ISSN: 2643-6876

Current Trends in Civil & Structural Engineering

DOI: 10.33552/CTCSE.2023.09.000724

Iris Publishers

Research Article

Causes of delays in the Egyptian Construction Projects

Mostafa Fekry Abdelnaby[1], Michael Gerges[2*] and Georgios Kapogiannis[3]

[1]*MSc Construction Project Management, Faculty of Computing, Engineering, and Built Environment, Birmingham City University, United Kingdom*

[2]*Associate Dean, Faculty of Science and Engineering, University of Wolverhampton, United Kingdom*

[3]*Associate Professor, School of Business and Leadership, Oryx Universal College in Partnership with Liverpool John Moores University, Qatar*

***Corresponding author:** Michael Gerges, Associate Dean, Faculty of Science and Engineering, University of Wolverhampton, United Kingdom.

Received Date: March 20, 2023

Published Date: April 10, 2023

Abstract

Construction projects' delays always is a bottleneck for economies growth. Hence, this research aims to contribute by understanding in a more empirical way the primary reasons beside this challenge in a country with strong cultural inheritance such as Egypt. Using a quantitative research method researchers seek answers from 118 senior engineers. Relative importance index (RII) was used based on a series of 61 reasons, as they have been acquired after a systematic literature review. Results shown delays were caused because of clients' modifications to specifications as well as lack of contractors to comply with cash flow during building construction. However, the participants were categorized as contractors, consultants and clients. Moreover, interestingly further meta data analysis of RII shown delays are derived mainly by the consultants for various reasons followed by the contractors and clients. That happens most likely because of non-accurate data that drives them to wrong decisions. Moreover, lack of forecasting projects' financial sustainability, materials and projects specifications as well as people not having the capacity to control the projects based on the available resources, drive the need to offer data-driven construction project management in Egypt. Building Information Modeling (BIM) paradigm being the driver of data-driven construction could be elaborated in the country's agenda to reduce the risks of observing projects delays and thus assure a better future for Egypt's projects viability and thus country's economy.

Keywords: Construction delays; Construction projects; Types of delays; Egypt; Relative importance index

Introduction

Construction is described as the physical development of buildings, substructure, and supporting infrastructure [1]. Construction can also be described as a wide methodology for the establishment of human development and the quality of communities [2]. In addition, a wide definition of the construction has specified that construction is the major driver of economic growth that converts diverse resources into built facilities through planning, design, implementation, maintenance, repairs, and management [3]. This comprises raw material extraction and processing, building materials and element production, project cycle creation from feasibility through demolition, as well as management and operation of the built environment [2]. Furthermore, the construction sector is comprised of many sectors that produce diverse goods that are stationary, complicated, long-lasting, and expensive [4]. Finally, construction also can be described as the economic sector that organizes, designs, builds, modifies, maintains, and demolishes facilities of all types of civil projects, mechanical projects, electrical engineering projects, and other comparable works [4]. According to [5] the construction

business is massive, fickle, and necessitates massive capital outlays. Moreover, the method in which conflicts and lawsuits are solved through the stages of the building process is a unique aspect of risk in the business [5]. Construction is being utilised to exert control over nations' economy, thus, it is always intertwined with politics, economy, sociology, and the legal system [6]. The construction sector is activities that is in charge of the planning, design, construction, maintenance, and eventual destruction of buildings and facilities [7]. It is mainly a service business, with variables derived from various sectors of the economy with which it is integrated and interrelated, often in rather complicated ways [1]. The significance of building stems from its involvement in the creation of developed physical facilities and employment, both of which constitute the largest and most evident part in the country's development cycle [1]. construction delay is defined as a construction duration that extends beyond what was originally expected, such delays have been shown to be a prospective source of risk in the construction sector, and many current research are searching for strategies to control them. The different hazards connected with project delays are cost-related, with delays typically resulting in a rise in the total cost of the project [8]. Various research have shown the origins and types of construction hazards that must be handled as part of the project management strategy. Where, delays are an unavoidable element of today's building procedures [9]. Furthermore, [10] noted that building projects have a tendency to be delayed, and that such delays represent significant losses for all stakeholders. Which includes the customer or owner, who suffers from a loss of usage and a rise in costs, as well as the contractor and consultant, who suffers from a prolonged stay on the job site and a loss of trust [10].

Characteristics of Construction Industry

The following are common characteristics of building works: immobility, individuality, heaviness, bulkiness, complexity, extended process time, high costs, and durability [11]. Moreover, there are some other features of construction such as, custom-built nature, high starting costs, difficulty, solidity and ever-changing technology [3]. As a result of the characteristics of building works and the wide variety of operations in the construction sector, construction is worthy of distinct consideration. Where, the construction sector must meet the need for residential as well as building facilities like social and commercial structures, large industrial projects, and industrial structures such as factories [12].

Literature Review

Time could be considered as one of the main factors throughout the life cycle of construction projects, also it could be considered as the most significant parameters of a project success [13]. Where the crucial factor in the agreement between the owner and the contractor is the project period negotiated between them [14]. Due to some circumstances and events that could happen during the project phases, some delays to the project's duration could occur. Delay is one of the greatest management challenges that are faced by many building projects all over the world [13]. Delays vary from one city to the other, and project type to another, due to the circumstances of each project [15]. This chapter will critically discuss the literature review of other research studies relevant to this research topic and provide an argument over what researchers have reviewed and analyzed to date regarding the causes and effects of construction projects' delays.

Definition of Construction Delays

Various definitions of delays have been established, as the delays could be defined as the overrunning of the time either by the deadline set out in the agreement, or the timetable decided by the participants for the completion of the works [16]. Also defined delay as something taking place in a timescale that is longer than planned, or failure to function on time, in other words, decisions to postpone various elements of the project ultimately decide whether the project is delivered on time or delayed.

Classification (Types) of Delays

Origin: Delays can be caused by owners, known as Owner Caused Delays (OCD), or Contractor Caused Delays (CCD), and Third Party Caused Delays (TPCD) [17]. This type will be widely discussed in factors causing construction delays.

Timing: Concurrent Delays (CD) This sort of delay normally happens in a case where several causes or forms of delays converge at the same time [18]. Concurrent delay is evident when delays due to the contractor occurrence and another relevant client occurrence both effect the work at the same time, in this scenario, both the customer and the contractor are to blame for the delay [19]. This situation becomes more complicated as more than one cause has a simultaneous effect on the work [20]. It could also happen when different parties are responsible for the same delay [17]. For example, if the customer fails to offer further information about the specific type of tile for bedroom floor finishes, a concurrent delay may arise, nevertheless, the contractor made the decision to use oak wood for bedroom floor finishes at the same time, but the customer intends to use a different sort of tile. In this case, the contractor cannot sue for damages since he did not follow the customer's instructions, but he may sue for an extension of time because the client neglected to give further design information [19].

Nonconcurrent Delays (NCD): Delays are caused by a single reason and a single party [17]. In this case, there is only one reason involved in disrupting the construction, so the time of delay and cost arising from this particular problem could be measured reasonably easily [20]. For example, if the customer has offered all the needed information about the specific type of tile for bedroom floor finishes, but nevertheless, the contractor made the decision to use oak wood for bedroom floor finishes instead. In this case, the contractor cannot sue for damages since he did not follow the customer's instructions, and he also cannot sue for an extension of time because the client has provided the needed design information [19].

Impact: The impact is divided in two categories, direct and indirect impact. Direct impact is issues that have a direct and immediate impact on project implementation on time [17]. Indirect impact, on the other hand, is issues that do not immediately impact the project but collectively cause delays at a later stage [17].

Compensability: Excusable Delay those delays are caused by the owners or their agents [18]. Excusable delays are divided into compensable and non-compensable delays. Excusable compensable delay, it is a delay in which a contractor should have a time extension and/or a potential cash right based on contractual clauses [19]. For instance, insufficient drawings and requirements from owners' architects are the most popular cause of compensable delays [20]. Moreover, sometimes owners make modifications to the project's specifications, which leads to delays [21]. In those cases, these sorts of delays involve the construction company claiming additional funds from the owners for extra time and costs [22]. Excusable non-compensable delays are the delays which are caused by third parties or events beyond anyone's control [20]. For example, climatic hazards, "acts of god", and unpredicted long-term events [21]; in those cases, the contractor is normally entitled to a time extension but no money compensation for delay damages [22]. These situations may be reasonable, unexpected, and beyond the contractor's responsibility, but not only based on the above definition, the consultant will decide that a delay is excusable or non-excusable. Where, delay issues should be considered within the context of the agreement's clauses, thus, the agreement should precisely identify the causes that constitute reasonable project delays and enable time extensions to the completion of the works. Several agreements, for instance, don't always provide for any late completion induced by weather circumstances, no matter how exceptional, unforeseen, or severe they are.

Non-Excusable Delay: are caused by construction companies (contractors) and their subcontractors or suppliers [18]. For example, the influence of a contractor's bad performance on the construction process, bad leadership, poor construction techniques, unproductive subcontractors or providers, and ineffective site management and oversight [23]. In this case, the construction company is not eligible for compensation and should make up for lost time by speeding up the schedule [22]. In addition, the construction company should pay financial penalties to the owner in compliance with the contract [21]. Remember, the agreement is the key document that decides whether a delay is excusable. Some other agreements, for illustration, state that supplier delays are excusable in case the contractor can demonstrate that the items were requisitioned or bought on schedule, but materials could not be supplied due to reasons beyond contractor's responsibility. On contrast, some other contracts do not allow such delays, therefore, the owner and contractor should make sure that contract's clauses are straightforward and precise about what delays are excusable or non-excusable.

Studies on causes of delay

There are several causes for delays. The construction industry is regarded as complex one, it includes many different aspects and areas of work, interests and priorities of different stakeholders must always be considered and decision making on different aspects of works can sometimes takes a long time to form [24]. The majority of recent research has centered on the causes of delays during the construction phase [25], and others have centered on the causes of delays from the planning and design activities at the pre-construction phase [26]. The real causes of delay must be well known in order to reduce and prevent delays in any building project [27]. The causes of delays have been classified into two groups, internal causes and external causes [28]. For example, external factors such as climate conditions, legislative adjustments, community problems and unexpected site conditions [29]. While internal factors occur from the contracting parties [28], such as financial issues, design and scope modifications, delayed decision-making and acceptance by the owner, problems with securing work permits, and issues with teamwork and cohesion [16]. For example, research was carried out by [30], targeting the large private and public construction projects in Jordan. The survey results suggested that the main causes are intervention of owners, insufficient experience of contractors, funding, efficiency of the labour force, slow problem-solving procedures, inappropriate scheduling, and sub-contractors [30]).

Another study that was conducted by Fallahnejad [31], mentioned that the prime causes of delays in Iran's gas pipeline construction projects were failure of main contractors to supply the imported resources, unreasonable deadlines of the contract placed by the owner, and late expropriation of properties due to difficulties with removing unwanted occupants. As confirmed by Ruqaishi & Bashir [32] that in the same projects (oil and gas construction projects) in Oman, it was found that the main causes of delays are unprofessional main contractors' handling and monitoring of sites, subcontractors and suppliers' issues, problems in shipping of supplies, poor coordination between participants of project activities, and poor engagement during the design and procurement phases with providers. In addition, there is another study conducted by Assaf et al [33] discovered a total of 56 potential causes; contractors, owners, and consultants all regarded the funding group delay factors as the most significant source of delay. Based on the contractors' prospective in the study, the most significant delay reasons, were the creation and approval of shop drawings, the delay in contractors' progress payment by clients, and design modifications [33]. According to the consultants and architects, the most significant factors of delay are cash flow issues throughout implementation, relationships among different subcontractors, project implementation timetables, and the hesitation of the owners' during decision making process [33]. On the contrast, the clients, claimed design mistakes, excessive bureaucracy in project documentation organisation, labour shortages, and a lack of skilled staff as the primary factors of implementation project delays [33]. Chan & Kumaraswamy [34] determined the primary reasons of time overruns in Hong Kong building projects, they initially identified the primary reasons of delays in Hong Kong construction and infrastructure works, and afterwards evaluated the relative importance weight of these issues. Furthermore, they investigated the disparities in views across the three primary industry stakeholders – clients, consultants, and contractors – in order to identify the reasons driving project delays [34]. Lastly, they evaluated the delay factor groupings on two sets of respondents and analysed the data to compare with those of other

academics throughout the world [34]. Because of the similarities of the monitoring format, Saudi Arabia and Nigeria were chosen for this study. Moreover, they concentrated on determining and ranking the weighted order of significance. The primary causes of construction delay were shown to be 'poor site monitoring and supervising,' 'unexpected ground circumstances,' and 'low decision-making speed including all working groups [34].

Furthermore, [35] considered the main drivers of delays, the impact of delays, and ways for reducing delays in Aceh, Indonesia building projects, where they found that there are a total of fifty-seven factors that caused delays. Where, contractor-related delays, equipment-related delays, client-related delays, material-related delays, finance-related delays, consultant-related delays, external-related delays, and manpower-related delays were all classified as reasons of delays [35]. According to the findings of 17 analyses, the two most prevalent consequences of delays in Aceh building projects were time overrun and cost overrun [35]. In addition, there is another study for [36] stated that delays are the most prevalent and expensive problem faced over the life of a development process, and that evaluating construction delays has become an essential element of the construction process. Where, although with today's technology and management awareness of project management practises, building sites continue to be delayed and task completion deadlines tend to be pushed back [36]. The study emphasized that strikes, rework, poor organization, material shortages, equipment breakdowns, change orders, and acts of God are all sources of delays, sometimes, which makes the situation more complicated when more than one factor occur at the same time [36]. Moreover, the study presented and evaluated the delay analysis approaches now utilized by professionals in the building sector, and also introduced the Isolated Delay Type (IDT), a novel and effective delay analysis methodology [36]. Delays on a building site are unavoidable, and as a result, many projects wind up in court, which is an expensive procedure [37]. As the current techniques for analysing delays and drafting claims are inaccurate, complicated, and expensive [37].

Effects (Impact) of Delays

Time Overrun: it is one of the most critical problems in the building sector, as it is described as failing to finish a work within the estimated time frame, in addition, it may be used to determine whether a project is unsuccessful [38]. In Indonesia, [39] conducted a survey to determine the primary reasons of time overruns in the building sector. Where, he cited design modifications, low worker productivity, insufficient planning, and resource limitations as the most significant reasons [39]. Another study carried out by [40] on schedule overrun building projects in Malaysia. They discovered that a total of 30 building projects were running behind schedule [40]. In addition, whenever the time overrun happens, the project execution time will be stretched beyond what was originally predicted, it is likely that the customer or clients will be dissatisfied as a result. Thus, the contractor may lose the job if he is perceived to be inept.

Cost Overrun: this is the difference between the actual cost of the business and the cost that was expected or allocated for it from the initial phase to the development and completion phase [41]. It is also known as cost escalation, cost rise, or excessive costs [41]. Sometimes, it happens individually or attendant to time overrun case. budget overruns in infrastructure development activities have been documented by researchers like [42], which this kind of projects are always related to government's' projects. Where cost overruns can occasionally be associated with political considerations. Therefore, sometimes politicians lie by either underestimating or inflating the advantages of initiatives in order to make them more sellable and to enrich themselves

Disputes and Claims: delays are among the most popular and expensive issues faced by the construction industry [43]. The majority of delay claims are complex and there is usually a lack of appropriate, helpful and contemporary documents [44]. So, most project stakeholders are conscious of the negative consequences and challenges that come with delay claims and their disputes [17]. Thus, it has become increasingly difficult for the construction industry to settle such disputes in an appropriate, timely, and economical way [45]. As a result, the construction sector needs to improve methodologies and strategies, in order to reduce and more effectively counter delay claims [17]. Such measures will also help decrease the high expense and considerable risks correlating to the litigation of claims for delays [44].

Arbitration and Litigation: arbitration and litigation are a judicial proceeding that takes place between involved parties or partners in an attempt to resolve an existing disagreement [37]. On other words, it happens when a third person identified as an adjudicator gets involved in an effort to resolve a disagreement between construction stakeholders before having to go to court [45]. These two phenomena, according to [46], are unavoidable and appear to be a component of building undertakings. These occurrences frequently occur if there is a project delay and there is disagreement over the reason for the delay and who should take responsibility and claim expenses [17]. Where, if any of the participants is not pleased, he will be obliged to sue the others. Hence, the cumulative consequence is that the project would be further delayed, and the expense will rise, including the expense of engaging an adjudicator or an expert.

Project Abandonment: Project abandonment is defined as putting a halt or an ending to a project development owing to numerous challenges, limitations, or issues encountered mostly during stages of the project lifecycle that make it almost impossible to proceed at that moment [47]. Where, many building and non-building projects were abandoned at different phases of their life cycles, resulting in considerable losses for investors [48]. Hence, the employer or customer suffers financial and other resource losses, especially time, while to contractors and consultants suffer losses in terms of time, expertise, and reputation [47]. Most development is typically abandoned as a result of excessively extended delays, when the contractors, consultants, or owners might quit the projects.

Methodology

The aim of this research is to investigate and discuss the causes of delays in Egyptian construction projects. Furthermore, the study

examines the most significant reasons of delays in construction sector as shown by prior studies. The objectives of the study results were utilised to create the framework for the most important factors of construction delay in Egypt, this offers a better knowledge of the success of Egypt's building sector in recent years. The survey design in this investigation has been influenced by earlier researchers' literature reviews such as Assaf & Al-Hejji [16]; Sweis, et al., [49] and Faridi & El-Sayegh [50], regards to assess the construction delays. The study's survey was broken into three sections:

1. Part one dealt with general information about the participant's expertise and the firm with which he or she is affiliated. Contractors, owners, and consultants were asked to provide information on their construction professional experience and to provide feedback on the % average time delay in works they have worked on.

2. Part two focused on participants' perceptions of performance measurement of the works.

3. Part three contained a list of sixty-one delay variables gleaned from previous literature researches.

According to the sources of delay, these issues have been further divided into four main categories. The questionnaire covered delay reasons relating to the project, client, contractor, consultant, supplies, equipment, workforce (labour), and external causes. Each delay factor's statements were divided into two groups: frequency of occurrence and severity effect degree, each question was graded on a four-point Likert scale. On a 1 to 4-point Likert scale, the frequency of recurrence was classified as follows: rarely; sometimes; commonly; and continuously. Additionally, the strength of the effect was classified on a 1 to 4 Likert scale as follows: no impact; fairly severe; severe; and extremely severe. To get a high type of attention, the following factors were addressed throughout the survey's styling:

a. Surveys were accompanied with a cover letter;

b. The cover letter specified the sort of work, and the author's name;

c. In the cover letter, the objective and advantages of the study were emphasised;

d. Participants were told that their identity, department, or company name would be kept private during the investigation.

e. The questionnaire was provided in a stylish and appealing form; and

f. The questionnaire was meant to be as brief as feasible, with the goal of being finished in 20-25 minutes.

The descriptive statistics approach was used for the assessment, and the study findings were presented using frequency and percentage methods such as tables, bar graphs, pie charts, and graphs. The data gathered from the survey were evaluated using the relative importance index method. In part three of the survey, participants were asked to rate the causes of construction delays in terms of strength and frequency index method on a scale of 1 to 4 [16]. Following that, the obtained data was entered into a Microsoft Excel sheet and examined using the relative importance index (RII). The relative importance index (RII) of the present sources of delays was determined, according to [51] and Gerges et al., [52]. They utilized following equation to rank the reasons of building delays in Qatar and the factor impacting labour productivity in Egypt.

Where RII equal the addition of n1, 2*n2, 3*n3, 4*n4, which are the total number of the participants who has chosen each number on the scale; then divided by the highest wight on the scale which is 4 in this case, then multiple by the total number of the participants (see the equation above).

Results and Discussion

This section addresses the rank of the delay factors to their frequency and severity weight, which explores the RII of 61 reasons of building delays. These reasons were classified into four categories: client/representative, consultant, contractor, and external. The primary goal of this survey was to assess the frequency, and also its severity of all delay causes in building projects, given that, depending on its type and complexity, each delay cause has a variable amount of influence on project delays. The RII refers to the effect as well as the frequency of each cause. The results were collected and analyzed using the relative importance index, as described in the methodology chapter. The research provided the current relative significance index based on all respondents' overall rankings. Afterwards, the survey's reasons of delay are compared to past research study outcomes in literature review.

Analysis of the Frequency of the Causes of Delays According to All Respondents

From the research it was found that modifications to specification was the main reason for delay followed by contractors funding during building (Figure 1).

From the analysis of the findings above, it can be seen that delay in Modifications to specifications has been ranked as the first cause, which is responsible by the consultant, followed by contractors funding during building. Then, delay during building, the materials and specifications vary of the client comes third. With regard to the top ten causes of delays, it can be observed that the consultant is the most responsible party for delays by 4 out of 10 causes. Moreover, the contractor comes second with 3 factors, whereas the owner comes third with 2 causes. Finally, the external factors has only one cause in the top 10 as it was ranked as the second highest cause.

Analysis of the Frequency Causes of Delay According to Each Group of Respondents

A reference to the first three ranking factors incorporating some core literature review is required (Figure 2).

Based on the analyzing of the results in Figure 2, the following assessment of the top 10 major reasons of delays for each group's perspective is presented:

Factors of delay	category	RII	Rank
26. Modifications to specifications	Consultant	0.79	1
43. Contractors funding during building	External	0.786	2
34. During building, the materials and specifications vary.	Owner	0.781	3
29. The consulting engineer's response time to the contractor was delayed	Consultant	0.777	4
35. Too many client change order information	Owner	0.768	5
16. Inadequate technical research by the contractor during the tender phase	Contractor	0.754	6
19. The contractor's quality control is insufficient.	Contractor	0.75	7
9. Work that is inadequate	Contractor	0.748	8
25. Time spent waiting for a site visit and the acceptance of testing and evaluation	Consultant	0.744	9
22. Drawings have been updated.	Consultant	0.741	10
17. The contractor's improper management of project operations	Contractor	0.734	11
42. The primary contractor failed to pay the subcontractors on time	External	0.729	12
44. Productivity is overestimated	External	0.722	13
46. Inability to estimate the length and resources of a task due to a lack of information	External	0.716	14
39. Delay in the supply of supplies	External	0.698	15
7. Necessary Modifications	Contractor	0.687	16
4. Poor equipment	Contractor	0.677	17
12. Machine failure/breakdown	Contractor	0.669	18
28. The consulting engineer's cooperation with the stakeholder groups was inadequate	Consultant	0.664	19
48. Agreement amendments	External	0.659	20
52. Requesting a permission from the municipality/other government agencies	External	0.651	21
23. Drawings / specifications / documents that are not accurate	Consultant	0.644	22
13. Inadequate administrative personnel on the part of the contractor	Contractor	0.637	23
33. The customer demanded an unreasonable time frame	Owner	0.631	24
36. The client's involvement in the building activities	Owner	0.627	25
50. Government policies and legislation are changing.	External	0.619	26
60. Equipment washout	External	0.609	27
53. The climate circumstances	External	0.602	28
40. Owner's failure to make cash payment	Owner	0.597	29
1. Insufficient contractor expertise	Contractor	0.588	30
21. Drawing completion and confirmation	Consultant	0.574	31
31. The employee's decision-making procedure is too lengthy	Owner	0.570	32
45. The project's development management team was unavailable	External	0.569	33
47. Insufficient performance assessment	External	0.561	34
30. The engineer's acceptance of contractor submissions was delayed	Consultant	0.558	35
8. Delay in the arrival of custom-produced imported materials	Contractor	0.552	36
24. Due of lack of experience with the local circumstances, surroundings, and materials, the designer made a design mistake	Consultant	0.548	37
37. The employee's financial limitations	Owner	0.543	38
55. Workforce limitation	External	0.539	39
61. Inadequate equipment	External	0.537	40
51. Authorization for transportation	External	0.531	41
2. Labour shortage	Contractor	0.527	42
11. Method of development	Contractor	0.522	43
15. Within the contractor's organisation, safety standards and regulations are not observed	Contractor	0.511	44
10. Inadequate control over the distribution of site resources	Contractor	0.505	45
27. The consulting engineer's team allocated to the project lacked qualifications	Consultant	0.499	46
41. Employee's failure to pay the contractor's payment claim (for finished work)	External	0.487	47
49. Communication gap and cooperation among construction stakeholders	External	0.480	48
32. Excessive bureaucracy/disruntledemployer	Owner	0.476	49
35. The Employee's inadequate cooperation among the entities	Owner	0.471	50
5. Incorrect time estimates	Contractor	0.467	51
20. The contractor's lack of cooperation among the entities	Contractor	0.460	52
3. Lack of materials on the job site	Contractor	0.451	53
54. Subsurface soil state (e.g. geological issue/water table issue)	External	0.444	54
58. Materials scarcity	External	0.438	55
18. The contractor's liquidity troubles	Contractor	0.429	56
56. Unskilled workforce	External	0.420	57
14. Disruption in mobilisation	Contractor	0.418	58
57. Variations in the cost of materials	External	0.412	59
6. Inadequate oversight and site organization	Contractor	0.409	60
38. The owner has suspended his staff' work.	Owner	0.406	61

Figure 1

Factors of delay	category	RII	Rank
23. Drawings / specifications / documents that are not accurate	Consultant	0.779	1
33. The customer demanded an unreasonable time frame	Owner	0.774	2
44. Productivity is overestimated	External	0.768	3
26. Modifications to specifications	Consultant	0.762	4
37. The employee's financial limitations	Owner	0.759	5
59. Delay in the supply of supplies	External	0.753	6
25. Time spent waiting for a site visit and the acceptance of testing and evaluation	Consultant	0.747	7
12. Machine failure/breakdown	Contractor	0.742	8
29. The consulting engineer's response time to the contractor was delayed	Consultant	0.734	9
3. Lack of materials on the job site	Contractor	0.729	10

Factors of delay	Category	RII	Rank
19. The contractor's quality control is insufficient	Contractor	0.818	1
59. Delay in the supply of supplies	External	0.784	2
21. Drawing completion and confirmation	Consultant	0.777	3
3. Lack of materials on the job site	Contractor	0.772	4
35. Too many client change order information	Owner	0.767	5
4. Poor equipment	Contractor	0.759	6
44. Productivity is overestimated	External	0.753	7
50. Government policies and legislation are changing	External	0.747	8
9. Work that is inadequate	Contractor	0.740	9
57. Variations in the cost of materials	External	0.738	10

Factors of delay	category	RII	Rank
6. Inadequate oversight and site organization	Contractor	0.798	1
19. The contractor's quality control is insufficient	Contractor	0.786	2
31. The employee's decision-making procedure is too lengthy	Owner	0.778	3
59. Delay in the supply of supplies	External	0.771	4
40. Owner's failure to make cash payment	Owner	0.769	5
3. Lack of materials on the job site	Contractor	0.758	6
49. Communication gap and cooperation among construction stakeholders	External	0.755	7
22. Drawings have been updated	Consultant	0.751	8
16. Inadequate technical research by the contractor during the tender phase	Contractor	0.745	9
42. The primary contractor failed to pay the subcontractors on time	External	0.740	10

Figure 2

Regarding the first reason of delay, the contractors' answers acknowledge that the Drawings / specifications / documents that are not accurate is the most repetitive factor, however, participants from the owners and consultants are less concerned about this factor. Similarly, the owners' answers indicate that the most repetitive source of delay is the contractor's quality control is insufficient. While, The most repetitive factor from the consultant's point of view is inadequate oversight and site organization. Moreover, all of the owners, consultants and contractors agreed by ranking delay in the supply of supplies in the top 10 of the causes. In addition, both of the owner and consultant agreed that the contractor's quality control is insufficient in one of the top 10 causes. The contractors' respondents show that delay due to modifications to specifications one of the repetitive factors, while none of the consultants and owners rank it as one of the top 10 factors. However, the clients' point of view that the poor equipment of the contractor one of the most repetitive factor, as a result it ranked 6th. With regard to the second cause of delays, the contractors' respondents point out that the owner demanded an unreasonable time frame by contractors is the most critical causes of delays, whereas it did not mentioned by the owners and consultant as one of the top 10. While both of the consultants and owners completely agreed that the delay in lack of materials on the job site is the most repetitive cause of delays, therefore it ranked 4th and 6th respectively. Moreover, the clients have ranked the delay due to variation in the cost of materials in the 10th place. Relating to the third cause of delay, the consultants ranked the delay in the clients' decision-making procedure is too lengthy as the most critical cause of delays in projects. Furthermore, the contractors ranked the owners' financial limitations as the 5th factor, and the owners ranked too many client change order information in the same rank 5th, while the consultants ranked the delay of owner's failure to make cash payment as 5th as well. Finally, it is clear from the analysing of these tables that the contractors have chosen that 4 out of the top 10 factors are responsible by the consultant, whereas the owners have chosen contractors-related and external-related factors equally as each is 4 out of the top 10. In addition, the consultants have chosen that contractor-related and external-related are the most repetitive factors with 4 and 3 out of 10 respectively.

Rank and the Average Importance Index of Delays Categories According to All Respondents

Factors of group-related delays	Contractors		Owners		Consultants		Average	
	RII	Rank	RII	Rank	RII	Rank	RII	Rank
Contractor-related	0.6647	4	0.7689	3	0.7426	3	0.7254	3
Client-related	0.6845	3	0.7544	4	0.6982	4	0.7123	4
Consultant-related	0.7547	1	0.7881	2	0.7988	1	0.7805	1
External-related	0.7256	2	0.7893	1	0.7756	2	0.7635	2

Figure 3

The results of Figure 3 give an overall sight of the most important repetitive delay category in Egypt. The majority of participants highlight that the consultant-related causes are the most significant delays category, followed by the external-related causes. On the other hand, the client-related causes of delays are ranked as the least repetitive category to delays. In addition, all participants recognize that causes of delays associated with the contractor's category are the third factors in Egypt. The average relative relevance index for each of the four categories is used to calculate the total participants' point of view. As a result, the consultant and external groups are the most significant driver to construction delays in Egypt, followed by the contractor, then the clients cause of delay come least.

Analysis of the Severity of the Causes of Delays According to All Respondents

Factors of delay	Category	RII	Rank
23. Drawings / specifications / documents that are not accurate	Consultant	0.874	1
28. The consulting engineer's cooperation with the stakeholder groups was inadequate	Consultant	0.865	2
43. Contractors funding during building	External	0.861	3
31. The employee's decision-making procedure is too lengthy	Owner	0.854	4
3. Lack of materials on the job site	Contractor	0.849	5
8. Delay in the arrival of custom produced imported materials	Contractor	0.843	6
49. Communication gap and cooperation among construction stakeholders	External	0.837	7
56. Unskilled workforce	External	0.829	8
59. Delay in the supply of supplies	External	0.821	9
24. Due of lack of experience with the local circumstances, surroundings, and materials, the designer made a design mistake	Consultant	0.817	10
30. The engineer's acceptance of contractor submissions was delayed.	Consultant	0.804	11
37. The employee's financial limitations	Owner	0.796	12
45. The project's development management team was unavailable	External	0.788	13
4. Poor equipment	Contractor	0.782	14
1. Insufficient contractor expertise	Contractor	0.776	15
19. The contractor's quality control is insufficient	Contractor	0.769	16
21. Drawing completion and confirmation	Consultant	0.764	17
22. Drawings have been updated	Consultant	0.758	18
57. Variations in the cost of materials	External	0.751	19
54. Subsurface soil state (e.g. geological issue/water table issue)	External	0.745	20
55. Workforce limitation	External	0.736	21
50. Government policies and legislation are changing	External	0.729	22
38. The owner has suspended his staff' work	Owner	0.721	23
32. Excessive bureaucracy/disgruntled employer	Owner	0.714	24
13. Inadequate administrative personnel on the part of the contractor	Contractor	0.704	25
26. Modifications to specifications	Consultant	0.687	26
14. Disruption in mobilisation	Contractor	0.681	27
17. The contractor's improper management of project operations	Contractor	0.679	28

33. The customer demanded an unreasonable time frame	Owner	0.673	29
46. Inability to estimate the length and resources of a task due to a lack of information	External	0.667	30
58. Materials scarcity	External	0.661	31
35. Too many client change order information	Owner	0.657	32
44. Productivity is overestimated	External	0.648	33
52. Requesting a permission from the municipality/other government agencies	External	0.640	34
29. The consulting engineer's response time to the contractor was delayed	Consultant	0.634	35
10. Inadequate control over the distribution of site resources	Contractor	0.629	36
6. Inadequate oversight and site organization	Contractor	0.624	37
36. The client's involvement in the building activities	Owner	0.618	38
34. During building, the materials and specifications vary	Owner	0.611	39
41. Employee's failure to pay the contractor's payment claim (for finished work)	External	0.603	40
27. The consulting engineer's team allocated to the project lacked qualifications	Consultant	0.591	41
25. Time spent waiting for a site visit and the acceptance of testing and evaluation	Consultant	0.584	42
11. Method of development	Contractor	0.578	43
16. Inadequate technical research by the contractor during the tender phase	Contractor	0.570	44
40. Owner's failure to make cash payment	Owner	0.564	45
42. The primary contractor failed to pay the subcontractors on time	External	0.561	46
47. Insufficient performance assessment	External	0.554	47
15. Within the contractor' s organisation, safety standards and regulations are not observed	Contractor	0.547	48
9. Work that is inadequate	Contractor	0.539	49
12. Machine failure/breakdown	Contractor	0.531	50
51. Authorization for transportation	External	0.524	51
61. Inadequate equipment	External	0.512	52
18. The contractor's liquidity troubles	Contractor	0.506	53
7. Necessary Modifications	Contractor	0.488	54
20. The contractor's lack of cooperation among the entities	Contractor	0.479	55
39. The Employee's inadequate cooperation among the entities	Owner	0.470	56
48. Agreement amendments	External	0.464	57
60. Equipment washout	External	0.454	58
5. Incorrect time estimates	Contractor	0.442	59
2. Labour shortage	Contractor	0.437	60
53. The climate circumstances	External	0.426	61

Figure 4

From the analysis of the findings above, it can be seen that delay in drawings/specifications/ documents that are not accurate has been ranked as the first cause, which is responsible by the consultant, followed by the consulting engineer's cooperation with the stakeholder groups was inadequate. Then, contractors funding during building comes third. With regard to the top ten causes of delays, it can be observed that the external-related cause is the most responsible party for delays by 4 out of 10 causes. Afterwards, the consultant comes second with 3 factors, whereas the contractor comes third with 2 causes. Finally, the owner factor has only one cause in the top 10. Severity could be linked to the delivery quality and its impact to hand over stage (delays push tasks completed faster…however quality delivery might not be as good as the owner/standards are in place). Hence, there is a need for a more proactive and collaborative approach to the delays based on this factor analysis.

Analysis of the Severity Causes of Delay According to Each Group of Respondents

Factors of delay	Category	RII	Rank
21. Drawing completion and confirmation	Consultant	0.779	1
54. Subsurface soil state (e.g. geological issue/watertable issue)	External	0.773	2
23. Drawings /specifications/ documents that are not accurate	Consultant	0.768	3
38. The owner has suspended his staff' work	Owner	0.761	4
59. Delay in the supply of supplies	External	0.757	5
34. During building, the materials and specifications vary	Owner	0.750	6
9. Work that is inadequate	Contractor	0.748	7
48. Agreement amendments	External	0.742	8
29. The consulting engineer's response time to the contractor was delayed	Consultant	0.740	9
24. Due of lack of experience with the local circumstances, surroundings, and materials, the designer made a design mistake	Consultant	0.734	10

Factors of delay	Category	RII	Rank
1. Insufficient contractor expertise	Contractor	0.697	1
18. The contractor's liquidity troubles	Contractor	0.689	2
29. The consulting engineer's response time to the contractor was delayed	Consultant	0.684	3
54. Subsurface soil state (e.g. geological issue/watertable issue)	External	0.677	4
46. Inability to estimate the length and resources of a task due to a lack of information	External	0.669	5
24. Due of lack of experience with the local circumstances, surroundings, and materials, the designer made a design mistake	Consultant	0.662	6
56. Unskilled workforce	External	0.658	7
42. The primary contractor failed to pay the subcontractors on time	Contractor	0.647	8
40. Owner's failure to make cash payment	Owner	0.640	9
21. Drawing completion and confirmation	Consultant	0.639	10

Factors of delay	Category	RII	Rank
1. Insufficient contractor expertise	Contractor	0.785	1
40. Owner's failure to make cash payment	Owner	0.781	2
54. Subsurface soil state (e.g. geological issue/watertable issue)	External	0.779	3
47. Insufficient performance assessment	External	0.775	4
18. The contractor's liquidity troubles	Contractor	0.768	5
19. The contractor's quality control is insufficient	Contractor	0.759	6
36. The client's involvement in the building activities	Owner	0.757	7
30. The engineer's acceptance of contractor submissions was delayed	Consultant	0.751	8
61. Inadequate equipment	External	0.747	9
6. Inadequate oversight and site organization	Contractor	0.744	10

Figure 5

Based on the analyzing of the results in these tables, the following assessment of the top 10 major reasons of delays for each group's perspective is presented:

Regarding the first reason of delay, the contractors' answers acknowledge that the Drawing completion and confirmation is the most severity factor, however, participants from the owners have ranked this factor in the 10th place, while the consultants are less concerned about this factor as it does not be ranked from the top 10. Similarly, the owners' and consultants' answers indicate that the most severe source of delay is the insufficient contractor expertise which comes in the first place. In addition, both of contractors and owners agreed that the delay due of lack of experience with the local circumstances, surroundings, and materials, the designer made a design mistake is one of the top 10 of causes which it comes 10th and 6th, respectively. Moreover, all of the contractors, owners, and consultants agreed by ranking delay due to subsurface soil state (e.g. geological issue/water table issue) in the top 10 of the causes, which it comes 2nd, 4th, and 3rd respectively. In addition, it can be seen that the owners ranked the delay due to owner's failure to make cash payment as the 9th, whereas the consultants ranked it as the 2nd one of the causes. The contractors' respondents show that delay due to drawings / specifications / documents that are not accurate is one of the severity factors, while none of the consultants and owners rank it as one of the top 10 factors. However, the consultants' point of view that the contractor's quality control is insufficient as one of the most severe factor, as a result it ranked 6. With regard to the fourth cause of delays, the contractors' respondents point out that the owner has suspended his staff' work is the most critical causes of delays, whereas it did not mention by the owners and consultant as one of the top 10. While both of the consultants and owners completely agreed that the delay due to the contractor's liquidity troubles is the most severe cause of delays, it ranked 2nd and 5th respectively. Relating to the third cause of delay, the clients ranked the consulting engineer's response time to the contractor was delayed as one of the most critical causes of delays in projects. Furthermore, the contractors ranked the agreement amendments as the 8th factor, whereas the owners ranked the primary contractor failed to pay the subcontractors on time in the same rank which is the 8th, in addition the consultants ranked the delay due to the engineer's acceptance of contractor submissions was delayed as 8th. Finally, it is clear from the analysing of Figure 5 that the contractors have chosen that 4 out of the top 10 factors are responsible by the consultant and 3 out of 10 by external factors, whereas the owners have chosen the contractors-related, external-related, and consultant-related factors equally as each is 3 out of the top 10. In addition, the consultants have chosen that contractor-related and external-related are the most severity factors with 4 and 3 out of 10 respectively.

Rank and the Average Importance Index of Delays Categories According to All Respondents

Factors of group-related delays	Contractors		Owners		Consultants		Average	
	RII	Rank	RII	Rank	RII	Rank	RII	Rank
Contractor-related	0.7767	2	0.6543	2	0.7423	1	0.7244	2
Client-related	0.6981	3	0.6361	4	0.6698	4	0.668	4
Consultant-related	0.6749	4	0.6387	3	0.7253	3	0.6796	3
External-related	0.7848	1	0.6758	1	0.7328	2	0.7311	1

Figure 6

The results of Figure 6 give an overall sight of the most important severity delay category in Egypt. The majority of participants highlight that the external-related causes are the most significant delays category, followed by the contractor-related causes. On the other hand, the client-related causes of delays are ranked as the least severity category to delays. In addition, all participants recognize that causes of delays associated with the consultant's category are the third factors in Egypt. The average relative relevance index for each of the four categories is used to calculate the total participants' point of view. As a result, the external and contractor groups are the most significant driver to construction delays in Egypt, followed by the consultants, then the clients cause of delay come least.

Conclusion

This study focused on the questionnaire survey that was delivered to experts in the construction sector in Egypt and the factors that were mentioned in previous studies. 118 responses are analyzed to find the most significant delay and success variables for the Egyptian's building projects. However, this research is mostly concerned with generic issues and does not address specific project conditions. Where the factors may be applicable in every circumstance that arises throughout the course of the projects. Egypt is a developing country lacking some of the resources needed to successfully complete a building construction project within the allocated time and budget. This has had a negative impact on the economy's infrastructure development as well as the reputation of its building industry in the worldwide market. Cause of delays in construction building projects in Egypt according to the research shown derived from Continues modification to specifications even during the construction process as well as luck of cash flow. However, there is a different perspective on how stakeholders (owner, consultant and external stakeholders) can interpretate projects' delays, however there is a need to provide more accurate data.

Building Information Modeling (BIM) paradigm is in place, therefore there is a need to develop a collaborative culture in a project [53] to offer capacity of sharing projects' data and information despite the location. Egypt is an upcoming economy in the Middle East and Northern Africa, however lack of skilled forces as well as productivity overestimation cause project delay. Hence, there is a requirement to develop proactive behavior to project managers [54] to assure projects delivery and thus optimize project's performance.

Within the same context in the region improved communication and mitigated project risks by encouraged collaboration between project participants shown in Kuwait [55]. Moreover, the use of BIM and relevant technologies in the region (KSA – 59%, UAE 40% and 47% the rest of the region), shows the trend moving towards a more digitilised format. This digital transformation could be the starting point for Egypt aiming to hit the problem of projects' delays [56].

Acknowledgment

None.

Conflict of Interest

No conflict of interest.

References

1. Wells J (1984) the Construction Industry in the Context of Development: A new Perspective. Habitat International, 8(3): 9-28.
2. Du plessis C (2002a) agenda 21 for sustainable construction in developing countries. Pretoria, South Africa: CSIR Building and Construction Technology.
3. Moavenzadeh F (1978) Construction Industry in Developing Countries. World Development, 6(1): 97-116.
4. Ofori G (1990) The Construction Industry: Aspects of its Economic and Management. Construction economics. Singapore: Singapore University Press, pp.1-17.
5. Kasimu AM, Abubakar DI. (2012) Causes of delay in Nigeria construction industry. Interdisciplinary Journal of Contemporary Research in Business, 4(2): 785-794.
6. Mogbo TC (2004) Construction and National Integration strategies for Achieving National unit through the Redesign, Construction and Privatization of new Road and Railway Network in Nigeria, pp.1-2.
7. Olaniran HF (2015) On the role of communication in construction projects in Nigeria. International journal of scientific & technology research, 4(7): 129-131.
8. Baloi D, Price ADF (2003) Modelling global risk factors affecting construction cost performance. International journal of project management, 21(4): 261- 269.
9. Yates JK, Epstein A (2006) Avoiding and Minimizing Construction Delay Claim Disputes in Relational Contracting. Journal of professional issues in engineering education and practice, ASCE, 132(2): 168-179.
10. Scott S, Harris RA, Greenwood D (2004) assessing the new United Kingdom protocol for dealing with delay and disruption. Journal of Professional Issues in Engineering Education and Practice, ASCE, 130(1): 50-59.
11. Turin DA (1980) What do we mean by building? Habitat International, 5(3): 271-288.
12. Palani K (2000) Challenges Facing the Construction Industry: A Botswana Perspective. Proceedings of the 2nd International Conference on "Construction in Developing Countries: Challenges Facing the Construction Industry in Developing Countries". 15-17 November, Gabarone, Botswana.
13. Aziz RF, Abdel-Hakam AA (2016) Exploring delay causes of road construction projects in Egypt. Alexandria engineering journal, 55(2): 1515-1539.
14. Kim Y, Kim K, Shin D (2005) Delay Analysis Method Using Delay Section. Journal of Construction Engineering and Management, 131(11): 1155-1164.
15. Sullivan A, Harris FC (1986) Delays on large construction projects. International journal of operations and production management, 6(1): 25-33.
16. Assaf SA, Al-Hejji S (2006) Causes of delay in large construction projects. International journal of project management, 24(4): 349-357.
17. Kartam S (1999) Generic Methodology for Analyzing Delay Claims. Journal of Construction Engineering and Management, 125(6): 409-419.
18. Ansah RH, Sorooshian S (2018) 4P delays in project management. Engineering, construction, and architectural management 25(1): 62-76.
19. Keane P, Caletka A (2015) Delay analysis in construction contracts. 2nd ed. Chichester: Hoboken: Wiley-Blackwell.
20. Alaghbari W, Kadir RA, Salim A, Ernawati (2007) The significant factors causing delay of building construction projects in Malaysia. Engineering, construction, and architectural management, 14(2): 192-206.
21. Srdic A, Selih J (2015) Delays in Construction Projects: Causes and Mitigation. Organization, technology & management in construction, 7(3): 1383-1389.
22. Tumi SA, Omran A, Pakir AHK (2009) Causes of delay in construction industry in Libya. The International Conference on Economics and Administration.
23. Hamzaha N, Khoiry A, Arshad I, Tawil N, Che Ani A (2011) Cause of Construction Delay-Theoretical Framework. International building control conference, 20 (1): 490-495.
24. Arantes A, Ferreira LMDF (2020) Underlying causes and mitigation measures of delays in construction projects: An empirical study. Journal of financial management of property and construction, 25(2): 165-181.
25. Wang T, Ford DN, Chong H, Zhang W (2018) Causes of delays in the construction phase of Chinese building projects. Engineering, construction, and architectural management, 25(11): 1534-1551.
26. Yang J, Wei P (2010) Causes of Delay in the Planning and Design Phases for Construction Projects. Journal of Architectural Engineering, 16(2): 80-83.
27. Wong K, Vimonsatit V (2012) A study of the factors affecting construction time in Western Australia. Scientific Research and Essays, 7(40): 3390-3398.
28. Shahsavand P, Marefat A, Parchamijalal M (2018) Causes of delays in construction industry and comparative delay analysis techniques with SCL protocol. Engineering, construction, and architectural management, 25(4): 497-533.
29. Sambasivan M, Soon YW (2007) Causes and effects of delays in Malaysian construction industry. International journal of project management, 25(5): 517-526.
30. Odeh AM, Battaineh HT (2002) Causes of construction delay: traditional contracts. International journal of project management, 20(1): 67-73.
31. Fallahnejad MH (2013) Delay causes in Iran gas pipeline projects. International journal of project management, 31(1): 136-146.

32. Ruqaishi M, Bashir HA (2015) Causes of delay in construction projects in the oil and gas industry in the Gulf Cooperation Council countries: a case study. Journal of management in engineering, 31(3): 5014017.

33. Assaf SA, Alkhail M, Al-Hazmi M (1995) Causes of delay in large building construction projects. Journal of management in engineering, ASCE, 11(2): 45-40.

34. Chan DW, Kumaraswamy MM (1997) a comparative study of causes of time overruns in Hong Kong construction projects. Journal of Project Management, 15(1): 55-63.

35. AbdMajid MZ, McCaffer R (1998) Factors of Non excusable Delays that Influence Contractors' Performance. Journal of Management in Engineering, ASCE, 14(3): 42-49.

36. Alkass S, Harris F (1991) An integrated system that aids in the analysis of contractor's claims resulting from delays. Building Research and Information, 19(1): 56-64.

37. El-Rasas T, Marzouk M (2020) Fuzzy model for assessing delays in Egyptian residential projects. Journal of financial management of property and construction, 25(2): 225-246.

38. Adam A, Josephson PB, 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.

39. Kaming P, Olomolaiye P, Holt G, Harris F (1997) Factors influencing construction time and cost in Indonesia construction industry. Journal of Construction Management and Economics, 15(1): 83-94.

40. Aftab HM, Ismail A, Mohd RA, Ade AA (2011) Time Overrun in Construction Projects from the Perspective of Project Management Consultant (PMC). Journal of Surveying, Construction & Property, 2(1): 54-66.

41. SINGH R (2010) Delays and Cost Overruns in Infrastructure Projects: Extent, Causes and Remedies. Economic and political, 45(21): 43-54.

42. Flyvbjerg B, Holm MKS, Buhl SL (2004) What Causes Cost Overrun in Transport Infrastructure Projects? Transport Reviews, 24(1): 3-18.

43. Alkass S, Mazerolle M, Tribaldos E, Harris F (1995) Computer aided construction delay analysis and claims preparation. Construction management and economics, 13(4): 335-352.

44. Schumacher L (1996) An integrated and proactive approach for avoiding delay claims on major capital projects. Cost engineering, 38(6): 37-39.

45. George FJ (2001) claims and disputes in construction industry. AACE International transactions, start page CD31.

46. Alaloul WS, Hasaniyah MW, Tayeh BA, Kusumaningrum P, Hasiholan B, et al. (2019) A comprehensive review of disputes prevention and resolution in construction projects. MATEC web of conferences, 270: 5012.

47. Olusegun AE (2011) Abandonment of Construction Projects in Nigeria: Causes and Effects. Journal of Emerging Trends in Economics and Management Sciences (JETEMS), 2 (2): 142-145.

48. Adebisi EO, Ojo SO, Alao OO (2018) Assessment of factors influencing the failure and abandonment of multi-storey building projects in Nigeria. International Journal of Building Pathology and Adaptation, 36(2): 210-231.

49. Sweis G, Sweis R, Abu Hammad A, Shboul A (2008) Delays in construction projects: The case of Jordan. International Journal of Project Management, 26(1): 665-674.

50. Faridi A, El-Sayegh S (2006) Significant factors causing delay in the UAE construction industry. Construction Management and Economics, 24 (11): 1167-1176.

51. Jarkas A, Younes J (2014) Principal factors contributing to construction delays in the State of Qatar. International Journal of Construction Project Management, 6 (1): 39-62.

52. Gerges M, Ahiakwo O, Jaeger M, Asaad A (2016) Building Information Modeling and Its Application in the State of Kuwait. International Journal of Civil, Environmental, Structural, Construction and Architectural Engineering 10 (1): 81-86.

53. Kapogiannis G, Sherratt F (2018) Impact of integrated collaborative technologies to form a collaborative culture in construction projects. Built Environment Project and Asset Management, 8(1): 24-38.

54. Kapogiannis G, Fernando T, Alkhard AM (2021) Impact of proactive behaviour antecedents on construction project managers' performance. Construction Innovation, 21(4): 708-722.

55. Gerges M, Ahiakwo O, Aziz R, Kapogiannis G, Saidani M, Saraireh D (2016) Investigating and Ranking Labour Productivity Factors in the Egyptian Construction Industry. International Journal of Architecture, Engineering and Construction, 5 (1): 44-52.

56. Wells J (1986) The Construction Industry in Developing Countries: Alternative Strategies for Development. Croom Helm Ltd, London.