the construction company's losses amid the Covid-19 pandemic is assessing the contractual risks brought about by the impacts of local and international government restrictions on the construction landscape. Moreover, while navigating the pieced work of ever changing and inconsistent government orders limiting construction project operations, construction business owners must identify and manage these risks associated with the pandemic. Some of the projects risks that should be given considerations during construction project planning include, financial impacts of the pandemic, site safety, site security, disruption in supply chains, labor shortages and unanticipated project delays associated with temporary shutdown, government orders permit delays or reduced team size to comply with physical distancing requirements. It is important to say the complete reality and extent of the risks associated with the Covid-19 pandemic has not been fully comprehended.

4.2.5 Self Isolation Measures

For the fear of catastrophic economic impacts and guarantee from construction companies that work would be done safely, many countries allowed some construction projects deemed essential works to go on despite the Covid-19 outbreak. Despite this leeway from countries, some construction companies announced the closure of their sites to prevent the transmission of the coronavirus amongst site workers. However, the construction companies previously not in business remobilized to the site wherever it is safe to restart the previously ongoing projects and also where social

distancing can be effectively implemented on site to protect workers' health and safety. Some countries issued broad guidelines to construction companies in order to implement phased reopening of construction sites for businesses, which is subject to isolation orders stemming from the Covid-19 pandemic. Despite following the precautionary measures, Covid-19 infections are likely to still occur, and in the sad event of an infection on the construction site, it is critical to promptly identify and isolate the infected workers. A very important infection control measure on the construction site for a worker confirmed to be infected with Covid-19 is not to return to work and self-isolate at home. The employers are expected to communicate with affected worker in order to provide them with the needed support while in self-isolation. Employees who have been sent home must then obey the guidelines on self-isolation and not return to work until their self-isolation time has been completed and the relevant health authority and/or the employer has given their approval. If necessary, prior to returning to work, the employee must show proof of medical discharge to their immediate employer using every contact medium necessary.

4.2.6 Heightened Construction Site Safety

On construction sites, safety has always been a big challenge; however, maintaining site safety while managing Covid-19 pandemic is much more difficult. Many construction projects were forced to shutdown due to the rapid spread of Covid-19 in different countries. After several consideration, many construction projects restarted and work resumed at sites, which puts the construction companies in difficult positions/situations of protecting the workers from not just the usual safety hazards but additionally from the spread of Covid-19. Some Covid-19 guidelines were released for the handling of construction projects by some agencies like the Center for Disease Control (CDC), Occupational Safety and Health Administration (OSHA) and other state and local regulatory agencies. Construction companies rely on these guidelines in order to develop and implement frameworks around those agencies' guidelines.

5.0. Conclusion

Coping with the presence of coronavirus pandemic on a construction site is difficult, especially when there are suggestions of new and uncomfortable ways of doing the job as a measure to combat the spread of the disease. The construction industry faced an unprecedented disruption in all its activities as the Covid-19 pandemic continues to alter the operational balance of the world. The industry is caught between service assessment of essential and non-essential projects and, stakeholders' constant adjustment to implications of site opening and closure around governmental conditions and guidance, while at the same time working to keep the site operational, workers protected and businesses afloat. Based on these numerous challenges facing the construction industry, this study explores the critical strategies employed by the construction businesses in dealing with the spread of Covid-19 pandemic while managing the construction sites. This is critically essential as the construction industry is greatly affected by the new challenges from the coronavirus outbreak, hence, there is need to pursue the best way forward for business continuity amid the Covid-19 pandemic. With careful review of studies on similar outbreaks and companies published documents given the paucity of research work in this specific area of managing Covid-19 pandemic on construction sites, descriptive statistics and exploratory factor analysis were used in this study to evaluate the main strategies adopted in managing the transmission of the pandemic on construction sites.

The study suggests that restricting all available access to the construction sites can significantly reduce the spread of coronavirus among the jobsite workers. In order to achieve this, the site management have to limit jobsite access to customers and the general public or restrict access to certain work area for the business visitors and essential workers. Restricting access helps to reduce the number of people on the jobsite at a particular time. For effective implementation of the site access restrictions, strategies like teleconferencing for site meetings, enhancing the site hygiene protocols and denial of site access to non-business and non-essential people should be implemented to not only reduce person to person contacts, but to combat the spread of the disease. The study likewise suggests that the creation of work bubbles on construction sites as a way to limit unnecessary social and physical interactions between workers on the jobsites can help contain the spread of Covid-19 on site. Work bubbles are similar to the support bubbles that was successfully implemented in New Zealand to drive the Covid-19 infected people number really down. The same idea was brought to the construction workplace where interactions are accepted from very specific and exclusive set of close workers while maintaining good hygiene of regular handwashing and also putting on face masks. Apart from supporting each other in getting the job done amid coronavirus pandemic, work bubbles also help workers in the same bubble to stay stable mentally.

In addition to the other coping measures, the study suggests identification and mitigation of contract risks during the Covid-19 pandemic in imperative for the construction business to stay in operation. Since the outbreak of Covid-19, there emerged a web of risks for the construction companies and other construction industry stakeholders to deal with. Contractual risks are very important part of the risks that need to be fully identified and mitigated. In light of the contractual risks, it is vital for employers and contractors to assess their respective positions under existing and future construction projects and mitigate any risk that might arise under the construction contracts. Construction companies should review all their contracts and determine if there are possibilities of force majeure, suspension of work or stop work orders clauses that would legally back the contractors claim of project completion date extension. Project managers should also pay attention to the provisions in the contracts that grant compensations for acts of God, governmental restrictions, owner-induced suspensions, outbreaks and stop of work. Delays caused by impacts of Covid-19 pandemic could be protected under the contract's force majeure or related provision. This suggested measure encourages early discussions between the construction company and the other stakeholders, most importantly the contractors, to understand the impact of pandemics like Covid-19 on the projects and the larger businesses. Risk allocation with Covid-19 would henceforth require a very detailed review and carefully worded to deal with the known and unknown impacts of the pandemics, taking into account future construction projects.

As an important sector of the economy allowed to open while adhering to the relevant Covid-19 safety guidelines, the construction industry need to take into account safety provisions to protect the workforce and minimize the risk of spreading the infection. No matter the level of adherence to the health and safety regulations at site, there are possibilities that some of the construction workers will show Covid-19 symptoms. In such a situation, a critical infection control measure to be enforced on the jobsite would be for infected worker to return home immediately and not to return to the jobsite but follow the self-isolation guidelines. The infected worker is required to complete the self-isolation time while the employer is expected to communicate and provide needed support. Upon completion

of the self-isolation period, a proof of medical discharge is expected prior to returning to work so as not to compromise the health and safety level of the jobsite against Covid-19 transmission.

Due to the urgency of developing and implementing a framework, many construction companies relied on different guidelines from authorized agencies to develop project-centered and robust safety protocols. This is needed to combat the spread of Covid-19 disease and also to ensure a safe working condition for the workers amid the pandemic. No matter how robust a safety protocol can be, there should always be plans in place or avenues created to improve on the initial framework. This can be achieved through the provision of comprehensive Covid-centered safety training for workers, implementation of monitoring protocol to allow for audit and non-compliance correction, and analysis of acquired data to serve as impetus for further improvement of the safety framework.

This study was carried out with the aim to explore the strategies adopted by the construction companies in coping with the Covid-19 pandemic on construction sites to serve as guide for construction sites there are still temporarily closed for the fear of Covid-19 infection. It has explored the various coping strategies deployed by employers to keep workers on site safe, and the key and underlying strategies for combating the spread of Covid-19 disease have been discussed. The obvious reality is that the Covid-19 outbreak will be here longer than anticipated, and while it continues to change the world outlook, the construction industry needs to ensure that their workers, sites, projects and the businesses are secured for the duration of the Covid-19 pandemic.

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Table 1: Demography of the Respondents

	Sample size	**% of Respondents**
Profession/Job roles		
Director	5	5.0
Designer	16	15.8
Management	8	7.9
Planning	50	49.5
Craftsman	3	3.0
Technical roles	5	5.0
Others	14	13.9
TOTAL	101	100
Size of Organization		
Fewer than 20 employees	18	17.8
21 to 100 employees	29	28.7
101 to 500 employees	16	15.8
501 to 1,000 employees	14	13.9
1,001 or more employees	24	23.8
TOTAL	**101**	**100**

Table 2: Results of the Reliability Analysis and Descriptive Statistics

SN	List of Factors	Reliability Analysis		Significance Index	
		[a]Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted	Mean Value	Overall Ranking
CM1	Workers travel to site observing social distancing]	.584	.954	4.0606	15
CM2	Social distancing between workers on site	.739	.953	4.01	18
CM3	Self-isolation for workers who fall ill	.542	.954	4.4747	2
CM4	Hand washing facilities at entrance and on site	.530	.954	4.59	1
CM5	Enhanced cleaning of all site facilities	.755	.953	4.2626	7
CM6	Restricting or staggering access to site welfare facilities]	.656	.953	3.9592	19
CM7	Workers are happy to continue working on site	.525	.954	4.1313	13
CM8	Workers are clear about their responsibilities under health and safety protocols	.698	.953	4.2121	9
CM9	Some workers have self-isolated due to health concerns	.561	.954	3.6531	25
CM10	We have had labour relations difficulties	.521	.955	3.1327	29
CM11	Project management activities were being carried out away from site	.636	.953	3.9592	20
CM12	Impacts of COVID-19 on project plan were revised and changes were made to the schedule	.673	.953	4.3333	5
CM13	Relevant notices were served after contract risk analyses and the need has been identified	.753	.952	4.0408	16
CM14	Contracts were renegotiated with other parties to fairly balance the risk	.573	.954	3.5612	26
CM15	Supply chain analysis were carried out to monitor gaps or breakdowns in the chain	.714	.953	3.7755	23
CM16	New site safety management protocols were implemented	.729	.953	4.2929	6

CM17	New COVID-19 site-specific risks were established	.760	.952	4.2143	8
CM18	Remote cross-team site meetings instead of face-to-face	.643	.953	4.2	11
CM19	New hygiene protocols were introduced including for personal and site cleaning	.823	.952	4.398	4
CM20	Coronavirus free declaration (free from cough and other symptoms) being made by site workers before entering site	.610	.954	3.9388	21
CM21	Site closed to non-business visitors	.573	.954	4.4062	3
CM22	Site closed to non-essential workers	.544	.954	4.2041	10
CM23	Site workers were discouraged from taking public transport where possible	.639	.953	3.7755	22
CM24	Movement between sites were banned	.652	.953	3.3367	28
CM25	Movement between sites and offices were banned (report to office only by video/audio/email	.655	.953	3.6939	24
CM26	Where applicable, movement between different sections of the site were banned	.599	.954	3.4742	27
CM27	Deep cleaning of the site where the risk of COVID 19 is suspected	.644	.953	4.0206	17
CM28	Measures put in place to prevent access where sites are closed	.682	.953	4.134	12
CM29	Arrangement made to cancel/postpone all scheduled delivery where site closure becomes imperative	.619	.954	4.0918	14

[a] Cronbach Alpha Coefficient is 0.955 for the 29 items on the list.

Table 3: Component Labelling and Its Associated Criteria

SN	*Extracted and Rotated Components*	*Eigen Value*	*% of Variance*	*Factor Loading*
COMP – 1	***Restricted site access***	13.000	44.827	
CM – 21	Site closed to non-business visitors			.926
CM – 22	Site closed to non-essential workers			.787
CM – 18	Remote cross-team site meetings instead of face-to-face			.575
CM – 19	New hygiene protocols were introduced including for personal and site cleaning			.570
COMP – 2	***Support Bubbling of Office and Site Staff***	1.814	6.254	
CM – 24	Movement between sites were banned			.977
CM – 26	Where applicable, movement between different sections of the site were banned			.809
CM – 25	Movement between sites and offices were banned (report to office by audio/email)			.646
CM – 23	Site workers were discouraged from taking public transport where possible			.547
COMP – 3	***Enhanced Hygiene and Social Distancing Protocol***	1.647	5.679	
CM – 7	Workers are happy to continue working on site			.870
CM – 1	Workers travel to site observing social distancing			.778
CM – 5	Enhanced cleaning of all site facilities			.698
CM – 2	Social distancing between workers on site			.592
CM – 4	Hand washing facilities at entrance and on site			.584
CM – 8	Workers are clear about their responsibilities under health and safety protocols			.582
COMP – 4	***Contract Risk Identification and Mitigation***	1.142	3.939	
CM – 15	Supply chain analysis were carried out to monitor gaps or breakdowns in the chain			.775
CM – 14	Contracts were renegotiated with other parties to fairly balance the risk			.745
CM – 13	Relevant notices were served after contract risk analyses and the need has been identified			.725
COMP – 5	***Self-Isolation Measures***	1.069	3.686	
CM – 9	Some workers have self-isolated due to health concerns			.882
CM – 3	Self-isolation for workers who fall ill			.569
CM – 10	We have had labor relations difficulties			.501
COMP – 6	***Heightened Construction Site Safety***	.798	2.750	
CM – 20	Coronavirus free declaration (free from cough and other symptoms) being made by site			.608
CM – 16	New site safety management protocols were implemented			.541
CM – 17	New Covid-19 site-specific risks were established			.517