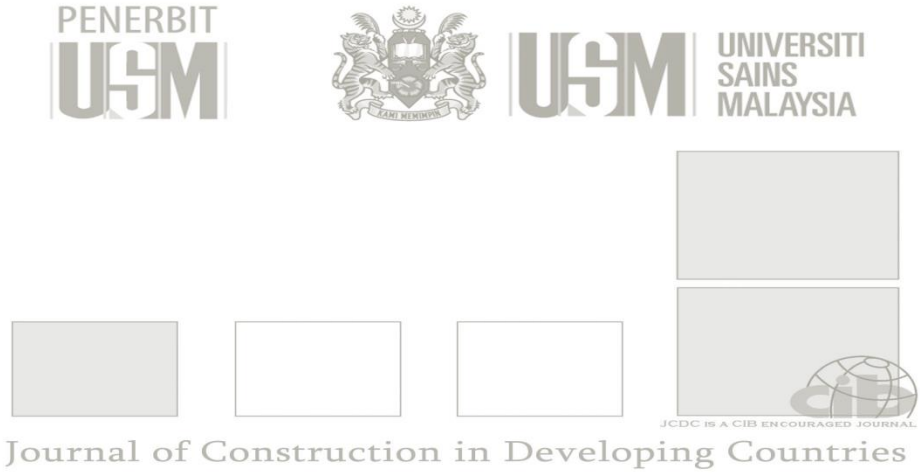

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THE IMPACT OF COVID-19 ON THE CONSTRUCTION SECTOR IN ZIMBABWE

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Abstract
The COVID-19 pandemic affected the construction industry in numerous ways. However, contextual empirical studies that enable derivation of interventions are yet to be undertaken. This study investigates the perceptions of construction professionals relative to the impact of the COVID-19 pandemic and responses on the construction sector in Zimbabwe. The study adopted a quantitative design which entailed the distribution of a web-based questionnaire among construction professionals, architects, construction/project managers, engineers, and quantity surveyors from construction and consultancy firms in Bulawayo and Harare. The data were analysed based on descriptive and inferential statistics. The results show that the COVID-19 pandemic and responses had significant effects on the construction sector. The pandemic affected the construction sector through nine (9) main pathways, the top five (5) being loss of income for workers, project implementation delays, job losses, increased health and safety risk, and project suspensions. Through identifying the main pathways in which the COVID-19 pandemic affected the construction industry, the study provides important insights to policymakers, construction stakeholders, and researchers to plan targeted interventions or policies to mitigate the effects of the pandemic on the sector. However, because of the small sample, the study results are indicative, and care should be taken when generalizing the results to a large population.

KEYWORDS: COVID-19, construction, factors, health, and safety, Zimbabwe

INTRODUCTION

The construction industry is a major contributor to the socio-economic development of a country through employment creation and infrastructure provision. In Zimbabwe, the construction industry is among the four (4) most important sectors on which national economic growth is anchored (Chinamasa, 2015). The construction industry contributes approximately 2.32% to the gross domestic product (GDP) (ZIMSTAT, 2020) and is anticipated to lead the post-coronavirus disease 19 (COVID-19) economic recovery in most countries (Stiles et al., 2021). With the COVID-19 pandemic stretching the capacity of public health infrastructure to the limit (Gbadamos et al., 2020), the construction industry is playing a vital role to fill this gap through the renovation and construction of new healthcare infrastructure. COVID-19 is an

infectious disease caused by the severe acute respiratory syndrome coronavirus (SARS-CoV-2). The virus was first detected in Wuhan, China in December 2019 (Phelan et al., 2020) and was declared a pandemic by the World Health Organisation (WHO) on 11 March 2020 (ILO, 2020). As of 22 January 2021, there were 97,613,676 confirmed cases of COVID-19, including 2,093,725 deaths globally (Johns Hopkins University [JHU], 2021). During the same period, Zimbabwe had 30,047 confirmed cases and 917 deaths (Ministry of Health and Childcare, 2021).

In response to the pandemic, several measures were put in place by governments and public health institutions globally to contain the spread and mitigate the effects of the disease. On 27 March, the President of Zimbabwe declared the first nationwide lockdown for twenty-one (21) days, effective from 30 March 2020 (The Herald, 27 March 2020). This entailed the closure of national borders, shutdown of main economic activities, restricted movement and large gatherings, and the introduction of additional public health protocols such as social distancing and hand washing. To give effect to these measures, Statutory Instrument 77 of 2020: Public Health (COVID-19 Prevention, Containment, and Treatment) Regulations was promulgated. As an important sector in the fight against COVID-19, some aspects of the construction industry, namely renovations, construction of new public health facilities, and road rehabilitation were permitted to continue operations during the pandemic.

Despite COVID-19 being a public health emergency, its effects were experienced beyond the public health boundaries. In terms of occupational health and safety (H&S), the SARS-CoV-2 is a new construction hazard (American Industrial Hygiene Association [AIHA], 2020). A significant number of COVID-19 infections have been reported at workplaces, including construction sites (AIHA, 2020; Pasco et al., 2020). Notably, the COVID-19 pandemic unprecedentedly disrupted global economies and contributed to a global economic downturn. The ripple effects from the COVID-19 pandemic led to the economic meltdown and slowed construction activities significantly. As highlighted by the International Labor Organisation (ILO, 2021), the construction sector is highly susceptible to economic cycles. The COVID-19-induced disruptions of global social and economic activities affected the world of work in a variety of ways. According to Araya (2020), COVID-19 contributed to the delay and halting of construction projects under development, shortage of labor due to quarantines, and disruption of global supply chains. During another study, the ILO (2021) observed that the COVID-19 pandemic affected construction firms, investors, construction activities, and the workforce. According to the ILO (2021), liquidity challenges will adversely affect microenterprises, while project investors will suffer from reduced profitability of investments. In addition, the pandemic contributes to a growing risk of job losses among construction workers (Khan et al., 2020; ILO, 2021). With the uncertainty created by the pandemic, investments in construction-related projects are projected to fall between 13-30% (Majumder and Biswas, 2020). In Malaysia, Esa et al. (2020) observed that construction activities faced project

suspensions and cancellations because of the shortage of materials, equipment, and parts as most of the suppliers had closed their businesses and could not deliver the requested materials on time.

The preceding discussion shows that available research, though limited, concurs that the COVID-19 pandemic has adverse effects on the construction sector. Notably, very few studies investigated the impact of COVID-19 on the construction sector in developing countries, especially those in Africa. Much of the available research studies on this subject are based on the review of the literature (Amri and Marey-Perez, 2020; Khan et al., 2020; ILO, 2020; Pathirana, 2020) and were conducted in developed countries (AIHA, 2020; Esa et al., 2020; Jallow et al., 2020; Raoufi and Fayeki, 2021). A research gap exists in understanding the impact of the pandemic in the construction sector in developing countries. To bridge this gap, this study sought to investigate the perceptions of construction professionals in Zimbabwe regarding the impact of the COVID-19 pandemic on the construction sector. To understand the impact, the study will seek to identify and rank the effects of the COVID-19 pandemic on the construction sector in Zimbabwe. This approach is informed by the United Nations Development Programme (UNDP) (2020) recommendations on the need to understand the effects of the pandemic. By identifying the main pathways through which the COVID-19 pandemic affected the construction industry, the study provides important insights to policymakers, construction stakeholders and researchers to plan targeted interventions or policies to mitigate the effects of the pandemic on the sector.

The research paper has four sections. The first section provides the introduction and background of the problem under investigation. The second section presents the theoretical background of the study. The methodology is presented in the third section, followed by a presentation and discussion of the research findings. The last section presents the conclusions and recommendations emanating from the study.

THE REVIEW OF RELATED LITERATURE

This section will provide the theoretical background of the study as follows: The first part will present the state of the construction industry in Zimbabwe, followed by the background of the COVID-19 pandemic, and the last section will consider the impact of COVID-19 on the construction sector.

The Zimbabwe construction sector

The construction industry is pivotal to ensuring Zimbabwe's economic growth. The construction industry is a key industry, providing shelter and infrastructure to facilitate commerce and socio-economic activities. Chinamasa (2015) contends that the construction sector, *inter alia*, anchors national economic growth in Zimbabwe. The construction industry plays a pivotal role in driving the economy through implementing projects in the housing, aviation, water, power and road development sectors. At its peak, the construction industry contributed 20% of the national labor force in 1996 (Ruzivo Trust, 2013). The

construction industry in Zimbabwe is dominated by indigenous small to medium-sized firms. According to Ruzivo Trust (2013), approximately 60% of the contractors are indigenous and 40% are large foreign contractors. Because of the diplomatic stand-off between Zimbabwe and Europe, most of the international contractors on government infrastructure projects are from China. The public sector is a major financier of the construction sector through loans, joint ventures, mortgages and direct budgetary support (Chinamasa, 2015). Despite the reduced construction activity from 2000 to 2008, the construction industry benefited from some modicum of economic stabilization during the tenure of the Government of National Unity (GNU) (2009-2012) and contributed significantly to the economic growth of the nation (Chinamasa, 2015).

However, with a deteriorating economic environment which culminated in a contraction of 6.5% in 2019 (UNDP, 2020), the construction industry's contribution to employment and the GDP has been on a downward trend. Industrial capacity utilization in the sector dropped to less than 10% (Government of Zimbabwe [GoZ] 2013), and contribution to wage (paid) employment stands at 5.3% (ZimStat, 2019). Chinamasa (2015) attributes the poor performance in the construction sector to limited financing, low fiscal space for capital development programmes, and little external capital flows. In addition, the construction industry also suffers from other notable performance deficits such as skills flight (Chigara and Mangore, 2012; Saungweme, 2011), low uptake of technology and equipment (Ruzivo Trust, 2013), declining productivity (Chigara and Moyo, 2014), and a poor H&S performance (Chigara and Smallwood, 2019). The COVID-19 pandemic would make it even harder for the construction sector to address existing problems and register growth.

The implications of covid-19 and responses on the construction sector

The COVID-19 pandemic is a new and unprecedented phenomenon, and studies investigating the implications of the COVID-19 pandemic on the construction sector remain limited. COVID-19 is an infectious disease transmitted through two main ways: airborne exposure pathways and surface exposure pathways (AIHA, 2020) where transmission occurs directly through coming in close contact (within 2m) with an infected person and indirectly through contact with a surface that has recently been contaminated with respiratory droplets (Workplace Health and Safety Queensland, 2020; WHO, 2020b). Previous studies have shown that the SARS-CoV-2 is transmitted at workplaces, including the construction sites. According to the AIHA (2020), the primary source of construction exposures is virus particles present in droplets and aerosols shed by infected individuals on the job site. Notably, both asymptomatic and symptomatic people can transmit the virus (AIHA, 2020). According to the WHO (2020), the spectrum of infection with the virus can range from people with very mild non-respiratory symptoms to severe acute respiratory illness. The ILO (2020) reveals that people with underlying health

conditions and individuals above 60 years are believed to be at a higher risk of developing a serious illness.

In addition to the public health concern, the available literature shows that COVID-19 has significantly affected various aspects of construction. In a qualitative survey of eight (8) construction practitioners from housing projects in Malaysia, Esa et al. (2020) established that the key effects of responses to COVID-19 include increased H&S, increase in the cost of development, increase in the completion time of projects, human resources, and resource availability. The primary cost drivers are related to the COVID-19 protocols such as cost of COVID-19 kits, the cost of appointing a COVID-19 H&S officer, providing workers' transportation, and hygiene protocols and accessories. Regarding time, the primary drivers were related to delays in handing over the project, delays in delivery of materials, and rescheduling of works. In terms of human resource issues limited workers, low productivity, workers' expertise, worker layoff or termination were the primary drivers. In terms of resource availability, the primary drivers were limited availability of materials and plant on the market and site, and the limited availability of skilled workers (Esa et al., 2020).

In Sri Lanka, Pathirana (2020) used literature analysis and observational evidence to investigate the impact of the COVID-19 pandemic on the construction industry. The major effects identified include challenges experienced by contractors to pay wages for their workers and challenges in the supply of construction materials from the international and local markets because of restrictions imposed on movements. During another qualitative survey of construction organisations in North America to determine the strategies that can be adopted by the construction sector to cope with the pandemic, Raoufi and Fayeki (2021) observed that the construction sector was affected by the COVID-19 pandemic in many aspects of its operations, which include a shortage of specialized labor and key personnel of projects during the pandemic and dynamic changes of the construction work environment. The authors argue that many construction firms are struggling to cope with the economic challenges, such as disruption, reduced investment and government spending on construction because of the uncertainty created by the pandemic.

Ogunnusi et al. (2020) conducted a global study involving 16 countries selected from Africa, Asia, Australia, Europe, and North America using an online questionnaire survey in which 71 responses were received. A total of 85.9% of the respondents believe the pandemic affected them between a moderate to a severe extent while the main pathways were through the partial or full suspension or stoppage of projects (Ogunnusi et al., 2020). In Jordan, Bsisu (2020) used a questionnaire-based survey to investigate the opinion of engineers to establish the impact of the COVID-19 pandemic on engineers and the construction sector. The key findings of the study included potential loss of employment among engineers, legal implications because of delays,

and negative financial effects for construction firms. The study has shown that 31.8% of engineers who worked from home during the COVID-19 lockdown reported a decrease in productivity while 51.8% of the engineers believe some engineers might lose their jobs because of the COVID-19 pandemic.

During another study, Jallow et al. (2020) investigated the impact of COVID-19 on construction in the United Kingdom (UK) based on five (5) interviews with respondents. The results showed that the pandemic is making the management of projects difficult as the staff are working from home. Working from home affected the management team's ability to coordinate the project team, thereby contributing to delays in project activities. The disruption of supply chains and labour markets affected the supply of materials, talent, and skills required to complete the project. The results of Jallow et al.'s (2020) study are supported by another literature-based study conducted by Amri and Marey-Perez (2020) in Oman which showed that the COVID-19 pandemic contributed to a drop in economic activity and working time, project delays, and job losses.

In another study, Gamil and Alhagar (2020) used a sequential mixed-method approach to understand the effect of COVID-19 pandemic on the construction industry's survival through the lens of construction experts and practitioners. The results of their study show that the most prominent effects of COVID-19 are the suspension of projects, labour impact and job loss, time overrun, cost overrun, and financial implications. In Nigeria, Osuizugbo (2020) adopted a qualitative approach among built environment professionals and identified the impact in terms of disruptions in the construction industry. The primary disruptions arising from the COVID-19 pandemic include transportation problem for materials and workers, project abandonment, delay in construction activities, high cost of construction materials, reduction in working hours per day, lack of funding, and shortage of workforce. Osuizugbo (2020) noted that the lockdown regulations made it difficult for workers to move while the macro-economic effects of the COVID-19 pandemic affected the ability of clients to finance projects subsequent to the lifting of lockdown regulations. The lockdown affected the supply of materials as manufacturers had to shut down and this pushed the cost of construction materials up (Osuizugbo, 2020).

Contributing a book chapter, Majumder and Biswas (2020) identified the impact of COVID-19 on construction as including project delays in relation to completion and handover, cost escalation risk, high risk of exposure to COVID-19, labor market disruptions, and fall in productivity or output of the construction sector. The study reported that in the USA, millions of people have filed for the unemployment benefit for the disruption of COVID-19. The study also observed the construction sector is facing problems such as a shortage of construction materials, and the high cost of such materials and equipment. This leads to slower project completion or cancelled projects because of production challenges experienced in the exporting countries such as China and Italy, among others (Majumder and Biswas, 2020).

The ILO (2021) produced a sectoral technical paper on the impact of COVID-19 on the construction sector. The major highlights of the technical paper are that the construction industry is susceptible to economic cycles, and thus the adverse economic swings of COVID-19 will adversely affect the construction sector in a variety of ways. Notably, the COVID-19 pandemic will increase the H&S risk in construction and threaten jobs. The pandemic has also affected the construction firms extensively, with many facing liquidity problems. This is attributed to reduced spending and consumption capacity, operating restrictions, and fear of contagion. The ILO highlights that some firms, especially SMEs, may face bankruptcy if the disruptions continue. Disruptions in global supply chains because of the COVID-19 pandemic also affect project timelines and costs, resulting in delays and cost overruns. This has affected the supply of plant, equipment, materials, and labor. The pandemic affected investors in construction projects as delays in project delivery affected project profitability (ILO, 2021).

From the foregoing discussions, the effects of the COVID-19 pandemic on the construction sector are summarized in Table 1:

Table 1: Impact of COVID-19 on the construction sector

Aspect	Specific Impacts	Authors
Labour-related impacts	Increased H&S risks	Majumder and Biswas (2020); ILO, (2021); Stiles et al. (2020), AIHA, 2020; Koh, 2020
	Loss of employment /labour impact and job loss	Amri and Marey-Perez (2020); Bsisu (2020); Gamil and Alhagar (2020); (ILO, 2021)
	Loss of income	Gamil and Alhagar (2020); Pathirana (2020)
Construction activities / operations-related impacts	Increase in cost of development	Esa et al. (2020); Gamil and Alhagar (2020); (ILO, 2021); Majumder and Biswas (2020); Osuizugbo (2020)
	Project implementation delays	Amri and Marey-Perez (2020); Esa et al. (2020); Jallow et al. (2020); Gamil and Alhagar (2020); ILO (2021); Majumder and Biswas (2020); Osuizugbo (2020)
	Project suspensions /abandonment/ cancelled projects (partially or fully stopped)	Gamil and Alhagar (2020); Majumder and Biswas (2020); Ogunnusi et al. (2020); Osuizugbo (2020)
	Fall in productivity or output of the construction sector.	Majumder and Biswas (2020)
Financial and legal impacts	Legal implications due to delays	Bsisu (2020)
	Negative financial effects for construction firms and project owners/investors	Bsisu (2020); Gamil and Alhagar (2020); ILO (2021)

The previous studies raised pertinent issues regarding the impact of the COVID-19 pandemic on the construction sector. However, a significant number of the studies are reviews, commentaries or editorials. Nevertheless, insights from construction industry stakeholders are very limited. Secondly, the majority of the reviewed studies emerged from the developed world. This study therefore

seeks to extend the knowledge from earlier studies by adopting a questionnaire survey to gather the opinions of construction professionals in Zimbabwe regarding the impact of the COVID-19 pandemic on the construction industry in Zimbabwe.

RESEARCH METHOD

A quantitative survey design was adopted which entailed the distribution of a web-based survey among construction professionals in the disciplines of Architecture, Civil Engineering, Construction H&S Management, Construction/Project Management, and Quantity Surveying from construction and consultant firms from Bulawayo and Harare. The quantitative survey design was adopted because it is a long-established approach in construction management research methods (Dainty, 2008) and capable of providing a quantitative description of attitudes or opinions of a population by studying a sample of that population (Creswell and Creswell, 2018). On the other hand, Bulawayo and Harare were selected because the two cities host the headquarters of most of the construction and consultant firms in Zimbabwe (Chigara and Smallwood, 2019).

Population and sample

The study sought to include all the contractors listed in categories A, B, and C (medium to large) (67) of the Construction Industry Federation of Zimbabwe (CIFOZ) 2020 database, and consultants, namely architects (54), quantity surveyors (22), and engineers (43). Given the small study population, the study adopted a census approach. The 2020 database of professional bodies, namely the Institute of Architects Zimbabwe (IAZ), Zimbabwe Association of Consulting Engineers (ZACE), and Zimbabwe Institute of Quantity Surveyors (ZIQS) provided the details of the registered professionals. Notably, construction project managers do not have a standalone association in Zimbabwe; using some standard forms of contract provisions, an architect, engineer, or quantity surveyor can assume the role of a construction project manager as a principal agent. Thus, respondents from consultant firms selected to respond as either architects, construction project managers, engineers, or quantity surveyors.

Questionnaire design and administration

A web-based survey was used to collect primary data for the study from construction professionals, namely architects, construction health and safety officers, construction project managers, engineers, and quantity surveyors selected from construction and consultant firms. Although on-line surveys are associated with a low response rate (O'Leary, 2017), their adoption was convenient given the restrictions imposed on movement because of the COVID-19 pandemic. Notably, online surveys have low administration costs and offer flexibility in terms of how questions are displayed (O'Leary, 2017). The questionnaire was divided into two sections: Section A collected respondents' demographic and socio-economic data such as designation, education, gender, and work experience. Section B comprised closed-ended questions

where respondents were asked to rate, on a five-point Likert scale, the extent to which the COVID-19 pandemic and responses affected the construction sector in Zimbabwe. The five-point Likert scale measurement applied to the questions was defined as follows: 1 = not at all, 2 = minor, 3 = moderate, 4 = near major, and 5 = major. A five-point Likert scale was utilised because of its ability to maintain the response categories meaningful to respondents (Losby and Wetmore, 2012).

To improve the quality of the research instrument, five construction experts were purposively selected from industry (3) and academia (2) to review the questionnaire relative to (a) the aspects of construction that were affected by COVID-19 pandemic, and (b) the ability of the questions to generate the type of information they are required to collect. The selection criteria for the experts required that they have (a) at least 10 years' working experience in the construction-related field and (b) hold a minimum of a master's degree in any of the disciplines of Architecture, Civil Engineering, Construction/Project Management, or Quantity Surveying. This criterion resonates with Feil and Khan's (2015) attributes of a construction expert as someone with least a bachelor's degree, more than 10 years' working experience in the industry, and aged above 30 years old. The feedback from the experts in terms of the above aspects was incorporated into the final version of the questionnaire. The refined/modified questionnaire, designed on SurveyMonkey, was then distributed via email and platforms of construction professionals with a web link to a survey embedded for easy access. The survey was open between 25 November 2020 to 15 December 2020 and gentle reminders were sent to respondents after two weeks from the date on which the survey was distributed.

Data analysis

The data were analysed with the help of the Statistical Package for Social Scientists (SPSS) version 24 through descriptive and inferential statistics. Descriptive statistical analysis was performed to compute measures of central tendency in the form of mean scores (MSs) to facilitate the ranking of the impacts. As espoused by Raoufi and Fayeki (2021), ranking facilitates identifying the most significant effects/impact which are important to develop recommendations for controlling and mitigating the effects of the pandemic on the construction industry. The MSs were used to denote the impact level and rank the impact. As suggested by Ikediashi et al. (2012), a midpoint score / benchmark of 3.00 [(1+2+3+4+5)/5 = 3)] was used to identify significant effects/impacts. The effects/impacts with MSs ≥ 3.00 are considered significant (Ikediashi et al., 2012). The MSs were interpreted following the guidelines of Smallwood (2020) where "≥ 1.00 ≤ 1.80" = minor to near minor; "> 1.80 ≤ 2.60" = minor to a near minor/near minor extent; "> 2.60 ≤ 3.40" = near minor to a moderate/moderate extent; "> 3.40 ≤ 4.20" = moderate to a near major/near major extent; and "> 4.20 ≤ 5.00" = near major to a major/major extent. Where two or more factors had the same MS, the standard deviation was used to facilitate rank differentiation (Doloi et al., 2012).

The Shapiro-Wilk test for normality for samples more than fifty (50) was also undertaken and a significant result, namely sig. value of 0.042 which is less than 0.05, indicated that the data was not normally distributed (Ghasemi and Zahediasl, 2012). The result supports the use of non-parametric tests for testing significant differences due to demographic variables. Significant differences due to demographic variables were examined utilising non-parametric tests. Blumberg et al. (2008) define the Mann-Whitney U test as a test for comparing the central tendency of two (2) independent samples and in this case, gender. Kothari (2009) defines the Kruskal-Wallis one-way analysis of variance as a test that is used to test the null hypothesis that more than two (2) independent random samples come from identical universes against the alternative hypothesis that their means are not equal. This test was used for testing significant differences due to designation, educational levels and experience. The statistical significance level for both tests is based on a standard value of $p < 0.05$.

RESULTS AND DISCUSSIONS

Sample stratum and response rate

From the 186 questionnaires distributed, 55 questionnaires were returned, which represents a 29.6% response rate. Notably, the response rate resonates with previous studies (Akintoye and Fitzgerald, 2000) which showed that the response rate for questionnaire surveys in the construction industry ranges between 20 to 30%. The actual responses received (55 questionnaires) exceed the minimum threshold of 30 respondents (O'Leary, 2017) for data to be considered sufficient for statistical analysis. Therefore, the response rate is considered adequate for statistical analysis. Considering the demographic and socio-economic characteristics of the respondents such as experience, designation, and qualifications, the results are valuable and provide important insights which can inform policy and practice to reduce the impact of the pandemic on the sector. Table 2 presents the demographic profile of the respondents:

Table 2: Demographic profile of respondents

Characteristic	Description	Frequency	Percent (%)
Gender	Male	43	78.2
	Female	12	21.8
	Total	**55**	**100**
Educational background	Bachelor's degree	28	50.9
	Master's degree	21	38.2
	Higher national diploma	2	3.6
	National diploma	4	7.3
	Total	**55**	**100**
Organisation	Architects	5	9.1
	Contractors	21	38.2

	Engineers	9	16.4
	Project managers	8	14.5
	Quantity surveyors	12	21.8
	Total	**55**	**100**
Respondent's profession/ Designation	Director/Partner /Chief executive officer	7	12.7
	Project manager	18	32.7
	Health and safety officer/Manager	2	3.6
	Quantity surveyor	16	29.1
	Architect	3	5.5
	Engineer	9	16.4
	Total	**55**	**100**
Number of years working in the construction industry	0 - 5 Years	11	20.0
	6 -10 Years	20	36.4
	11 - 15 Years	17	30.9
	> 15 Years	7	12.7
	Total	**55**	**100**

The demographic analysis shows that most respondents were males (78.9%) while female respondents made up 21.2%. The gap between male and female respondents resonates with the results of the ZimStat (2019) survey which showed that women make up 11.8% of wage/paid employment in the non-agricultural sector. In terms of educational qualifications, the analysis shows that 50.9% of the respondents had an honours degree, followed by 38.2% with a master's degree, 7.3% a national diploma, and 3.6% with a higher national diploma. Regarding the designation, 32.7% of the respondents were project or construction managers followed by quantity surveyors (29.1%), and engineers (16.4%). The respondents were selected from contractors (38.8%), and consultants: Architects (9.1%), engineers (16.4%), project managers (14.5%), and quantity surveyors (21.8%).

Impact of the COVID-19 on the construction industry in Zimbabwe

Table 3 indicates the extent to which the COVID-19 pandemic and responses affected the construction sector in terms of percentage responses to a scale of 1 (not at all) to 5 (major extent), and an MS ranging between 1.00 and 5.00, the midpoint score being 3.00.

Table 3: Impact of COVID-19 on the construction sector in Zimbabwe

Nature of effect/impact	MS	Std. dev.	Rank
Loss of income to workers during the period of lockdown	4.80	0.65	1
Project implementation delays	4.67	0.79	2
Increased rate of unemployment/job losses	4.55	0.81	3
Increased the H&S risk in the industry	4.33	1.06	4
Project suspensions	4.31	0.88	5
Reduced labour productivity and construction output	4.20	0.87	6
Increased cost of delivering projects	4.09	0.91	7

Negative financial effect (e.g. reduced profitability)	3.91	1.08	8
Increase in disputes, litigation, and claims	3.13	1.17	9
Reduced project quality	2.46	0.98	10

Notes: MS = Mean score, Std. dev. = Standard deviation.

Notably, the MSs for 9/10 (90.0%) of the aspects through which the COVID-19 pandemic affects construction are above the midpoint score of 3.00, which shows that the COVID-19 pandemic and responses have a major as opposed to minor effect on construction. The MS for 'reduced project quality' is less than the midpoint score of 3.00, which shows that COVID-19 had a minor impact as opposed to a major impact on project quality.

The section below will discuss the results along a three-cluster framework, namely the 'labor-related impacts', 'construction operations related impacts', and 'financial and legal impacts'. This approach resonates with and is informed by the work of the ILO (2021) and Jallow et al. (2020) and helps to trace the pathways through which the pandemic affected the construction sector.

LABOUR-RELATED IMPACTS

The labour-related impact of COVID-19 includes loss of income, unemployment/job losses, and increased H&S risk.

Loss of income

The results suggest that loss of income (MS = 4.80) was the main impact of COVID-19 and responses on the construction industry. For an industry that does not have a culture of advance payments, the lockdown regulations and suspension of projects affected the contractors' financial cash flows, which subsequently affected their ability to pay workers' salaries/wages timeously and in full during the pandemic. In addition, the fall in purchasing power of the Zimbabwe dollar, a currency used to pay salaries, also contributed to a reduced amount of income for workers. This finding confirms past studies which established that some contractors, especially small enterprises (Gamil and Alhagar, 2020; Pathirana, 2020) could not pay salaries during lockdowns. In addition, the results also resonate with the findings of a study conducted by the ZimStat (2020) which established that 31% of wage earners had a lower income compared to before the pandemic.

Job losses

During this study, job losses (MS = 4.55) emerged as the third rated impact of COVID-19 on the construction industry. The possible explanation for job losses among construction workers includes project suspension, restrictions on the number of workers required on site, and the inability of construction operations to be conducted remotely. The results confirm the ZimStat (2020) evaluation showing a drop in wage employment from 42% to 38% between April and July 2020. As highlighted by Alsharef et al. (2021), the cash flow challenges experienced by contractors and subcontractors necessitate the furloughs and

layoffs as the businesses cannot make the payroll. The study results are consistent with past studies showing that the COVID-19 pandemic contributed to a labor market retreat across all industries and occupations (Khan et al., 2020) and a significant loss of jobs among construction workers (Gamil and Alhagar, 2020). Previous studies contend that the stay-at-home directives make it near impossible for non-essential workers who cannot work from home to retain their jobs (Khan et al., 2020).

Increased H&S risk

The results show that the pandemic increased the H&S risk (MS = 4.33) in the construction industry. The COVID-19 pandemic introduced a new H&S risk to an existing array of risks in the construction industry. Introducing COVID-19 in an already high-risk industry makes the delivery of H&S in construction a complex activity. Apart from the biological risk posed by COVID-19, the uncertainty associated with returning to work for construction workers can contribute to psychological stress and anxiety among workers. Nonetheless, the results confirm past studies (AIHA, 2020; Majumder and Biswas, 2020; ILO, 2021; Stiles et al., 2021; Chigara and Moyo, 2021) which showed that COVID-19 introduced a new H&S risk in the construction sector. Equally important is the emerging evidence which shows that COVID-19 is transmissible through workplaces (AIHA, 2020) and that the construction sector has experienced a high rate of infection (Stiles et al., 2021). Although some vaccines to prevent the spread of the COVID-19 disease are emerging, their distribution may take some time while the new variants of the coronavirus may exacerbate the problem. Thus, the new and increased occupational risks call upon stakeholders to take action to protect the H&S of workers. The intensification of preventive initiatives such as risk assessment should be prioritized to protect workers from being exposed to the COVID-19 specific and general H&S risks.

CONSTRUCTION OPERATIONS RELATED IMPACTS

The results show that the COVID-19 pandemic has had adverse effects on project parameters through project implementation delays, reduction in labor productivity and construction output, and increase in project cost. However, the results suggest that the COVID-19 pandemic and responses had a minor to moderate/moderate effect on project quality.

Project implementation delay

The results indicate that the COVID-19 pandemic contributed to project implementation delays (MS = 4.67) between a near major to a major/major extent. The measures introduced to limit the spread of COVID-19 such as lockdowns disrupted operations at construction sites and these disruptions affected project implementation. At a global level, the lockdown measures disrupted supply chains for materials, plant, and equipment. At a national level, the lockdown affected labor movement and the supply of construction materials. Although some construction activities such as road rehabilitation, modernisation, and retrofitting of health infrastructure continued operations during the pandemic, most construction activities were suspended during the

full lockdown period. This adversely affected project implementation programmes and significantly delayed projects against their pre-COVID-19 programmes. Although the drivers of the delays may vary from country to country, the occurrence of delays was reported in other countries. In the USA, Alsharef et al. (2021) observed that the COVID-19 slowed ongoing projects and delayed the start date for new projects. In India, Majumder, and Biswas (2020) reported that projects were delayed by a minimum of two to three months. As reported in previous studies, the drivers of delay range from investors' financial challenges (Alsharef et al., 2021), the inability of the project management team to coordinate project teams effectively (Jallow et al., 2020), and disruptions in supply chains (ILO, 2021; Majumder and Biswas, 2020; Osuizugbo, 2020). Moreover, the project implementation delays may contribute to disputes, litigations, and claims. The results highlight the need for parties to the contract to agree on a rescheduled programme of works that takes into account COVID-19 H&S working protocols.

Project suspension

The research findings show that the COVID-19 pandemic and response measures contributed to project suspension (MS = 4.31) to between a near major to a major/major extent. The results reflect on the partial and total suspension of projects because of the COVID-19 pandemic. Notably, non-essential construction operations were temporarily suspended during the lockdown period. However, the uncertainty created by the pandemic and the financial shocks from the COVID-19 leading to economic contraction also affected the ability of some investors to finance their projects. In Nigeria, Osuizugbo (2020) and Ogunnusi et al. (2020) established that the pandemic contributed to partial or total suspension of projects and sometimes abandonment or cancellation of projects. Majumder and Biswas (2020) indicated that investment in construction-related projects was reduced to between 13 to 30% on account of the COVID-19 pandemic. With government's focus being directed towards COVID-19 containment and mitigation measures, public sector investment diminished. Osuizugbo (2020) contended that clients are finding it difficult to fund resumption of projects after the initial suspension in line with the lockdown regulations.

Reduced productivity

The results show that the COVID-19 pandemic and responses contributed to a fall in productivity or construction output (MS = 4.20). The COVID-19 pandemic disrupted the traditional methods of working on construction sites, affecting labour productivity and construction output. The changes include new H&S measures, remote work, and staggering of work shifts. This finding is consistent with a previous study in the USA (Alsharef et al., 2021) which reported a COVID-19-induced fall in productivity in the construction industry. In Jordan, Bsisu (2020) reported that work-at-home arrangements contributed to a reduced productivity among 30% of engineers who took part in the survey. Confirming a COVID-19 induced fall in productivity, Alsharef et al. (2021) identified delays in supply of materials, inspection delays, and shortage of materials on the local

market as some of the factors contributing to diminished labor productivity. The results call for a revisit of the methods of construction, construction material production, and procurement systems. The pandemic has shown how the fragility of supply chains as a result of the pandemic can cripple downstream activities that depend on imported materials and products.

Increase in cost of development

The results show the pandemic contributed to an increase in project costs (MS = 4.09) between a moderate to a near major/near major extent. The possible explanation for this factor includes the introduction of new H&S protocols such as additional personal protective equipment (PPE), frequent disinfection of workplaces, and COVID-19 testing. Given that these additional requirements were not part of the original budget, the effect on cost is negative. In addition, disruptions of global and national supply chains in terms of material supply resulted in shortages of some materials, thereby putting pressure on the prices of the materials to go up, increasing the cost of the project. During a previous study, Majumder and Biswas (2020) reported that contractors and developers who rely on material and equipment imports from China experienced higher costs of such materials and equipment. This confirms the observations of the ILO (2021) and Osuizugbo (2020). However, an increase in project cost may force clients to suspend construction projects. Therefore, a major implication of this finding calls for the need to find an amicable way to apportion the extra costs arising from the effects of the pandemic among project stakeholders under the contractual agreement.

FINANCIAL AND LEGAL IMPACTS

The results show that the COVID-19 pandemic had financial and legal ramifications on contractors and investors.

Negative financial effect

Another way in which the pandemic affected the construction industry was through threatening the profitability on projects (MS = 3.91). The pandemic had a negative financial effect on construction firms and investors/owners. The increase in the cost of implementing projects, delays in project completion, payment delays, and project suspensions exerted an unexpected revenue and financial shock on construction firms and clients. The financial shocks from the pandemic and the additional costs to implement COVID-19 H&S provisions had a significant effect on contractors' cash flows (Raoufi and Fayeki, 2021) and some small to medium enterprises (SMEs) face the risk of bankruptcy if the disruptions continue (ILO, 2021). In an industry characterised by razor-thin profit margins, an additional cost where there is no additional support from the other stakeholders such as clients will reduce contractors' profit levels. The lack of new private or public sector investment in the sector is likely to aggravate the problem. Investors are also affected by the financial shocks from the pandemic with delays in completion dates likely to jeopardise project profitability (ILO, 2021).

Increase in disputes, litigations, and claims

The research findings show that the COVID-19 pandemic contributed to an increase in contractual disputes, litigations, and claims (MS = 3.13) between a minor to a moderate/moderate extent. The non-performance of contract provisions may trigger disputes between parties to a contract such as contractor and client, and between investor and future tenant. However, because of the novelty of COVID-19, several interpretations proffered regarding how to manage non-performance of contractual obligations because of COVID-19 are not converging. There is no agreement among construction law experts regarding whether to invoke the 'force majeure' clause. The inconsistency in interpreting contractual clauses is a cause for concern, and a potential trigger of disputes, litigations, and claims. As summarized by Bsisu (2020), legal implications because of delays in project implementation are expected despite a section for unforeseen events as an acceptable cause for delays in the contracts. Noting this challenge, the ILO (2021) recommended the need to include general contractual provisions and legal principles excusing liability for non-performance (force majeure), and other provisions that make contractual provisions that allow for adjustments in time and financial resources.

Overall, these results show that the COVID-19 pandemic and responses had a significant impact on the Zimbabwean construction industry. The pandemic affected the industry through nine (9) aspects, namely loss of income to workers, project implementation delays, increased unemployment rate/job losses, increased H&S risk, project suspensions, reduced labor productivity and construction output, increased cost of delivering projects, negative financial effect (reduced profitability), and increase in disputes, litigation, and claims. The pandemic impacts were experienced at various levels such as project, worker, construction firm, and investor levels. An important observation emerging from this study is that the COVID-19 pandemic exacerbated underlying weaknesses in the construction sector in Zimbabwe. Previous studies reported performance deficits in terms of cost overruns (Chigara et al., 2013), persistent health and safety problems (Chigara and Smallwood, 2019; Moyo et al., 2015), poor productivity management (Chigara and Moyo, 2014), project schedule overruns (Chigara and Mangore, 2012), and decent work and people-centred management challenges (Moyo et al., 2019). In addition, the results further exposed the challenges of overreliance on imported materials and products. Thus, the intensification of these deficiencies has strong ramifications for the economy, given the importance of the sector in promoting economic growth. As highlighted by Majumder and Biswas (2020), a fall in productivity or construction output causes a further shrinking of the overall economic activity. Given that some aspects of construction qualify under essential services, the results provide important insights to policy makers relative to what action they require to enhance productivity in a healthy, safe, and efficient way during and after the COVID-19 pandemic. The need to intensify preventive initiatives such as risk assessment at workplaces and

alternative methods of construction that enhance productivity while protecting jobs, and the H&S of workers cannot be overstated.

Significant differences due to demographic variables

The Mann-Whitney U tests and Kruskal-Wallis test were conducted to explore the consistency of opinion of the different professionals sampled on the impact of COVID-19 on the construction sector in Zimbabwe. The results of the Mann-Whitney U tests and Kruskal-Wallis test show that there was no statistically significant difference in the aggregated ranking of impacts concerning gender (0.705), designation (0.809) and educational levels (0.414) since their p-values were > 0.05. Males have a lower ranking of 27.57 compared to a females' higher rank of 29.54. This implies that males view COVID-19 pandemic and responses as less significant than female respondents. Architects have the lowest rank value of 22.17 whilst project managers have the highest ranking with a mean rank value of 31.97. Health and safety managers have a second highest ranking with a mean rank value of 29.00 and the third highest ranking are quantity surveyors with a mean rank value of 27.59. Directors and civil engineers are third and fourth ranking with mean ranks values of 26.64 and 23.56 respectively. These results imply that architects view the COVID-19 pandemic and responses as less significant whilst project managers regard the COVID-19 pandemic and response as more significant. Respondents with a higher national diploma have a lower rank value of 14.50 whilst those with a national diploma have the highest ranking with a mean rank value of 37.13. Respondents with an honours degree have a second highest ranking with a mean rank value of 28.48 while the third highest ranking value is a master's degree with a mean rank value of 26.90. This implies that respondents with a higher national diploma view the COVID-19 pandemic and responses as less significant whilst those with national diplomas view the COVID-19 pandemic and response as more significant. Holistic interventions are supported by the results showing consistent insights from respondents regardless of their demographic differences.

CONCLUSIONS AND RECOMMENDATIONS

The study sought to determine the impact of the COVID-19 pandemic and responses on the construction sector in Zimbabwe. The results show that the COVID-19 pandemic and responses had significant effects on the construction sector. The pandemic affected the construction sector through nine (9) main dimensions/pathways, the main five (5) being loss of income for workers, project implementation delays, job losses, increased H&S risk, and project suspensions. Notably, the pandemic has adverse effects on constructions firms, investors, construction activities, and workforce alike. The results reveal the multi-dimensional nature of the impact of COVID-19 on the construction sector, which calls for a multi-stakeholder approach to implement both short-term and long-term interventions to address the current problems. Notably, the COVID-19 pandemic exacerbated the deficiencies in the construction sector in terms of health and safety, project delays, project cost overruns, and

reduced productivity which negatively impact on the performance of the industry and its ability to contribute to economic growth. Therefore, the construction sector needs to revisit its methods of construction to ensure resilience in the face of the current pandemic and any possible future pandemics.

The study has the following implications for policy and practice: First, loss of income, a growing rate of unemployment, and increased exposure to H&S risk can drag workers and their families into an intergenerational poverty trap. This calls for policy and economic support to the construction sector to save jobs and protect workers' health, safety and well-being. There is a need for the intensification of risk assessment initiatives to prevent and reduce the impact of the pandemic on workers. The additional costs involved call for other stakeholders such as clients to provide budgetary support. Second, poor project performance in terms of delays, cost-overruns, and fall in productivity affects business viability and the economy. This calls for the construction sector to introspect on construction methods and to adopt alternative methods that increase productivity while protecting jobs and workers' health and safety. The COVID-19 pandemic has also put to the test the strategy of relying on imported construction materials on projects. In the long term, there is a need for government to support local manufacturers of construction materials to ensure self-reliance in the face of a pandemic. The relative consensus from the demographic variables of respondents is fundamental. However, males and construction professionals that rarely work on construction sites need to have a better understanding of COVID-19 and its impacts. Added to these, those with diplomas need their awareness levels on COVID-19 to be raised.

The study had the following limitations: First, the low response rate requires a cautious approach when generalising the results to a large population. Nonetheless, the study provided important exploratory evidence that can inform practice and further research. The socio-economic characteristics of the respondents such as experience in the industry, designation, and qualification suggest that the quality of responses can be considered to be highly reliable. Second, the current study investigated the overall impact of the pandemic on the construction sector based on the perceptions of a selected category of respondents, namely construction professionals, and excluded other equally important stakeholders such as workers and clients. To ensure a holistic view, future studies should incorporate the perspectives of workers and clients, and compare these to those of the construction professionals. Furthermore, a future study could investigate the impact of the pandemic in any of the identified pathways through which the pandemic affected the construction sector.

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