

Original article

PROJECT PERFORMANCE IN THE GLOBAL CONSTRUCTION INDUSTRY DURING THE COVID-19 ERA

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Received: 13 February 2023

Revised: 14 March 2023

Accepted: 7 April 2023

Abstract: The Covid-19 global pandemic has had profound impact on the way all industries operate now, and the construction industry is no exception. Given the importance of this industry in providing critical infrastructure needed to enhance the quality of life of all global citizens, this paper presented the results of a systematic review of empirical studies that have investigated construction project performance over the Covid-19 era spanning from 2020 to 2023. The Systematic Quantitative Assessment Technique was used to identify and assess 54 empirical articles from six of the most renowned academic publishers in order to answer three important research questions: 1) What was the geographical spread of construction project performance articles from 2020-2023? 2) Which data collection methods were utilized by these articles? 3) What themes were investigated by these articles? The review revealed that Asia had the most representation while South America had no representation at all, thus representing a geographical gap which future studies should address. The review also revealed that most studies relied on surveys to collect project performance data with relatively fewer studies using qualitative methods or adopting a mixed methods approach, with this representing a methodological gap to be addressed by future studies. Finally, the impact of the Covid-19 pandemic on the performance of construction firms was the most investigated theme, while the strategies firms can use to 'future proof' themselves against future pandemics or other unexpected disasters was the least investigated theme.

Keywords: Construction industry; Project performance; Covid-19 pandemic; Systematic review.

1. INTRODUCTION

Critical physical infrastructures remain non-negotiable components of enhancing the quality of life of all citizens across the globe (Grady et al., 2021). The construction industry is tasked with the important duty of providing these infrastructures at the highest quality possible and within agreed-upon budgetary and time parameters (Rosado et al., 2022). However, the global construction industry has

historically struggled to deliver projects within established time and cost parameters and this has been an issue of concern for scholars and practitioners for decades (Azmi et al., 2022). According to Changali et al. (2015), 98% of mega projects are delivered 30% above budget while 77% are delivered 40% behind schedule. Several factors have been identified for the staggering inefficiency of the global construction industry such as poor risk management practices (Bahamid et al., 2022),

weak organizational structures (Suleiman, 2022), poor communication among construction project team members (Gamil & Abd Rahman, 2022), improper forecasting (Abdel-Monem et al., 2022), delays in cash flow (Patel et al., 2022) and weak technical competencies (Kampamba et al., 2022).

In late 2019 and throughout 2020, the Covid-19 global pandemic caused tremendous disruptions in all socio-economic activities and put tremendous strain on existing physical infrastructures while leading to huge demands in additional infrastructure particularly in the healthcare sector around the world (Camacho & Antonio, 2022). These increased demands placed tremendous pressure on the global construction industry requiring them to not only renovate existing infrastructures but to produce new infrastructures in record time contrary to their previous spotty record in delivery quality projects as at when due and within budget (Ma, 2022).

It is against this backdrop that this paper decided it was worthwhile to provide a systematic quantitative assessment of peer-reviewed articles on construction project performance during these turbulent three years that will forever be known as the Covid-19 era. The objective of the review was to understand the geographic spread of these articles on

construction project performance during this era, the data collection methods used by these articles and the themes investigated by them. The understanding of these three aspects of construction project performance articles during the Covid-19 era would also lead to the identification of significant research gaps which can serve as the foundation of future research on project performance in the global construction industry.

The rest of the paper proceeds as follows: First, the methodology used to conduct the systematic review is presented. This is followed by a presentation and discussion of the findings of the review and the paper ends with a conclusion.

2. METHODOLOGY

In conducting a systematic review of construction project performance articles during the Covid-19 era (2020-2022), this paper adapted an abbreviated version of the Systematic Quantitative Assessment Technique (SQAT) developed by Pickering and Byrne (2014). This technique was selected because it provides a straightforward five-step process for conducting systematic reviews which is easily replicated by other scholars. This five-step process and how it was applied in this paper is presented in Table 1.

Table 1: Application of SQAT methodology

S/N	Step	Application in paper
1.	Define topic	Project performance in the global construction industry (PPGCI) during the Covid-19 era, 2020-2023.
2.	Formulate research questions	1. What was the geographical spread of PPGCI articles from 2020-2023? 2. Which data collection methods were utilized by PPGCI articles from 2020-2023? 3. What themes were investigated by PPGCI articles from 2020-2023?
3.	Identify keywords	“Covid-19” + “construction”
4.	Identify and search databases	1. Google Scholar served as the main database used to search for PPGCI articles 2. English language articles that included in their titles the phrases “Covid-19” and “construction” published between 2020 and 2023 were explored. 3. Only original peer-reviewed empirical articles published by six of the most prominent academic publishers were utilized to ensure quality (Emerald, Elsevier, Sage, Springer, Taylor and Francis and Wiley). 4. 54 PPGCI articles out of the 164 found met the selection criteria for this paper.
5.	Read and assess articles	1. Article abstracts were initially read to ensure that they were dealing with project performance in the construction industry during the Covid-19 global pandemic 2. The selected articles were read in full in order to obtain answers to the paper’s three research questions.

Table 2 presents the number of articles found and selected for each of the six academic publishers utilized for this systematic review of PPGCI articles.

Table 2: Articles found and selected per publisher

S/N	Publisher	Articles found	Articles selected
1.	Emerald	43	28
2.	Elsevier	35	10
3.	Sage	8	2
4.	Springer	45	3
5.	Taylor and Francis	29	11
6.	Wiley	4	0
		164	54

3. FINDINGS AND DISCUSSION

3.1 Geographic distribution of PPGCI articles during the Covid-19 era, 2020-2023

Table 3 shows that 21 different countries were represented by 50 of the 54 PPGCI articles reviewed, while the remaining four articles adopted a multi-country perspective. In terms of individual country representation, Nigeria had the most representation with eight articles, followed by the United Kingdom with five, and then Ghana and India with four articles each.

The remaining countries had either three or few articles representing them. Only four of the 56 articles reviewed provided a multi-country perspective on the impact of Covid-19 on construction project performance and this represents an important research gap which future PPGCI studies can address. Comparing Covid-19 challenges and resilience strategies among construction firms in different countries allows for the diffusion of construction project management best practices which can lead to improvement in project performance across the countries compared.

Table 3: Country distribution of PPGCI articles reviewed

S/N	Country	No.	Articles
1.	Nigeria	8	Alara, 2021; Ebekoziem & Aigbavboa, 2021; Ebekoziem et al., 2021; Kukoyi et al., 2022; Oladimeji, 2022; Olukolajo, et al., 2022; Onubi et al., 2022; Oni et al., 2023
2.	Multi-country	6	; Ahmed et al., 2022; Ogunnusi et al., 2021; Raouifi & Fayek, 2021; Rokooei et al., 2022; Uddin et al., 2022; Waheeb et al., 2022
3.	United Kingdom	5	Jones et al., 2022; Osunsanmi et al., 2022; Salami et al., 2022; Salami et al., 2023; Stride et al., 2023
4.	Ghana	4	Agyekum et al., 2022; Amoah et al., 2022; Boamah et al., 2022; Simpeh et al., 2022
5.	India	4	Cherian & Arun, 2022; Farooq et al., 2022; Jha, 2021; Mahasuar, 2023
6.	China	3	Duan et al., 2023; Wang et al., 2022; Yan & Li, 2022
7.	Malaysia	3	Gamil et al., 2022; Olanrewaju et al., 2021; Tan & Abdul-Samad, 2022
8.	South Africa	3	Amoah & Simpeh, 2021; Aigbavboa et al., 2022; Simpeh & Amoah, 2022
9.	Australia	2	Shoostarian et al., 2022; Sutterby et al., 2023
10.	Indonesia	2	Oey and Lim, 2021; Wijyaningtyas et al., 2022
11.	Saudi Arabia	2	Alhammadi, 2022; Almohassen et al., 2023
12.	Turkey	2	Gumusburun Ayalp & Çivici, 2022; Tekin, 2022
13.	Czech Republic	1	Nový & Nováková, 2022
14.	Egypt	1	Youssef et al., 2023
15.	Iraq	1	Al-Mhdawi et al., 2023
16.	Kuwait	1	Soliman et al., 2022;
17.	Singapore	1	Gan and Koh, 2021
18.	Sri Lanka	1	Niroshana et al., 2022
19.	Thailand	1	Artpairin & Pinmanee, 2022

20.	United Arab Emirates	1	Sami Ur Rehman et al., 2022
21.	United States of America	1	Nnaji et al., 2022
22.	Zimbabwe	1	Chigara & Moro, 2022

Figure 1 presents a continental perspective on the geographical spread of the 50 PPGCI articles that adopted a single-country perspective. Asia had a significant representation with 20 out of the 50 articles collecting Covid-19 related construction project performance data from the continent. Africa was a second with 17 articles, followed by Europe with 8 and Oceania with 2. North America had only one representative, while South America had no representation in this review and this represents an important research gap which future studies should address, particularly considering that the Covid-19 pandemic was global in scope and

affected all construction sectors regardless of continent, and also considering that the Brazilian construction industry alone was worth \$73.9 billion in 2021 (Mordor Intelligence, 2022). It is possible to argue that this lack of South American representation by the PPGCI articles reviewed in this paper is due to the fact that only English articles were included in this systematic review and none of the 12 sovereign countries in the continent have English as their *lingua franca*. However, this argument loses its potency when one considers that Asia had the largest representation and most Asian countries also do not have English as their *lingua franca*.

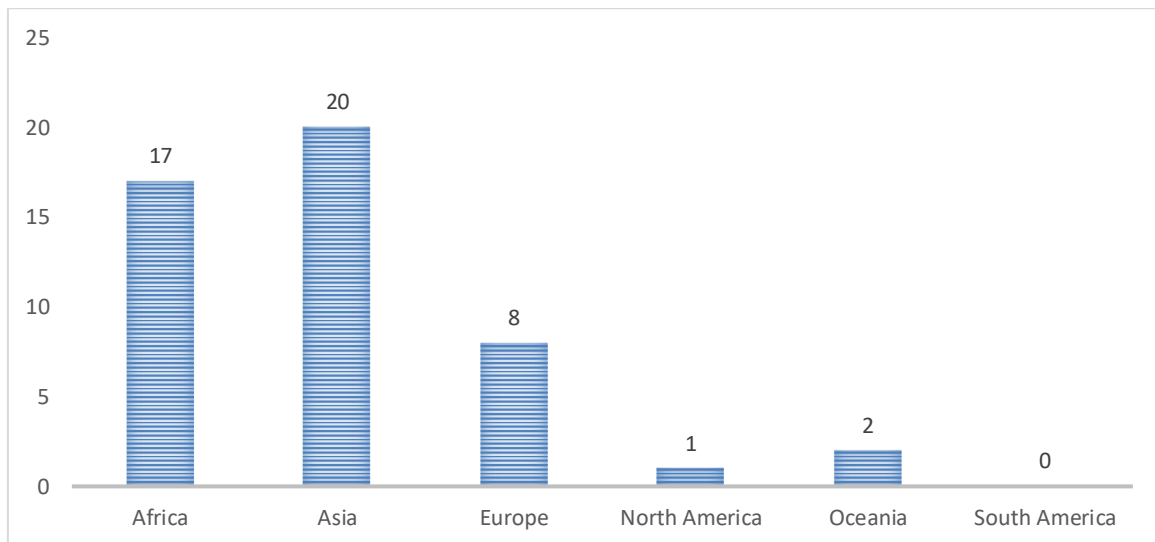


Figure 1: Geographical spread of PPGCI articles by continent

3.2 Data collection methods utilized by PPGCI articles during the Covid-19 era, 2020-2023

Figure 2 indicates that the majority of PPGCI articles (51%, 29 out of 54) reviewed in this paper relied on surveys to collect data. Interviews were a distant second (21%, 12 out of 54) in terms of popularity as a source of data while mixed methods were used by eight of the articles reviewed; the remaining five articles

relied on content analysis to collect data. These findings reveal a heavy quantitative bias by extant PPGCI articles which implies that the in-depth insights about the extent to which Covid-19 affected construction project performance that can be obtained using qualitative data collection methods have not been fully explored and this serves as a research gap which future scholars should address.

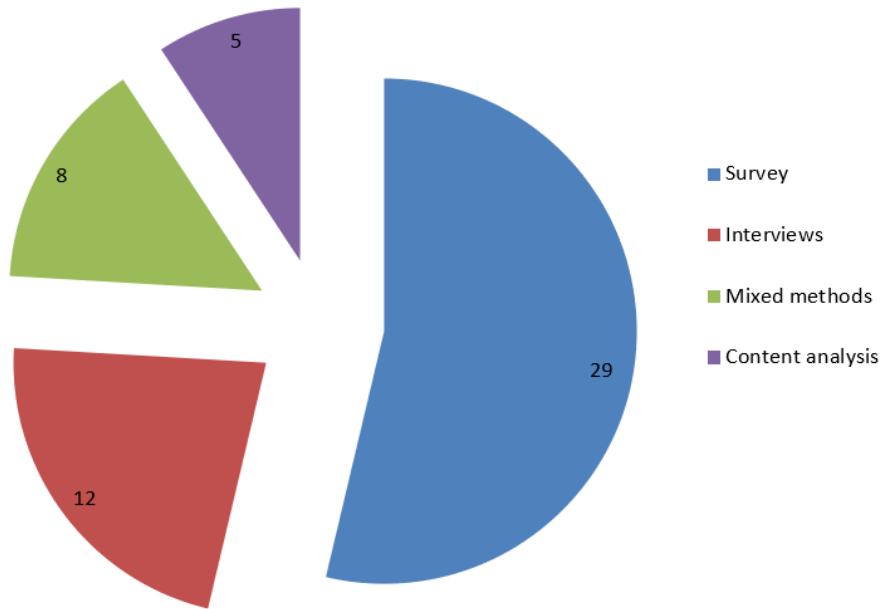


Figure 2: PPGCI data collection methods

Another methodological research gap revealed by Figure 2 is that relatively few PPGCI scholars have taken advantage of the robustness of a mixed methods approach to data collection which allows researchers to gain “breadth and depth in understanding and corroboration, while compensating for the inherent weaknesses of using each approach separately” (Javed, 2022).

3.3 Themes investigated by PPGCI articles during the Covid-19 era, 2020-2022

A critical analysis of the 54 PPGCI articles reviewed in this paper revealed that four distinct PP themes were investigated, and these are presented in Figure 3.

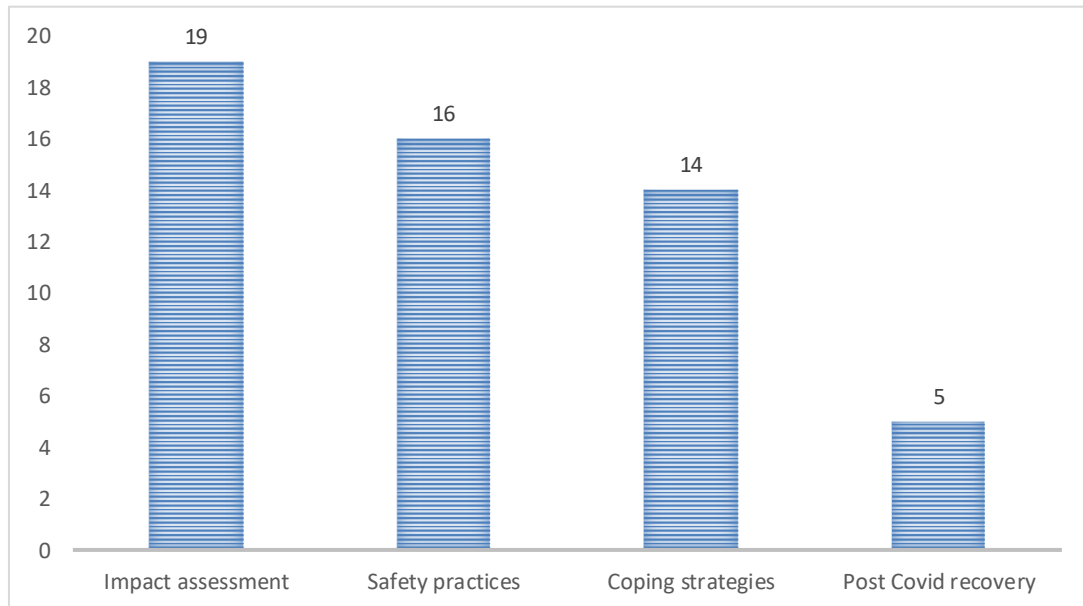


Figure 3: PP themes

The most investigated theme was ‘impact assessment’ which involved studies seeking to determine the different ways in which Covid-

19 impacted the regular operations of construction firms. There was scholarly consensus among all 19 articles in this theme

that Covid-19 had a significant negative impact on project performance in the construction industry, with the main impacts being reduced worker productivity (Al-Mhdawi et al., 2023; Oni et al., 2023; Wijayaningtyas et al., 2022), scarcity and cost increases of building materials due to supply chain disruptions (Alhammadi, 2022; Farooq et al., 2022; Gumusburun Ayalp & Çivici, 2022) and poor cash flows due to scarcity of construction projects during the pandemic (Oladimeji, 2022; Sami Ur Rehman et al., 2022; Tekin, 2022).

The second most common theme was an investigation into the safety practices that construction firms across the globe had to institute either proactively or due to government regulations to keep workers safe and mitigate the transmission of the disease. The most commonly utilized safety measures included the provision of personal protective equipment for the workers (Alara, 2021; Amoah & Simpeh, 2021; Olanrewaju et al., 2021), educating workers about Covid-19 (Agyekum et al., 2022; Chigara & Moyo, 2022; Kukoyi et al., 2022), ensuring physical and social distancing on the construction site (Gan & Koh, 2021; Nnaji et al., 2022; Olukolajo et al., 2022), daily sanitization of construction equipment and work sites (Chigara & Moyo, 2022; Onubi et al., 2022; Simpeh & Amoah, 2022) and staggering start times, break times and finish times to avoid congestion on sites (Nnaji et al., 2022; Onubi et al., 2022; Simpeh & Amoah, 2023)

Once construction firms ensured that workers were protected as much as possible from the Covid-19 virus, the next issue was to develop strategies to continue construction activities amidst the safety restrictions put in place, and that was the focus of 14 of the 54 articles reviewed in this study. Four distinct coping strategies were identified, with the most prevalent being construction firms collaborating with one another to share expertise, building materials and personnel in order to successfully complete projects (Salami et al., 2023; Sutterby et al., 2023; Yan & Li, 2022). The second most popular coping strategy was the integration of digital technology such as Building Information Modelling (BIM) and other remote working software to enable building professionals to

work collaboratively and seamlessly without having to meet face-to-face (Cherian & Arun, 2022; Shooshtarian et al., 2022; Wang et al., 2022). Construction firms also relied on government support in the form of subsidies and palliatives such as cash assistance for construction workers who were forced to work less hours due to Covid-19 restrictions (Jha, 2021; Oey & Lim, 2021; Raoufi & Fayek, 2021).

The remaining five articles reviewed in this paper focused on identifying strategies that construction firms could implement to quickly recover from the negative effects of the global pandemic and to strengthen their resilience against future disruptions in the global economy due to another pandemic or any other unexpected phenomenon. All five articles sought the opinion of construction stakeholders from different parts of the world who all identified wholesale adoption of digitisation technologies as a means of 'future-proofing' the global construction industry against unexpected macro disruptions as these technologies would help management become more efficient, effective and agile going forward (Ebekozi et al., 2021; Ogunnusi et al., 2021; Gamil et al., 2022; Osunsanmi et al., 2022; Stride et al., 2023). The Covid-19 pandemic has forced construction firms to take more closer attention to issues of worker health and safety, and stakeholders felt that institutionalizing more robust and holistic health (including mental health) and safety protocol would be a sustainable strategy for ensuring improved worker productivity and effectiveness as economies continue to recover from the negative effects of the global pandemic (Ebekozi et al., 2021; Gamil et al., 2022; Ogunnusi et al., 2021; Stride et al., 2023). Construction stakeholders also opined that national governments have an important role to play in enhancing the resilience of the construction industry providing more access to affordable capital and increasing public sector demand for infrastructure (Ebekozi et al., 2021; Gamil et al., 2022).

4. CONCLUSION

The Covid-19 global pandemic has had a significant impact on how all industries operate today, and the construction industry is no exception. Considering the crucial role that this

industry plays in the provision of critical infrastructure necessary to sustain and enhance the quality of life of all global citizens, this paper presented the results of a systematic review of project performance articles in the global construction industry over the years, 2020 to 2023, which the paper dubbed “the Covid-19 era”.

54 empirical articles were reviewed in order to answer three research questions, with each question dealing with the geographical spread of PPGCI articles, data collection methods adopted by these articles and themes investigated by these articles respectively. As it relates to the geographical spread, South America had no article representation, and this represented a geographical research gap in extant PPGCI articles during the Covid-19 era. As for data collection methods, qualitative and mixed methods were relatively under-represented, and this served as a methodological gap in construction project performance literature in the context of Covid-19. Finally, as it related to themes investigated, impact assessment of the effect of Covid-19 was the most popular theme, followed by an investigation of the safety practices instituted by construction firms to mitigate the spread of the disease, then an identification of coping strategies and resilience strategies utilized by these firms.

Although this paper presented important findings regarding construction project performance during the occurrence and immediate aftermath of a global pandemic, it was limited by the fact that only articles published by the most recognized academic publishers were included for review. Future reviews can include articles from other publishers making sure to screen them for methodological quality. Another suggestion for future reviews should be a comparison of articles a few years before the pandemic and a few years after to determine if the effects of the pandemic caused a shift in scholarly focus as it relates to construction project performance.

The global pandemic has shown the world how fragile its structures are, particularly as it relates to the resilience of the global supply chain which remains crucial for the survival of many construction companies. It has brought to

light the importance of considering vertical integration of the supply chain and using locally available materials in the construction process so as to improve the resilience of construction companies to future shocks to the global industry due to man-made or natural disasters.

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