Construction Focus, Vol 14, No 1 (2021), 12 – 24

AN ASSESSMENT OF PROFESSIONAL PERCEPTION ON CONTRACTOR-RELATED DELAY FACTORS IN PUBLIC CONSTRUCTION PROJECTS

[1] LAWAL Fadila Muhammad, [2] IBRAHIM Emmanuel Chongcicimmi, [1] ABUBAKAR Ismail, [1] AYENI Olugbenga & [1] OYELEKE Fauziyya Mojirade

[1]Department of Building, Ahmadu Bello University, Zaria
[2]Department of Building Covenant University, Ota

Correspondence: fadilaabdallahlawal@gmail.com

ABSTRACT

Delay in construction project is considered one of the most common problems causing a multitude of negative effect on the project and its participating parties. This study aims to assess contractor-related factors contributing to delays in public construction projects in Kaduna metropolis. The study adopted a quantitative research approach through the use of structured questionnaire survey. A total of 61 structured questionnaires were distributed to construction professionals drawn from various building firms within Kaduna Metropolis. Out of 61 distributed questionnaires, 44 were retrieved and analyzed for the study. A descriptive statistical methods encompassing frequency distribution and mean ranking score were used to analyzed data collected. The study revealed that rework due to construction errors, improper or obsolete construction methods, and frequent change of subcontractors were identified as the most significant contractor-related delay factors. Also, escalation of material prices, conflicts with consultants and owners, and frequent changes of subcontractors were revealed as the most frequently occurring delay factors. Despite these challenges, respondents strongly agreed that ensuring availability of resources, employing competent project managers, and implementing effective financial management are the most effective measures for minimizing contractor-related delays in construction projects. The study concludes that contractor-related delays in public construction projects are primarily caused by rework from construction errors, obsolete methods, and frequent subcontractor changes. Therefore, the study recommends that addressing these issues through better planning, cost management, and effective communication can significantly reduce project delays.

KEYWORDS: *Causative factors, Construction projects, Contractor delays, Public projects.*

INTRODUCTION

Globally, the construction industry plays an important role in the national socio-economic development of a country (Khahro, 2018). In Nigeria, the construction industry occupies an important position in the economy, which provides shelter, infrastructure, and development (Oladinrin, 2012). Furthermore, Akash and Rum (2011) stated that an improvement in the economic growth of a country will increase the growth of the construction industry and at the same time, there will be an increasing demand for the construction of facilities and buildings.

According to Adam, Josephson, and Lindahl (2017), more than 50% of construction projects experience time overruns, which ultimately result in

project delays. As noted by Egwim, Alaka, Toriola-Coker, Balogun, Ajayi, and Oseghale (2017), construction delays are a widespread phenomenon and represent one of the most significant challenges facing the global construction industry. Tafesse, (2021) emphasized that delays occur in almost every construction project, with their extent varying considerably from one project to another. Gebrehiwet and Luo (2017) defined a "delay" in construction as the completion of project activities or the overall project later than the planned or contractually agreed schedule. In addition, Odenigbo, Odusami, Okolie, and Okafor (2020) described delay as the slowing down of work progress without a total stoppage of construction, which can result in time overruns beyond the agreed delivery date. Carvalho, Maués, Moreira, and Reis (2021), as well as Rashid (2020), noted that delay is a common factor leading to multiple adverse effects and may occur at any stage of a project. Similarly, Isyaku (2020) stated that construction delay refers to the situation in which a project is completed later than the time specified in the contract. Consequently, the critical problems encountered by the construction industry in Nigeria are the inability to complete projects on the scheduled date, at the stipulated cost, and the low quality of work (Mamman, 2019). Gandhak and Sabihuddin (2014), using average responses, showed that factors such as building permit approval, changes in drawings, incomplete documents and inspection and decision during development stages are the most relevant causes of delays in a construction project. A study by Durdyev and Hosseini (2020) revealed that major construction delays occur primarily due to corruption and bureaucracy, insufficient funding, and price fluctuations. The study also identified excusable, compensable, critical, and concurrent delays as the main types affecting Nigerian power construction projects. Furthermore, differing views between clients and contractors regarding these delay types often lead to disputes and additional project setbacks **(**Durdyev and Hosseini 2020).

Consequently, previous studies (Egwim *et al*., (2017) have revealed that contractor-related factors are major contributors to schedule delays in construction projects. Fashina and Opti (2020) noted that when construction projects experience delays, the effects are often detrimental to stakeholders. Moreover, the impacts of construction delays are considered the aftermath of unidentified delay causes within a project (Viles, Rudeli, & Santilli, 2020). These effects typically have a significant influence on project delivery outcomes.

Over the years, several conventional approaches have been adopted for the effective management of construction project delays, emphasizing robust planning, technological integration, clear communication, and financial control (Arlota and Werner, 2020). According to Bukar and Ibrahim (2021), developing realistic schedules with proper risk assessments and contingencies helps minimize time overruns. Similarly, the use of digital tools such as BIM and IoT enhances real-time monitoring and enables timely corrective actions (Kiani Mavi and Gengatharen, *et al.*, 2021). Furthermore, strong stakeholder collaboration and clear contract provisions help reduce disputes and coordination issues that often result in project delivery delays (Fashina, Omar, Sheikh, and Fakunle, 2021). Maintaining adequate funding and effective governance can serve as a tool for managing delay in construction project delivery (Celestin, 2020).

The persistence of contractor-related delay problems in public construction projects has become a major setback with far-reaching consequences for the construction industry, organizations, the economy, and society, particularly in developing countries such as Nigeria (Tafesse, 2021). According to Durdyev (2021), contractor delays remain a significant challenge in construction projects, often resulting in cost overruns, schedule extensions, and reputational damage. Previous studies have identified several primary causes of contractor-related delays in public construction projects, including improper planning, poor site management, inadequate contractor experience, insufficient owner financing and delayed payments for completed work, subcontractor-related problems, shortages of materials and labor, equipment unavailability or failure, and lack of effective communication among project parties, as well as construction-stage errors (Sambasivan & Soon, 2007; Muwafaq, Abdel-Monem, & EL-Dash, 2020)

While the need to manage contractor-related delay factors in public sector projects remains a recurring concern in the construction industry, there is a growing necessity to assess the specific delay issues associated with contractors within the Nigerian construction industry. Therefore, this study aimed at to assessing the perceptions of construction professionals to provide insights into contractor-related delay factors that hinder effective project delivery. The findings are will serve as a guide for industry practitioners in formulating strategies and interventions to minimize delays, enhance project performance, and optimize resource utilization.

LITERATURE REVIEW

Construction Project Delay

Construction projects are required to be completed based on the schedule, within the stipulated cost, time, quality and under safe conditions (Abbasi *et al.*, 2020). As noted by Adam *et al*. (2017), construction project delays remain a persistent and critical barrier to project success despite these shared project goals objectives among contracting parties. According to Celestin (2020) a construction delay is defined as the extension of project duration beyond the contractually agreed completion date or the originally planned timeline. Previous studies (Masood, Ali, Shafique, Shafique, Zafar, Maqsoom & Ullah, 2015; Khahro & Memon, 2018; Hasmori, Said, Deraman, Abas, Nagapan, Ismail, Khalid & Roslan, 2018; Jayalath & Perera, 2019) have broadly categorized construction project delays into four distinct types based on causation and liability including excusable delays (e.g., natural disasters or "acts of God"), non-excusable delays (attributable to contractor or subcontractor negligence), compensable delays (caused by owner-related actions), and non-compensable delays (triggered by third-party or sovereign events beyond contractual control). Moreover, each of these types of delay carries different implications for time extensions and financial compensation of a construction project.

Causes of Delay in Public Construction Projects

Delay in construction project management is caused by different factors. According to Hasmori *et al.* (2018). While some factors are major and pervasive as reported by stakeholders, others are minor, leading scholars to prioritize the most prevalent issues in their groupings ((Egwim *et al*., 2017). As noted by Ahmed (2015) delay related factors are classified into eleven

(11) categories, including consultant-related, contractor-related, design-related, equipment-related, external-related, labor-related, material-related, owner-related, project-related, engineer-related, and human behavior-related factors. However, this study focused on contractors related delay factors in construction project.

Contractor Related Delay Factors

These are delay related factors caused by the contractor in a given construction project. As established in previous studies, contractor-related delay factors include difficulties in financing project by contractor (Al-Kharashi and Skitmore, 2009), inadequate manpower (Naychisoe & Ayemyacho, 2014). Similarly, Hanish (2016) identified delay factors including rework due to errors during construction, conflicts between contractor and other parties (consultant and owner), ineffective planning and scheduling of project by contractor, frequent change of sub-contractors, improper or obsolete construction methods, shortage of material and poor procurement of material. Also, Sambasivam and Soon (2007) highlighted delay factors such as poor site management and supervision and escalation of material prices.

Measures for Minimising Delay

The success of construction projects is crucial for all project stakeholders as well as the nation to sustain national development (Mamman, 2019). As noted by Tafesse, *et al* (2021) several factors affect whether or not a project is completed successfully. Recently, studies Tafesse, *et al* (2021) have identified ways to minimizing delays in construction projects. These include proper project planning and scheduling, improved financial management, enhanced workforce training and development, regular communication among project team members, and site management and supervision, timely procurement of materials, use of advanced construction technology, use of experienced subcontractors and suppliers, availability of resources, competent project manager, frequent coordination between parties involved, and frequent progress meetings. Hence, these factors were adopted as working variables in this study.

RESEARCH METHODOLOGY

Research Design

The study adopted a quantitative research design utilizing a self-developed structured questionnaire titled "*An Assessment of Professional Perception on Contractor-Related Delay Factors in Public Construction Projects*." The instrument was designed to gather the perceptions of key stakeholders in public building construction within Kaduna Metropolis and was structured into four main sections: the first captured respondents' demographic characteristics; the second identified causative factors linked to contractor-related delays; the third evaluated the most significant and frequently occurring delay factors; and the fourth explored potential mitigation measures to minimize such delays. All variables were assessed using a 5-point Likert scale to measure respondents' perceptions of impact, frequency, and level of agreement. The scales were defined as follows: for impact (1 = High, 2 = Moderate, 3 = Significant, 4 = Low, 5 = No Impact), frequency (1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Often, 5 = Very Often), and agreement (1 = Strongly Disagree, 2 = Disagree, 3 = Undecided, 4 = Agree, 5 = Strongly Agree).

Sampling Technique and Sample Size

A mixed approach of purposive and convenience sampling was used. Purposive sampling targeted experienced professionals with relevant qualifications

and direct involvement in public building construction projects in Kaduna Metropolis to ensure data validity and contextual relevance. Convenience sampling was applied to accommodate logistical constraints and include readily available respondents from selected construction firms. This combined sampling approach balanced expertise with practicality, resulting in a final sample of 61 professionals as the target population.

Data Collection and Analysis

A total of 61 questionnaires were distributed, of which 44 valid responses were retrieved and analyzed. Data analysis employed descriptive statistical techniques, including frequency distribution and mean score ranking, to establish the relative importance of the identified contractor-related delay factors.

RESULT AND DISCUSSION

Response Rate Analysis

The result presents in Table 1 indicates a high response rate of 72.1%, which reflects strong participation and interest among construction professionals within Kaduna Metropolis. This rate is considered satisfactory and adequate for quantitative analysis, as it exceeds the commonly accepted threshold of 60% for survey-based studies (Baruch, 1999). The relatively high retrieval rate also enhances the reliability and representativeness of the collected data.

Table 1: Response Rate Analysis

Category	Frequency (No. of Questionnaires)	Percentage (%)
Questionnaires Distributed	61	100.0
Questionnaires Returned (Valid)	44	72.1
Questionnaires Not Returned/Invalid	17	27.9
Total	61	100.0

Demographic Characteristics of Respondents

Table 2 present a result of the profile of respondents that participated in the study. The findings revealed that the majority of respondents were professionals from contracting firms, mainly engineers and builders with extensive practical experience in construction activities. Similarly, over one-third of the participants had between 15 and 20 years of industry experience, indicating a highly knowledgeable sample. This composition implies that the data obtained are both credible and a representative of real construction practice, thereby strengthening the reliability of the findings and their relevance for addressing contractor-related delay issues in public building projects.

Table 2: Demographic Characteristics of Respondents

Category	Sub-category	Number of Respondents	Percentage (%)
1. Nature of Firm	Contracting	20	45.4
	Consulting	8	18.2
	Both	16	36.4
	Total	44	100
2. Profession	Engineer	16	36.4
	Builder	16	36.4
	Architect	8	18.2
	Quantity Surveyor	4	9.0
	Others	0	0
	Total	44	100
3. Years of Experience	Less than 5 years	5	11.4
	5–10 years	11	25.0
	10–15 years	7	15.9
	15–20 years	15	34.1
	More than 20 years	6	13.6

Identification of Contractor-Related Delay Factors

Referring to Table 3, the ranking of attributes for contractor-related delay factors indicates the most significant issues affecting construction project delivery. The top three factors identified were rework due to errors during construction (mean = 3.0), aligning with previous studies such as Hanish (2016), thereby reinforcing the recurring nature of quality-related setbacks in project execution. This was followed by the use of improper or obsolete construction methods (mean = 2.7), and frequent change of subcontractors (mean = 2.6), both of which reflect inefficiencies in technical processes and workforce consistency that can severely affect project timelines.

Notably, difficulties in financing projects by contractors (mean = 2.3) and inadequate manpower (mean = 2.2) were ranked sixth and seventh respectively, and considered the least significant among the listed factors. This suggests that, while financial and labor resource challenges exist, technical and operational issues such as construction errors and poor methodology are perceived to have a greater impact on delays. The findings highlight the critical need for capacity-building, stable subcontractor engagement, and improved quality control measures to reduce contractor-induced delays in public building projects.

Table 3: Identification of Contractor-Related Delay Factors

S/N	Factors	Response Frequency					∑f	∑fx	Item Mean	Rank
		1	2	3	4	5				
1	Rework due to errors during construction	6	15	17	5	1	44	133	3.0	1st
2	Improper or obsolete construction methods	2	16	15	9	2	44	120	2.7	2nd
3	Frequent change of sub-contractors	4	18	16	5	1	44	113	2.6	3rd
4	Conflict between contractor and other parties	9	13	14	6	2	44	111	2.5	4th
5	Poor site management and supervision	9	13	14	7	1	44	110	2.5	4th
6	Ineffective planning and scheduling	8	17	13	5	1	44	106	2.4	6th
7	Escalation of material prices	10	16	12	4	2	44	104	2.4	6th
8	Shortage of material and poor procurement	8	20	9	4	3	44	106	2.4	6th
9	Difficulties in financing project by contractor	12	12	14	5	1	44	103	2.3	9th
10	Inadequate Manpower	6	22	13	1	2	44	98	2.2	10th

Legend: 1=High Impact, 2=Moderate Impact, 3=Significant Impact, 4=Low Impact, 5= No Impact

Assessing the Frequency of Occurrence of Contractor Delay Factors

Table 4 presents the most frequently occurring contractor-related delay factors identified through the survey. The findings from the survey revealed that the most frequently occurring contractor related delay factors are the escalation of material prices (mean = 3.5), conflicts between contractors and other stakeholders (mean = 3.4), and a cluster of internal issues such as frequent change of subcontractors, poor site management/supervision, and rework due to construction errors (each mean = 3.3). Moreover, the high ranking of material price escalation implies that inflation and fluctuating market conditions continue to exert significant pressure on construction timelines, a trend similarly observed by Musarat, Alaloul, Qureshi and Altaf (2020), who associated rising material costs to frequent schedule overruns in developing economies. In addition, the finding that conflicts among project stakeholders rank highly suggests persistent coordination and communication challenges within project delivery structures as supported in a study by Hanish (2016) who noted that role ambiguity and poor collaboration often lead to prolonged project completion times. Furthermore, contractor related inefficiencies such as subcontractor changes, poor supervision, and construction errors underscore weaknesses in internal management and quality assurance processes; this aligns with Famiyeh, Amoatey, Adaku and Agbenohevi (2017), who emphasized that poor site coordination and frequent rework are among the main causes of time overruns in building projects. On the other hand, factors like ineffective planning and material procurement issues, although ranked slightly lower (mean = 3.2), remain relevant as they directly influence workflow and resource availability (Suresh and Arun Ram Nathan, 2020). Similarly, inadequate manpower (mean = 3.1) and financing challenges (mean = 2.8) appear less frequent but still contribute to inefficiencies when not effectively managed. These findings imply that operational and market driven constraints rather than financial or labour issues are currently the most significant contributors

to contractor related delays in public building projects.

Table 4: Assessing the Frequency of Occurrence of Contractor Delay Factors

S/N	Factors	Frequency of Occurrence					∑f	∑fx	Item Mean	Rank
		1	2	3	4	5				
1	Escalation of material prices	4	4	11	18	7	44	152	3.5	1st
2	Conflict with consultant & owner	3	5	15	13	8	44	150	3.4	2nd
3	Frequent change of sub-contractors	3	4	18	15	4	44	145	3.3	3rd
4	Poor site management and supervision	2	9	13	14	6	44	145	3.3	3rd
5	Rework due to construction errors	1	8	18	11	6	44	145	3.3	3rd
6	Shortage and poor procurement of material	2	10	11	16	5	44	144	3.2	6th
7	Ineffective planning and scheduling	2	10	10	19	3	44	143	3.2	7th
8	Inadequate manpower	3	8	16	14	3	44	138	3.1	8th
9	Improper/obsolete construction methods	4	8	15	15	2	44	135	3.0	9th
10	Difficulties in financing by contractor	4	8	15	15	2	44	123	2.8	10th

Legend: 1=Never, 2=Rarely, 3=Sometimes, 4=Often, 5= Very often

Measures to Minimize Contractor-Related Delay Factors

Table 4 presents the results for measures to minimizing contractor-related delay factors in public construction project. The result revealed a high level of agreement among respondents regarding the effectiveness of the proposed measures in minimizing contractor-related delays. Findings showed that the availability of resources (mean = 4.59) is the most strongly agreed measure for minimizing contractor-related delays in public construction projects. Similarly, a competent project manager (mean = 4.57) and improved financial management (mean = 4.55) signify that sufficient resources, effective leadership, and sound financial control are crucial to preventing project delays. Likewise, the use of advanced construction technology, engagement of experienced subcontractors, and efficient site management (each mean = 4.45) were also rated highly, reflecting the importance of technical capacity and operational efficiency. Furthermore, respondents agreed that coordination among parties (mean = 4.34) and regular communication (mean = 4.30) enhance teamwork and reduce conflicts. Although still positively rated, measures such as proper project planning (mean = 4.25), frequent progress meetings (mean = 4.18), and workforce training (mean = 4.07) received slightly lower agreement levels compared with the other factors, implying these are standard practices with less immediate impact. The timely procurement of materials (mean = 3.77) ranked lowest, suggesting that material supply challenges are often external and less controllable by contractors.

Consequently, the findings of this study reveal that the most effective strategies for minimizing contractor-related delays in public construction projects are the availability of resources, competent project management, and sound financial control. This aligns with Hanish (2016) who emphasized that effective decision-making and resource allocation play

crucial roles in preventing time overruns in large construction projects. Similarly, Durdyev and Hosseini (2020) found that managerial competence and leadership are among the most significant factors influencing project performance and timely delivery.

The results further indicate that the use of advanced construction technology, engagement of experienced subcontractors, and efficient site management significantly contribute to minimizing delays, consistent with Banobi, and Jung (2019). Arlota and Werner (2020), who noted that adopting digital and data-driven construction methods enhances project efficiency and reduces operational bottlenecks. Moreover, improved communication, coordination among project participants, and proper planning were also recognized as important measures for maintaining workflow harmony, echoing the conclusions of Memon, Abdul Rahman and Abdul Azis (2021) that collaborative practices and clear communication reduce conflict-induced delays.

Table 4: Measures to Minimize Contractor-Related Delay Factors

S/N	Proposed Measures	Response Frequency					∑f	∑fx	Item Mean	Rank
		5	4	3	2	1				
1	Availability of resources	32	7	4	1	0	44	202	4.59	1st
2	Competent project manager	26	17	1	0	0	44	201	4.57	2nd
3	Improve financial management	24	20	0	0	0	44	200	4.55	3rd
4	Use of advanced construction technology	20	24	0	0	0	44	196	4.45	4th
5	Use of experienced sub-contractors and suppliers	20	24	0	0	0	44	196	4.45	4th
6	Site management and schedule	22	20	2	0	0	44	196	4.45	4th
7	Frequent coordination between the parties involved	21	17	6	0	0	44	191	4.34	7th
8	Regular communication among project team members	15	27	2	0	0	44	189	4.30	8th
9	Proper project planning and schedule	20	15	9	0	0	44	187	4.25	9th
10	Frequent progress meetings	12	29	2	1	0	44	184	4.18	10th
11	Enhanced workforce training and development	14	19	11	0	0	44	179	4.07	11th
12	Timely procurement of materials	7	20	17	0	0	44	166	3.77	12th

Legend: 5= Strongly Agree, 4=Agree, 3=Undecided, 2=Disagree, 1= Strongly Disagree

CONCLUSION AND RECOMMENDATION

Conclusion

The study concludes that contractor-related delays in public construction projects occur primarily from rework due to construction errors, use of obsolete methods, and frequent changes of subcontractors. These factors reflect underlying issues in technical execution and project continuity. To address these factors, the study identifies effective resource management, competent project leadership, and robust financial control as the most critical mitigation measures. Conversely, the findings from the study underscored that technical inefficiencies and poor stakeholder coordination continue to pose significant challenges, reinforcing the need for enhanced planning, oversight, and collaboration to ensure timely project delivery.

Recommendations

The study recommends the following;

i Ensuring adequate resources, effective leadership, and technological advancement to enable timely and efficient execution of public construction projects.

ii Promoting managerial competence, fostering long-term subcontractor relationships, and establishing proactive communication frameworks to enhance overall project performance.

REFERENCES

Abbasi, O., Noorzai, E., Gharouni Jafari, K., & Golabchi, M. (2020). Exploring the causes of delays in construction industry using a cause-and-effect diagram: Case study for Iran. *Journal of Architectural Engineering, 26*(3), 05020008. https://doi.org/10.1061/(ASCE)AE.1943-5568.0000431

Adam, A., Josephson, P. E. B., & Lindahl, G. (2017). Aggregation of factors causing cost overruns and time delays in large public construction projects: Trends and implications. *Engineering, Construction and Architectural Management, 24*(3), 393–406.

Ahmed, M. T. (2015). Delay in Construction. *International Journal of Construction Management.*, https://doi.org/10.1080/15623599.2018.1512029.

Andiyan, A., Putra, R. M., Rembulan, G. D., & Tannady, H. (2021, June). Construction project evaluation using CPM-Crashing, CPM-PERT and CCPM to minimize project delays. In *Journal of Physics: Conference Series* (Vol. 1933, No. 1, p. 012096). IOP Publishing. https://doi.org/10.1088/1742-6596/1933/1/012096

Al-Kharashi and Skitmore. (2009). Causes of delays in Saudi Arabian Public Sector Construction Projects. *Journal of Construction Management and Economicss, 27 (1),* Pp. 3-23.

Arlota, A., & Werner, M. H. (2020). Delays in Construction Projects: Relevant Concepts and (Too Many?) Approaches. Construction Law International, 15-28.

Baruch, Y. (1999). Response rate in academic studies: A comparative analysis. *Human Relations, 52*(4), 421–438.

Banobi, E. T., & Jung, W. (2019). Causes and mitigation strategies of delay in power construction projects: Gaps between owners and contractors in successful and unsuccessful projects. *Sustainability, 11*(21), 5973.https://doi.org/10.3390/su11215973

Bukar, A. A., & Ibrahim, U. A. (2021). Investigating the impact of risk management on project performance in construction industry: Evidence from Nigeria. *Science Journal of Business and Management, 9*(3), 224–230. https://doi.org/10.11648/j.sjbm.20210903.20

Carvalho, A. B., Maués, L. M. F., Moreira, F. D. S., & Reis, C. J. L. (2021). Study on the factors of delay in

construction works. *Ambiente Construído, 21*(3), 27–46. https://doi.org/10.1590/s1678-86212021000300536

Celestin, M. (2020). The influence of financial management on timely project delivery in Rwanda's local government. *Indo American Journal of Multidisciplinary Research and Review (IAJMRR), 4*(2), 66–73.

Durdyev, S. (2021). Review of construction journals on causes of project cost overruns. *Engineering, Construction and Architectural Management, 28*(4), 1241–1260. https://doi.org/10.1108/ECAM-02-2020-0137

Egwim, C. N., Alaka, H., Toriola-Coker, L. O., Balogun, H., & Sunmola, F. (2021). Applied artificial intelligence for predicting construction projects delay. *Machine Learning with Applications, 6,* 100166. https://doi.org/10.1016/j.mlwa.2021.100166

Famiyeh, S., Amoatey, C. T., Adaku, E., & Agbenohevi, C. S. (2017). Major causes of construction time and cost overruns: A case of selected educational sector projects in Ghana. *Journal of Engineering, Design and Technology, 15*(2), 181–198. https://doi.org/10.1108/JEDT-11-2015-0075

Fashina, A. A., & Opti, F. F. (2020). Exploring the common delay factors related to major parties involved in construction projects: A systematic review. *PM World Journal, 9*(V), 1–18. https://pmworldlibrary.net

Fashina, A. A., Omar, M. A., Sheikh, A. A., & Fakunle, F. F. (2021). Exploring the significant factors that influence delays in construction projects in Hargeisa. *Heliyon, 7*(4). https://doi.org/10.1016/j.heliyon.2021.e06826

Gandhak, P., & Sabihuddin, S. (2014). Stakeholders' perception of the causes and effect of construction delays on project delivery: A review. *Journal of Construction Engineering and Project Management, 4,* 41–46. https://doi.org/10.6106/JCEPM.2014.4.4.041

Gebrehiwet, T., & Luo, H. (2017). Analysis of delay impact on construction project based on RII and correlation coefficient: Empirical study. *Procedia Engineering, 196,* 366–374. https://doi.org/10.1016/j.proeng.2017.07.212

Hanish, J., A. H. (2016). A Study of contractor related Delay Factors in Construction. *International Research Journal of Engineering and Technology.*, 1162-1164.

Hasmori, M. F., Said, I., Deraman, R., Abas, N. H., Nagapan, S., Ismail, M. H., Khalid, F. S., & Roslan, A. F. (2018). Significant factors of construction delays among contractors in Klang Valley and its mitigation. *International Journal of Integrated Engineering*, *10*(2), 32-36. https://doi.org/10.30880/ijie.2018.10.02.006

Jayalath, C., & Perera, B. A. K. S. (2019). Exploring a shared comprehension between judicial approaches and scholar views pertaining to concurrent delays. *International Journal of Construction Management*, 21(4), 352-366. https://doi.org/10.1080/15623599.2019.1627502

Khahro, S. H., & Memon, Z. A. (2018). Non excusable delays in construction industry: A causal study. *Engineering, Technology & Applied Science Research*, 8(6), 3561–3564. https://doi.org/10.48084/etasr.2335

Kiani Mavi, R., Gengatharen, D., Kiani Mavi, N., Hughes, R., Campbell, A., & Yates, R. (2021). *Sustainability in construction projects: A systematic literature review*. Sustainability, 13(4),1932.https://doi.org/10.3390/su13041932

Mamman, E. J. (2019). A predictive cost model for building construction projects in Niger State. *Journal of Environmental Science and Policy Evaluation, 6*(1), 46–53.

Masood, R., Ali, M., Shafique, F., Shafique, M. A., Zafar, B., Maqsoom, A., & Ullah, Z. (2015). Investigating the delay factors of construction projects in metropolitan city of a developing country. Journal of Civil Engineering and Architecture Research, 2(9), 947-955.

Memon, A. H., Abdul Rahman, I., & Abdul Azis, A. A. (2012). Time and cost performance in construction projects in southern and central regions of Peninsular Malaysia. *International Journal of Advances in Applied Sciences, 1*(1), 45–52.

Musarat, M. A., Alaloul, W., Qureshi, A. H., & Altaf, M. (2020, November). Inflation rate and construction materials prices: Relationship investigation. In *2020 International Conference on Decision Aid Sciences and Application (DASA)* (pp. 271–276). IEEE. https://doi.org/10.1109/DASA51403.2020.9317162

Muwafaq, A., Abdel-Monem, M., & El-Dash, K. M. (2020). Review study for rework causes in construction industry. *Al-Azhar University Civil Engineering Research Magazine (CERM), 42*(1).

Naychisoe, & Ayemyacho. (2014). Current Practices on Labour Management in Building Construction Projects. *International Journal of Scientific Engineering and Technology Research Volume.03, IssueNo. 10,* Volume.03, IssueNo.10, Pages: 2017-2021.

Odenigbo, O. G., Odusami, K. T., Okolie, K. C., & Okafor, V. C. (2020). Causes of delayed payment in construction project in Nigeria. *European Journal of Engineering and Technology Research, 5*(9), 1049–1053. https://doi.org/10.24018/ejeng.2020.5.9.2066

Oladinrin, O. O. (2012). Role of construction sector in economic growth: Empirical evidence from Nigeria. *FUTY Journal of the Environment, 7*(1), 50–60.

Rashid, Y. (2020). Analysis of delay factors and their effects on construction projects. *Management Science Letters, 10*(6), 1197–1204.

Sambasivan, M., & Soon, Y. W. (2007). Causes and effects of delays in Malaysian construction industry. *International Journal of Project Management, 25*(5), 517–526..https://doi.org/10.1080/15623599.2020.1716132

Suresh, M., & Arun Ram Nathan, R. B. (2020). Readiness for lean procurement in construction projects. Construction Innovation, 20(4), 587–608. https://doi.org/10.1108/CI-07-2019-0067

Tafesse, S. (2021). *A review on the critical factors causing delay of delivery time in construction projects.* International Journal of Engineering Technologies IJET, 6(4), 69–81. https://doi.org/10.19072/ijet.815025

Viles, E., Rudeli, N. C., & Santilli, A. (2020). Causes of delay in construction projects: A quantitative analysis. *Engineering, Construction and Architectural Management, 27*(4),917–935. https://doi.org/10.1108/ECAM-01-2019-0024