

Major delays in construction projects: A global overview¹

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Abstract

Over the years, delay in construction projects have been a persistent source of concern for construction practitioners, project developers and researchers. This has led the civil engineering and construction research community to develop various approaches and techniques in identifying the major causes of these recurrent eccentricities, globally. The primary objective of this paper is to present an overview of the major delays in construction projects and their causes across the globe with emphasis on the significance research studies conducted in selected countries. The paper is therefore, based on a literature review investigating the major delays in construction projects in selected construction industry globally. The paper could assist impending construction practitioners that may want to enter into the construction market anywhere in the world and upcoming researchers who may want to further explore construction-related projects delay to get an improved fundamental understanding of the major project delays encountered in the construction industry.

Keywords: Types of construction Delay, Major Construction Delays, Construction Projects

Introduction

Delay can be defined as the extension of timeline required to finish up a construction project (Hammadi & Nawab, 2016). Besides, whenever construction projects encounter delay, they are either lengthened or fast-tracked, which in turn incur extra cost (Subramani, 2014). To the owner, client or donor, delay signifies a loss of revenue via the lack of production facilities and rentable space, a total reliance on current facilities (Oloo & Ngugi, 2016) or inadequacy in the enforcement of building codes and regulations (Fakunle et al., 2020). Sometimes, delay causes excessive overhead costs to the contractor due to a number of reasons that may include prolonged work

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period, outrageous increase in material costs, and increase in labor cost (Assaf, Bubshait, Atiyah, & Al-Shahri, 2001).

Furthermore, considering the fact that the timely delivery of any form of project, be it telecommunication projects (Fashina, Abdilahi, & Fakunle, 2020) or construction projects (Olawale and Sun, 2010) is perceived as one of the most vital aspect of projects success, delay in construction projects can be seen as one of the most common and costly problem encountered in the construction industry and it is globally taken seriously (Abdul-Rahman et al., 2009; Moura et al., 2007; Olawale & Sun, 2010). Presently, many least developed and developing countries in Asia, Middle East, Africa and Europe are faced with the problem of construction delays (Ali, 2018; Alnuaimi & Mohsin, 2013; Kikwasi, 2013; Moura et al., 2007; Sambasivan & Soon, 2007). This implies that construction delays can have several negative effects on construction projects if not properly managed (Sheikh, Fakunle, & Fashina, 2020). Nevertheless, some of these delay effects include time and cost overruns, acceleration losses, low service quality, sudden contract termination, low efficiency, and disputes among key construction stakeholders etc. (Aibinu & Jagboro, 2002; Kikwasi, 2013). Globally, these delays affect the construction industry, without excluding the developed countries such as the US, UK, Australia, China, Japan etc. (Olawale & Sun, 2010; Sepasgozar et al., 2019).

This paper attempts to present an overview of the major delays in construction projects from a global perspective. In an effort to achieve this, a detailed literature review investigating the major delays in construction projects and their causes in selected construction industry across the globe was carried out. Moreover, this paper expands and provides an improved understanding of project delays in the global construction industry. This however, offers useful information that can guide future studies related to delay in construction projects.

Theory

Major Types of Delays in Construction Projects

Delays in a construction project are expensive and often unavoidable (Ogburn & El-adaway, 2013). This is due to some factors that include insufficient planning, inconclusive owner, or external factor like natural disasters (Ogburn & El-adaway, 2014). Nevertheless, delays in construction affects every facet of any project, be it the cost, schedule or the reputation of the parties involved (Fashina, Fakunle, & Opiti, 2020). Consequently, delays in construction projects have been classified by various researchers and authors into different categories. However, majority of these classifications hold similar fundamental terms that are likened to one another (Al-Momani, 2000; Keane & Caletka, 2009). These include four major categories that are elaborated in the subsection below. Namely (Al-Momani, 2000; Keane & Caletka, 2009):

1. Critical or Non-critical;
2. Excusable or Non-excusable;
3. Compensable or Non-compensable;
4. Concurrent or Non-concurrent.

Non-Excusable Delays

This type of delay is mostly common with contractors or their suppliers (Ibironke, Oladinrin, Adeniyi, & Eboreime, 2013). For instance, a contractor is usually not eligible to demand for an extension of the contract deadline or a reimbursement for expenses incurred as a result of project delay. As such, a contractor does not have a right to give excuse as regards any delay traceable to him or his supplies. In addition, a contractor may be remunerated for such delays in order to hasten the pace of the project work, and the owner is permitted to enforce the penalty/charges for delay on the contractor (Ibironke et al., 2013). The charges are normally deducted from his dues, as described in the contract. Settled damages are commonly conveyed as a daily rate that is based on the estimation of costs likely to be incurred by the owner, peradventure, the project experiences a late completion due to delay by the contractor (Ibironke et al., 2013). The following are some of the specific events that can cause an inexcusable delay to occur:

- Delay in the start of a project.
- Delay in the procurement of project materials, tools, or necessary equipment.
- Inadequate planning and scheduling.
- Overall late performance and execution of contractor, subcontractor or suppliers.
- Issues related to quality and failures.

Excusable Delays

Excusable delay is a type of delay that is as a result of an unexpected event beyond the contractors or the subcontractor's control. Excusable delays are normally defined in the contract and it is the responsibility of the contractor and owner to refer to the construction contract documents for clarification (Ravisankar, Anandakumar, Krishnamoorthy, & M.Phill, 2014), which implies that any decision to be made concerning the type of delays must be done within the context of the specific contract. It is therefore, important that the factors that are considered valid delays to the construction project and those that justifies the extension of the completion date should be clearly defined in the contract document. For instance, it is specifically stated in some contracts that regardless of how intense or unexpected, time extension caused by weather conditions may not be allowed. According to the public agency specifications, delay caused by the following actions are generally considered as excusable delays (Al-Momani, 2000):

- General labor strikes
- Fires outbreak
- Floods
- Owner- directed changes
- Errors or oversights in the plans and specifications
- Contradictory site conditions or concealed conditions
- Typically sever weathers
- Interference by outside agencies
- Lack of action by government bodies, such as building inspection

Non-compensable Delays

A non-compensable delay is simply the type of delay where the contractor is not eligible for added compensation resulting from any excusable delay that may occur (Ravisankar et al., 2014). This means that a non-excusable delay permits neither additional compensation nor a time extension. However, whether or not a delay is compensable depends mainly on the term of the construction contract (Ibironke et al., 2013). Mostly, a contract specifies the types of delays that are regarded as non-compensable and those in which the contractor is not entitled to any additional money. However, such cases may grant the contractor a time extension.

Compensable Delays

Compensable delays are delays that allow the contractor to be eligible to a time extension as well as additional compensation. Unlike the non-excusable delays, excusable delays can be compensable (Keane & Caletka, 2009). Wars, uncommon weather, and environmental occurrences like earthquakes, fires outbreak, and acts of government are typical examples of this type of delay (Ibironke et al., 2013). For this type of delay, the contractor is usually not eligible for compensation for delay damages but he is entitled to a time extension (Keane & Caletka, 2009).

Critical and Non-critical Delays

Critical delays are delays that prevent the contractor from concluding the work on the scheduled timeline agreed upon in the construction contract (Alkass, Tribaldos, Mazerolle, & Harris, 1995). Generally, all projects have critical activities entrenched in their execution regardless of the type of schedule used. These critical activities are also known as the controlling item of work. The Critical Path Method (CPM) schedule helps detect these critical activities that are in a construction project (De La Garza, Prateapusanond, & Ambani, 2007). CPM usually attempts to achieve three key objectives that include calculating project's completion date, identifying the extent to which individual activities in the schedule could slip without delaying the entire project and identifying which activities in the schedule would have the highest risk of affecting the project completion date if they slipped (Lu & Lam, 2008).

One the other hand, it is significant to note that regardless of how a construction project schedule is to be used to analyze the identified delays there will constantly be a prevailing factor that will require considerable attention. This is referred to as the contemporary evidence that relates to daily reports, schedules in effect and other activity data available to imitate the current condition at the time of the delay (Iyer & Jha, 2006). Consequently, non-critical delays can be referred to as the delays that do not influence the project timeline but somehow, affect the advancement of the work activities (Barnes, 1988; Healy, 2007). It can thus be said that excusable and non-excusable delays are critical delays. This leaves non-critical delays as a separate delay classification.

Concurrent Delay

Like most of the other delay types, concurrent delays have numerous meanings as recommended by construction practitioners. The following are some of the definitions agreed upon by the Association for the Advancement of Cost Engineering (AACE) (Anon, 2000):

“Two or more delays that occur or overlap within the same period, either of which occurring alone would have affected the ultimate completion date.”

“Where two or more independent causes of delay occur during the same time period. The same time period being referred to is not always literally within the exact period of time but can be related by circumstance, even though the circumstance may not have occurred during the exact same period.”

“True concurrent delay is the occurrence of two or more delay events at the same time, one an employer risk event, the other a contractor risk event and the effects of which are felt at the same time.”

Generally, concurrent delay is broadly understood as the state where two or more delay activities happen at various times nevertheless, the impact is fully or partially felt at the same time (Healy, 2007). This often happens when both the owner and the contractor are responsible for the delay i.e. during an excusable but non compensable delay. Such delays essentially do not have to happen concurrently but can be on two parallel critical path chains (Healy, 2007). On the other hand, concurrent delays can be an excusable delay through compensation that may give the contractor some reliefs in terms of extension of time, cancellation of penalty on damages, and sometimes probable delay of damages subject to that particular situation and the prescribed agreement.

Critical and Non-critical Delays

Basically, this is the delay triggered by one of the parties involved in construction projects, with the remaining parties not partaking in accountability for it (Lu & Lam, 2008). This often happen when one of the work activities require more than the timeline to achieve such activities within the scheduled period (De La Garza et al., 2007). Critical Path Method (CPM) is one tool utilized to identify the duration of such delay alongside, the resulting cost, and its effect on the other activities. In addition, CPM supports the identification and information of party causing the delay and thus conveys the accountability and the costs of delay (De La Garza et al., 2007).

Related research studies on the contributing factors to delay in construction projects

A cope of studies has been carried out over the years, to establish the potential and actual causes of delay in construction projects in different countries and regions (Endut, Akintoye, & Kelly, 2005; Kikwasi, 2013; Le-Hoai, Lee, & Lee, 2008; Moura et al., 2007; Sepasgozar et al., 2019). These research studies covered areas like the causes, effects, risks and mitigation measures of delays in different types of construction projects and consequently, various aspects of construction delays have been explored in prior studies using various methods within different contexts. Studies like the one by (Moura et al., 2007) specified that in Portugal construction industry, over 40 percent of the construction projects experience delay. Le-Hoai et al. (2008) in their work also discovered from 87 construction experts that were interviewed in Thailand that delay in construction projects is a regular challenge faced by the Thailand construction industry.

Unlike the work by (Moura et al., 2007), approximately 66.7 percent of projects in private sector and 79.5 percent in the public sector experienced delay in a study carried out in Malaysia by (Endut, Akintoye & Kelly, 2005). Sambasivan & Soon (2007) in their investigation, also indicated that 17.3 percent of the public projects in the Malaysian construction sector encountered delay. In similar studies in the Middle East, Mahamid (2011) established in his study that 76 percent of the Palestine construction projects that were investigated encountered some delays, 80 percent of projects studied by Emam, Farrell & Abdelaal (2015) in Qatar also suffered delay, while in Oman, 40% of the respondents in a study by (Alnuaimi & Mohsin, 2013) indicated that the construction projects carried out by them were upset by delay. In the African context studies from different African nations have also revealed that many projects experience delays. Some of these studies include the work by (Mansfield, Ugwu & Doran, 1994) who investigated the causes of delay and cost overruns in Nigerian construction projects, Kikwasi, (2013) who explored the causes of delay in construction projects in Tanzania, Abd El-Razek, Bassioni & Mobarak (2008) who studied the causes of construction project delay in Egypt, Alinaitwe, Apolot & Tindiwensi (2013) who examined the causative factors of delay in public construction projects in Uganda and so on. Other continents also saw the work by (Sepasgozar et al., 2019) examined the factors that influence delays in construction projects in USA and Maués et al. (2017) on a case study that explored the basic construction delays in the Brazilian Amazon.

Furthermore, many researchers have conducted studies on factors causing delay in the construction sectors, globally (Alaghbari, Kadir, Salim, & Ernawati, 2007; Alinaitwe et al., 2013; Assaf, Al-Khalil, & Al-Hazmi, 1995; Fugar & Agyakwah-Baah, 1970; Mansfield et al., 1994; Moura et al., 2007; Sepasgozar et al., 2019). Several of the studies examined the delay in building projects (Abd El-Razek et al., 2008; Alaghbari et al., 2007; Assaf et al., 1995; Fugar & Agyakwah-Baah, 1970), some paid attention to the delays in highway projects (Ellis & Thomas, 2002; Manavazhi & Adhikari, 2002), while other explored the delay in construction projects as a whole (Abd El-Razek et al., 2008; Emam et al., 2015; Mansfield et al., 1994). However, a number of the well-established studies acknowledged that these factors are mostly related to financial challenges, inappropriate planning and scheduling, inexperienced/unskilled contractor, and owner change order and design (Ellis & Thomas, 2002; Ogunlana, Promkuntong, & Jearkijrm, 1996; Sepasgozar et al., 2019). In one of the early studies, Chalabi and Camp (1984) identified unskilled workforce and inadequate planning at the very early stages of most project as two common delay factors in developing countries. This has since been validated by various other studies till date (Enshassi, Kumaraswamy, & Jomah, 2010; Sepasgozar et al., 2019; Sweis, Sweis, Abu Hammad, & Shboul, 2008). Alkass & Harris (1991) in another early work pinpointed workers strikes, rework, poor organization, material shortages, equipment failures, change orders, and acts of God as some of the causes of construction delay.

In 1995, 56 causes of delay in large building projects were reported by Assaf et al. (1995). The authors in their study, identified financing group delay factors as the highest ranked delay factor among the 56 causes of delay discussed in the study (Assaf et al., 1995). Similarly, Ogunlana et al., (1996) presented the results of a study in 1996 that explored the causes and effect of delays in building construction projects. The authors categorized the causes of delays into six groups that include owners, designers, construction managers, contractors, and resources suppliers. Improving on the work by (Ogunlana et al., 1996), Abd. Majid & McCaffer (1998) identified 57

major causes of delays and classified them into eight categories that include client-related delays; finance-related delays; consultant-related delays; contractor-related delays; equipment-related delays; material-related delays; manpower-related delays; and external-related delays.

By the year 2000, the result from the study by (Al-Momani, 2000) revealed that major causes of delay in the construction of public projects are related to the designers, user changes, weather, site conditions, late deliveries, economic conditions, and increase in quantity. Considering the views of contractors and consultants, Odeh & Battaineh (2002) also identified seven delay factors as the major factor among the ten discussed in their study. These include owner interference, inadequate contractor experience, financing and payments, labor productivity, slow decision making, improper planning, and subcontractors (Odeh & Battaineh, 2002). In the same year, Aibinu & Jagboro (2002) found out that the number of change orders; financial constraints; and owners' lack of experience in construction were the three main causes of time delays in the construction of private residential projects.

Similar to the work by (Aibinu & Jagboro, 2002), a time performance survey was conducted by Assaf & Al-Hejji (2006) to investigate the causes of delay in construction projects. The authors ranked the causes according to the perceptions of the 15 owners, 19 consultants, and 23 contractors that partook in the intensive field survey (Assaf & Al-Hejji, 2006). The authors in their findings established that the most shared cause of delay among the 73 causes of delay identified by all three parties was "change order" (Assaf & Al-Hejji, 2006). Although many identified causes are common between two parties, all the parties involved in construction projects believe that traffic control and restrictions at site; changes in government regulation; accidents during construction activities and the effect of social and cultural factors are four delay causes that are of the least importance (Assaf & Al-Hejji, 2006). The following year saw the work by (Alaghbari et al., 2007), where the authors provided some insights obtained from various project stakeholders, concerning the causes and effects of delays in construction project. The authors pointed out that the most significant external factors that causes delay in construction projects include the lack of materials, and the unavailability of equipment and tools in the market while poor weather conditions and delays in materials transportation are next in their ranking (Alaghbari et al., 2007).

The factors that influence delay in residential projects was explored in the work by (Sweis et al., 2008). The study ascertained that too many change orders by the owner and the financial hitches faced by the contractor are the foremost causes of construction delay (Sweis et al., 2008). The works by (Abd El-Razek et al., 2008; Le-Hoai, Lee and Lee, 2008) are two prominent studies in 2008 besides the work by (Sweis et al., 2008). On one side, Le-Hoai, Lee and Lee (2008) via a quantitative approach explored the causative factors of delays in large construction projects and identified financial problem of owners, poor project management, and poor site monitoring as the most significant causes of construction delays. On the other hand, Abd El-Razek et al., (2008) identified the following five causes of delay as the most significant: design changes by owner or his agent during construction; partial payments during construction; non-utilization of professional construction/contractual management; financing by contractor during construction; and delays in contractor's payment by owner.

Exploring the major causes of delay in construction projects in 2010, Enshassi et al. (2010) carried out a questionnaire survey that involved only contractors. They found that fluctuation in prices of

materials, delay in materials supply to construction site, slow permits by local authorities, incompetent sub-contractors, and design changes are the underlying factors that delay construction projects (Enshassi et al., 2010). In a similar questionnaire survey study, Kikwasi (2013) in his findings indicated that frequent changes in design, delayed payment to suppliers, improper project management, lack of coordination among construction stakeholders involved in the project, and incompetent contractors are all critical factors that contribute to construction delays. Also, the study by (Alinaitwe, Apolot & Tindiwensi, 2013) ranked the three most causative factors of delay as modifications to the scope of project, late payments, and deficient monitoring of site. In addition, the findings of a questionnaire survey by (Shehu, Endut & Akintoye, 2014) in 2014 revealed that there exist five major delay factors that leads to delay in construction projects. The delay factors include financial problems faced by the contractor, delay in materials delivery, fluctuation in materials prices, unavailability of materials, and unexpected site condition, as perceived by the 205 construction experts involved in the survey (Shehu et al., 2014). Like in the findings of (Shehu, Endut & Akintoye, 2014), a questionnaire survey study in 2015 by (Emam et al., 2015) revealed that the most significant delay causes are changes in design, ineffective planning and scheduling, changes in scope project, under estimated project schedule, and shortage of skilled labor. In a notable work, Moura, Teixeira & Pires (2007) revealed poor site supervision and management by the contractor, variation in prices of materials and financial problems of contractors as the most important factors that influence delays in construction industry.

In a recent study, Zidane & Andersen (2018) identified the top ten universal delay factors in construction projects from an intensive literature review that was complemented by delay factors in major Norwegian construction projects based on empirical data. Chen et al. (2019) in a more recent and notable study, examined the causes of delay in grain bin construction projects. The findings from their work indicated that contractor-related delay is the most important category of the causes of delay in grain bin construction projects (Chen et al., 2019). The authors also revealed in their study the existence of the five topmost delay causes related to grain bin construction project delays. They include shortage of adequate equipment, poor communication among contracting parties, problems with subcontractors, inadequate experience of the design team and frequent change orders by clients (Chen et al., 2019).

Moreover, a careful comprehensive literature review carried out in the current paper shows that the causes of delay vary from country to country and from one project types to another and there exist some significant aspects of delay in construction projects.

Conclusions

In conclusion, the aim of this paper has been successfully attained, following the review of relevant review of prior studies in the literature on the major delays in construction projects and their causes. As indicated previously, the construction industries in developed countries are not exempted from the impacts of delays, despite the advanced technological development in the construction sectors of developed countries like the US, UK, China, Australia and so on. This implies that delay in construction is a global phenomenon.

Furthermore, it can be observed from the literature that delays in construction projects are categorized in prior work into four major group that include critical or non-critical; excusable or non-excusable; compensable or non-compensable and; concurrent or non-concurrent. Also, it was discovered from literature that that the causes of project delay differ from country to country and from a type of project to another and there exist some significant aspects of delay in construction projects that is peculiar to some countries and regions.

The paper is therefore important to key stakeholders within the global construction industry particularly, the imminent construction practitioners that may want to enter into the construction market anywhere in the world and it is proffers useful information that can guide upcoming researchers who may want to further explore construction-related project delays.

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