

Exploring the common delay factors related to major parties involved in construction projects: A systematic review ¹

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Abstract

Construction projects are mostly considered to be complex and the implementation of such projects are basically risky particularly, when the proper tactics to address this complexity are missing. As such, many construction projects are faced with undesirable outcomes during the implementation phase such as delay in project completion. This is a fundamental challenge that is traceable to the fact that a number of parties are involved in the management of these projects. Consequently, this paper explores the common delay factors related to major parties involved in construction projects. This was achieved via a literature review, by identifying and grouping the delay factors that are common in practice into four categories that include contractor-related factors, consultant-related factors, owner-related factors and others factors. The paper provides significant information for new construction practitioners who may want to start practicing in any construction industry worldwide. Impending researchers are also provided with an improved underlying understanding of the common delay factors related to major parties involved in the construction projects which can help validate their findings in the future.

Keywords: Common Construction Delay, Roads, Construction Industry, Major Parties Involved in Construction Projects, Low-income Countries

Introduction

Since the creation of the universe, construction have been seen as an essential need for humanity, predominantly, the need for a shelter (Costanza et al., 2007; Shackleton & Shackleton, 2004). The

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early construction project recorded in human history is the building of a house (Hendrickson & Au, 2008; Pérez-Lombard, Ortiz, & Pout, 2008), and within a short period of time, construction projects improved to a stage where professionals and skilled works are required (Pérez-Lombard et al., 2008). As such, there is a growing demand for construction projects till date, globally. This has led construction industries worldwide to constantly explore significant ways of erecting buildings with high quality, that meets environmental protection requirements, public health and safety requirements, and most recently energy efficiency requirements using trailblazing construction technology and new level of insights/knowledge (Sheikh, Fakunle, & Fashina, 2020).

Consequently, construction stakeholders such as investors, contractors, architects, consultants, materials suppliers are needed in the implementation of these projects. However, the participation of the different parties throughout the lifecycle of the construction projects mostly lead to unwanted challenges (Zou & Zhang, 2009). These challenges affect the productivity, performance and success of construction projects and in turn often leads to the complete abandonment of the entire project(s) by all parties involved (Aibinu & Jagboro, 2002). In fact, these projects are mainly faced with the challenge of delay in completion that affect all aspects of the projects, be it the cost, schedule or the reputation of the parties involved (Aibinu & Jagboro, 2002).

Delay in the construction industry is a global challenge and it is known to be the most common (H. Abdul-Rahman et al., 2006), expensive (Baloi & Price, 2003), risky (Mills, 2001), and a comprehensive problem associated with both private and public construction projects (Li, Akintoye, Edwards, & Hardcastle, 2005). This implies that a delayed project will always have undesirable consequences on the final outcome of such project. Furthermore, like in the telecommunication industries where projects are faced with challenges (Fashina, Abdilahi, & Fakunle, 2020), delays in construction projects downshifts economic activities (Global_Construction, 2015), weaken employment opportunities (Hart, 1973), and can dampen foreign investors (Neary, 2009). These are fundamental challenges in the construction industry that motivated this research.

Thus, the aim of this paper is to present a systematic review on the common delay factors related to major parties involved in construction projects. This paper thus offers useful information that can guide impending research studies related to construction project delays. Moreover, this paper increases the knowledge required to better understand the impacts of stakeholders on project delays in the global construction industry. The first part of this paper presents the background introduction of the link between construction project delays and the impacts of parties involved. The second part explores the major parties involved in construction projects with a focus on the contractors, consultants and owners. In addition, an empirical review on the common delay factors in practice that are related to the major parties involved in construction projects is presented in the third part. The last part of this paper presents the concluding remarks.

Theory

Major parties involved in construction projects

There are three primary parties involved in a construction project and they include the owner, the consultant, and the contractor. Individually, the three parties have their roles to play in the different

stages of the construction project. In order to finish the construction project in the most efficient way, a collaborative tactics between the owner, consultant and contractor is required (Meng, 2012). Furthermore, it is important to note that the donors for most construction projects in low-income countries are considered as co-owners of the project, since they provide funding for the different construction project in these countries (Griffis and Bates, 2006; Wu, Fang, & Li, 2015).

Owner

The owner of the project is referred to as the party that owns, manages, and provided funding for the project. To manage the different phases of the project, particularly, the implementation stage, the owner assigns either a construction company or an individual to represent him (Knapp, Long, & Howell, 2014). Consequently, the owner's representative is endowed with the responsibilities of taking crucial decision-making on the project, and choosing the proper parties needed to implement the project (Huang & Hinze, 2006). However, it is the responsibility of the owner to set the appropriate operational criteria that is required for a successful completion of the project (Griffis and Bates, 2006). In addition, it is the duty of the project owner to set parameters on total cost, payments principal milestones, and the deadline for completion of the project (Harrison & Lock, 2017).

Contractor

A contractor is known as the party that is assigned with the task to implement one or more of the phases of a construction project, occasionally, some construction project requires the services of sub-contractors to carry out some activities of the project or even the entire project (Edward R. Fisk & Reynolds, 2010; Fulford & Standing, 2014). Furthermore, the contractor is responsible for the routine of all work in agreement with the contract documents. These comprise of all personnel, equipment, material, and knowledge essential to advance the project (Suprpto, Bakker, Mooi, & Moree, 2015).

Consultant

Similar to the telecommunication industry, a consultant in the construction industry is said to be the party assigned by the owner to prepare the feasibility studies, project designs, and contract documents needed for the project (Abdilahi, Fakunle, & Fashina, 2020; Assaf & Al-Hejji, 2006). The role of a consultant sometimes extends to the execution phase, particularly, when some problems appear and a modification is required in the project designs.

Empirical review

The empirical literature review was conducted through articles related to the research area, published books on construction, related conference proceedings, and other e-resources. This section explores the possible delay factors that could be encountered in any construction project via a detailed review of the literature. The delay factors that are common in practice are identified and grouped into four categories. These include contractor-related factors, consultant-related factors, owner-related factors and others factors.

Delay factors related to contractor

When a construction firm is involved in a big construction project, a contractor is usually given the responsibility to carry out most of the construction works/activities. However, in the case where the project does not meet up with the deadline or is not finished within the assigned budget, the contractor is always answerable (Abdul-Rahman, Hamzah, Takim, & Min, 2009). In practice, a contracting business is usually challenging and quite demanding, since it involves several complex activities.

Essentially, the way a contractor responds to specific situations mostly depend on the contract type and nature of the work (Gebrehiwet & Luo, 2017; Ndekugri, Braimah, & Gameson, 2008). Likewise, the ability of a contractor to complete a project according to the planned project schedule is dependent on the accessibility of resources (integrating money, workforce, materials, and equipment) and decision-making competence (Gündüz, Nielsen, & Özdemir, 2013; Ibronke, Oladinrin, Adeniyi, & Eboime, 2013). In addition, the contractor outsources for his workforce either by sub-contracting or direct hiring. As such, if a construction delay is traceable to the sub-contractor, both the owner and the key contractor have the responsibility to devise a possible solution to tackle such problem (Gündüz et al., 2013; Ibronke et al., 2013). It is therefore, crucial for the contractor to regularly oversee the work performance of sub-contractors to sustain a balance between the different construction activities (Zidane & Andersen, 2018).

Contractor-related delay factors have for long been identified as one of the main causes of schedule delays in construction projects (Chan & Kumaraswamy, 1996). Contractor-related delay factors includes unproductive project planning and scheduling, inexperience of contractor, recurrent change of subcontractors, outdated technology, unsuitable construction methods, rework due to errors etc. (Zidane & Andersen, 2018). Nevertheless, there exist some other factors associated with the contractor that could lead to delays in construction project (Fakunle & Fashina, 2020) and they can be generally categorized into four. These include materials, equipment, workforce, and project management performance.

Materials

Materials are one of the overbearing mechanisms of any construction project and also the main disbursement for the donor, client or owner (Ayman, 2000; Zidane & Andersen, 2018). Looking at this from the contractor's perspective, an on-site management of materials is just one side of the picture. In practice however, the planning for material procurement is energetic for the contractor at the early planning stages of the construction project (Durdyev, Omarov, & Ismail, 2017; Hammadi & Nawab, 2016). The failure to yield an appropriate procurement plan, or deprived material handling by the contractor, can easily lead to delays and several other difficulties like the theft or degradation of construction materials (Durdyev et al., 2017).

Shortage and delay in materials supply has been argued globally to be one of the most vital factors that lead to delay in the delivery of a construction project (Rahman, Yap, Ramli, Dullah, & Shamsuddin, 2017). However, the related fundamental reasons may vary from nation to nation. The most important cause for scarcity of materials relates to the source or accessibility of construction materials (Rahman et al., 2017). On the contrary, poor materials procurement and inventory management system are perceived to be the most significant cause of delay in material

supply (Rahman et al., 2017). This further has some other primary reasons such as late identification of the type of materials required. Material-related delays may include the shortage of construction materials, poor quality of construction materials, poor procurement of construction materials, imported construction materials, escalation of material prices, late delivery of materials and unreliable suppliers (Rahman et al., 2017; Sambasivan & Soon, 2007).

Equipment

Construction equipment and machinery are often utilized to do repetitive tasks and operations (Prajeesh & Sakthivel, 2016). There exists numerous equipment that is been used in the construction industry for small- and large-scale activities (Al-Momani, 2000; Zidane & Andersen, 2018). The equipment utilized in the construction industry can be categorized into operators or haulers depending on the function to be performed (Le-Hoai, Lee, & Lee, 2008; Prajeesh & Sakthivel, 2016). Operating equipment on one side comprises of cranes and graders that stays within the perimeter of the construction site, while on the other hand, haulers include dump, trucks, and other transportation equipment that are normally utilized for the movement of materials to and fro the construction site (Prajeesh & Sakthivel, 2016). Depending on the intended rate of usage, the contractors may to either choose to purchase or hire the equipment (Ibironke et al., 2013; Prajeesh & Sakthivel, 2016). Since it is the fundamental responsibility of the contractor to select the appropriate equipment type, ensure on-time delivery, seek proper maintenance, and prevent equipment from damaging when acquiring or hiring, the construction process could be faced with some delays if the contractor fails to adequately carry out his responsibilities, as regards the equipment (Zidane & Andersen, 2018).

However, there is no consensus among contractors and consultants as regards equipment-related delays (Susanti Djalante, 2019). The contractors believe that the low level of equipment operator's skill is one of the major factors that cause delay in construction project while consultants have classified the absence of high technology mechanical equipment as the first delay factor related to equipment (Zidane & Andersen, 2018)

Workforce

The major task in the construction industry today is labor (Abd. Majid & McCaffer, 1998; Shahsavand, Marefat, & Parchamijalal, 2018). Human resources or workforce is also seen as one of the most vital features of construction operations and processes. Workforce of a construction project comprises of the site supervisors, site inspectors, technicians, and civil, mechanical and electrical engineers. Workforce can be grouped into three, based on the skill level and they are unskilled, semi-skilled, and skilled manpower. A rigorous selection and effective management of these groups can be very vital to the success of any construction project (Abd. Majid & McCaffer, 1998; Abdul Kadir, Lee, Jaafar, Sapuan, & Ali, 2005).

In most low-income countries, the mainstream of construction businesses and contractors are local, but they do bring in some foreign experts with a vast construction industry background. However, outsourcing workforce from foreign nations can be a little tricky. This is because it involves numerous processes that can be very complex and time-consuming (Zidane & Andersen, 2018). These include the selection process, testing, health insurance, and travel and accommodation expenses and so on (Zidane & Andersen, 2018). Most times, due to the cultural

differences between the different nationalities involved in a project, different approaches to work and language barriers can be a factor to construction delay. This can in turn hinder the progress of the project.

Project management performance

Project management performances in construction projects have positive effects on the success of such projects. Following the novel advances in the project management framework, the project management setting is becoming more complex (Healy, 2007). This is why the project management setting is perceived as an unstable environment that changes daily. Consequently, the utilization of many skills like collaborative work, project planning, effort-free delivery techniques are needed to successfully apply project management (Healy, 2007). In spite of this, many contractors are still faced with few barriers to the successful implementation of project management (Alzahrani & Emsley, 2013).

Throughout a construction project, the contractor carries out several duties that is instrumental to project management performance (Alzahrani & Emsley, 2013). They majorly include planning & scheduling, communication & management, and monitoring & controlling of suppliers and sub-contractors (Zidane & Andersen, 2018). However, in an effort to ensure successful project monitoring and control, the contractor is required to implement the appropriate communication plan. This is mostly achieved by involving the construction stakeholders such as the client, consultant, sub-contractors, suppliers, construction management, and available local authorities (Bal, Bryde, Fearon, & Ochieng, 2013; Olander, 2007; Ward & Chapman, 2008).

Furthermore, another issue that is seen to have a negative impact on a construction project is quality control (Arditi & Gunaydin, 1997; Barnes, 1988; Bomberg & Lstiburek, 2018). This may sometime lead to repetition of activities, particularly, when sufficient care is not taken to accomplish the mandatory quality standard (Zidane & Andersen, 2018). It is therefore, important that contractors must bear in mind that on-site training and motivation could increase the efficiency of the workers.

Delay factors related to consultant

Most times, the client consults construction professionals that are often referred to as consultants to assist him/her in establishing an entire construction project. They are entrusted with the task to design the infrastructure of the project (Alaghbari, Kadir, Salim, & Ernawati, 2007; Glasser, 2002). Such design may include architectural, mechanical, structural, and electrical designs (Ibironke et al., 2013). They could also be required to prepare some related project documents like the tender, bills, drawing and specification documents (Mansfield, Ugwu, & Doran, 1994). Furthermore, in some cases, the consultants can also mastermind the project planning, cost control and estimation, and quality control (Barnes, 1988; Healy, 2007; Lester, 2007).

In an ideal circumstance, consultant-related delays do occur in the course of preparing drawings, accepting of design drawings, endorsing designs from contractors and client, and carrying out inspection procedures (Healy, 2007). There are many possible reasons behind these types of delays; the notable factors are; unskilled consultancy staff, inadequate qualifications, insufficient communication and coordination skills, and improper planning (Assaf & Al-Hejji, 2006; Braimah,

2013; Braimah & Ndekugri, 2009; Zidane & Andersen, 2018). Some researchers are also certain that the enquires and inspections of consultant throughout the construction processes normally slow down the pace of the project (Braimah & Ndekugri, 2009).

Delay factors related to owner

Throughout the entire construction process, the owner or client is considered as the main participant. Since the responsibilities of the owners are often burdensome, researchers suggest that they require the services of knowledgeable parties such as a project manager that can adequately manage or organize the construction project (Hwang, Zhao, & Goh, 2014; Zidane & Andersen, 2018). In addition, one of the most critical decisions that owners must make at the start of the project is to ascertain the period required to carry out the contract (Keane, Sertyesilisik, & Ross, 2010; Zhao, Lv, Zuo, & Zillante, 2010). Although most of the owners prefer an early project completion, they need to carefully conduct sufficient investigation that will guide the contract duration (Zidane & Andersen, 2018). The failure of the owner to entrust the construction site to the contractor at the start of the project is also another vital delay factor (Assaf & Al-Hejji, 2006). Consequently, the owner's prompt decision on different matters in the early stages of the project and the involvement of the workforce could hasten the progress of the project (Alnuaimi, Taha, Al Mohsin, & Al-Harhi, 2010; Assaf & Al-Hejji, 2006; Enshassi, Arain, & Al-Rae, 2010). Although the owner is required to participate in the vertically and horizontally in construction project, they must do this without intruding the project plans of the contractor (Hwang & Low, 2012). Furthermore, it is important for the owner to ensure that funds are made available on time because the instability of funds can lead to project delay or extension (Assaf & Al-Hejji, 2006; Hwang & Low, 2012).

Other factors

There are two other crucial factors that do cause delay in construction projects and they are delays related to early planning and design, and external factors (Rathinakumar, Vignesh, & Dhivagar, 2017).

Early planning and design

Depending on the situation, early planning and design stage can either affect the lifecycle of a project positively or unpleasantly. This implies that a precise, suitable and accurate construction plan can lead to a smooth and progressive construction activities and eventually meeting up with project timeline (Issa, 2013; Zwikael, 2009). However, adequate attention is required as well as substantial information regarding the project and interconnected matters and extensive information about the project and interconnected matters. In addition, unclear and unfinished construction design, documents, and specifications could generate an unfriendly situation between the owner and some construction participants (Issa, 2013; Zwikael, 2009). It is thus, vital to identify the critical role of drawings in the initial design phases, and, as such, an appropriate communication or organization plan will be of great significance (Taleb et al., 2017).

External factors

Some factors are outside the control of construction participants. For instance, in the summer, some parts of some countries like Somaliland experience a very harsh weather condition. For example, in Berbera, the temperature is usually between 41 and 46 degrees Celsius in the summer (Omar, Fashina, & Fakunle, 2020). In such harsh circumstances, contractors may be faced with several complications that generally lead to the declination of the construction process (Sheikh et al., 2020) or occasionally, an immature termination of works (Chan, Scott, & Chan, 2004). These complications may include interruption due to utility lines such as electricity, water or gas and sometime social and cultural festivals/celebrations can also intrude the time required for the workforce to get to the construction site, particularly if they do not stay on-site or cultural differences (Kim, Kim, Shin, & Kim, 2015) or when there is a deficiency in the enforcement of building codes and regulations (Fakunle, Opiti, Sheikh, & Fashina, 2020).

Inflation in the prices of raw materials or exchange rate can also negatively affect a construction project as this is a factor that is not within the control of the owner and contractor (Durdyev et al., 2017). A similar case happened in Libya in 2011, where most of construction projects were forced to stop, due to the doubling in the price of steel (Shebob, Dawood, Shah, & Xu, 2012; Shebob, Dawood, & Xu, 2011). External factors can also generate disputes between the construction stakeholders and in turn increase the project cost and duration (Fenn, Lowe, & Speck, 1997; Rauzana, 2016). Findings from prior work have also shown that, majority of the highly ranked reasons for delays in construction projects are traceable to external causes, rules and situations, terrorization and wars, and natural disasters like earthquakes or floods (Haseeb, Xinhai-Lu, Bibi, Maloof-ud-Dyian, & Rabbani, 2011).

Conclusions

This paper has explored the common delay factors related to major parties involved in construction projects through a systematic review of the relevant literature. As indicated previously, the three key parties involved in construction projects are the owners, the consultants, and the contractors. These parties at different phases of a construction project play diverse roles, independently. However, as suggested by (Meng, 2012), it is important for these parties to collaboratively work together if any construction project is to be completed in the most effective or productive way.

Furthermore, the delay factors that are common in practice are grouped into four categories based on the major parties involved in construction projects. These consist of the contractor-related factors, consultant-related factors, owner-related factors and others factors. Unlike other parties, contractors are associated with significant delay factors that affect construction project as discussed in this paper. They include materials, equipment, manpower, and project management performance. Moreover, since contractors are typically given the responsibility to implement greater part of the routine construction activities in agreement with the contract documents, it is vital that on-site project management training and motivation should be carried out regularly to increase the efficiency of the workers and thus minimize construction project delays.

The paper is thus significant to new construction practitioners who may want to start practicing in any construction industry worldwide as it provides useful information that could guide them. The

study also offers impending researchers a basic and better understanding of the common delay factors related to major parties involved in the construction projects which could thus be used to validate their findings in the future.

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References

- Abd. Majid, M. Z., & McCaffer, R. (1998). Factors of non-excusable delays that influence contractors' performance. *Journal of Management in Engineering*.
[https://doi.org/10.1061/\(asce\)0742-597x\(1998\)14:3\(42\)](https://doi.org/10.1061/(asce)0742-597x(1998)14:3(42))
- Abdilahi, S. M., Fakunle, F. F., & Fashina, A. A. (2020). Exploring the extent to which project scope management processes influence the implementation of telecommunication projects. *PM World Journal*, IX(V), 1–17.
- Abdul-Rahman, H., Berawi, M. A., Berawi, A. R., Mohamed, O., Othman, M., & Yahya, I. A. (2006). Delay mitigation in the Malaysian construction industry. *Journal of Construction Engineering and Management*. [https://doi.org/10.1061/\(ASCE\)0733-9364\(2006\)132:2\(125\)](https://doi.org/10.1061/(ASCE)0733-9364(2006)132:2(125))
- Abdul-Rahman, Hamzah, Takim, R., & Min, W. S. (2009). Financial-related causes contributing to project delays. *Journal of Retail and Leisure Property*. <https://doi.org/10.1057/rlp.2009.11>
- Abdul Kadir, M. R., Lee, W. P., Jaafar, M. S., Sapuan, S. M., & Ali, A. A. A. (2005). Factors affecting construction labour productivity for Malaysian residential projects. *Structural Survey*.
<https://doi.org/10.1108/02630800510586907>
- Aibinu, A. A., & Jagboro, G. O. (2002). The effects of construction delays on project delivery in Nigerian construction industry. *International Journal of Project Management*.
[https://doi.org/10.1016/S0263-7863\(02\)00028-5](https://doi.org/10.1016/S0263-7863(02)00028-5)
- Al-Momani, A. H. (2000). Construction delay: A quantitative analysis. *International Journal of Project Management*. [https://doi.org/10.1016/S0263-7863\(98\)00060-X](https://doi.org/10.1016/S0263-7863(98)00060-X)
- Alaghbari, W., Kadir, M. R. A., Salim, A., & Ernawati. (2007). The significant factors causing delay of building construction projects in Malaysia. *Engineering, Construction and Architectural Management*. <https://doi.org/10.1108/09699980710731308>
- Alnuaimi, A. S., Taha, R. A., Al Mohsin, M., & Al-Harthi, A. S. (2010). Causes, Effects, Benefits, and Remedies of Change Orders on Public Construction Projects in Oman. *Journal of Construction Engineering and Management*, 136(5), 615–622.
[https://doi.org/10.1061/\(ASCE\)CO.1943-7862.0000154](https://doi.org/10.1061/(ASCE)CO.1943-7862.0000154)

-
- Alzahrani, J. I., & Emsley, M. W. (2013). The impact of contractors' attributes on construction project success: A post construction evaluation. *International Journal of Project Management*. <https://doi.org/10.1016/j.ijproman.2012.06.006>
- Arditi, D., & Gunaydin, H. M. (1997). Total quality management in the construction process. *International Journal of Project Management*. [https://doi.org/10.1016/S0263-7863\(96\)00076-2](https://doi.org/10.1016/S0263-7863(96)00076-2)
- Assaf, S. A., & Al-Hejji, S. (2006). Causes of delay in large construction projects. *International Journal of Project Management*. <https://doi.org/10.1016/j.ijproman.2005.11.010>
- Ayman, H. (2000). Construction delay: a quantitative analysis. *International Journal of Project Management*.
- Bal, M., Bryde, D., Fearon, D., & Ochieng, E. (2013). Stakeholder Engagement: Achieving Sustainability in the Construction Sector. *Sustainability*, 5(2), 695–710. <https://doi.org/10.3390/su5020695>
- Baloi, D., & Price, A. D. F. (2003). Modelling global risk factors affecting construction cost performance. *International Journal of Project Management*. [https://doi.org/10.1016/S0263-7863\(02\)00017-0](https://doi.org/10.1016/S0263-7863(02)00017-0)
- Barnes, M. (1988). Construction project management. *International Journal of Project Management*. [https://doi.org/10.1016/0263-7863\(88\)90028-2](https://doi.org/10.1016/0263-7863(88)90028-2)
- Bomberg, M. T., & Lstiburek, J. W. (2018). Quality Management in Construction Process. In *Spray Polyurethane Foam in External Envelopes of Buildings* (pp. 97–108). <https://doi.org/10.1201/9780203738900-5>
- Braimah, N. (2013). Construction Delay Analysis Techniques—A Review of Application Issues and Improvement Needs. *Buildings*. <https://doi.org/10.3390/buildings3030506>
- Braimah, N., & Ndekugri, I. (2009). Consultants' perceptions on construction delay analysis methodologies. *Journal of Construction Engineering and Management*. [https://doi.org/10.1061/\(ASCE\)CO.1943-7862.0000096](https://doi.org/10.1061/(ASCE)CO.1943-7862.0000096)
- Chan, A. P. C., Scott, D., & Chan, A. P. L. (2004). Factors affecting the success of a construction project. *Journal of Construction Engineering and Management*. [https://doi.org/10.1061/\(ASCE\)0733-9364\(2004\)130:1\(153\)](https://doi.org/10.1061/(ASCE)0733-9364(2004)130:1(153))
- Chan, D. W. M., & Kumaraswamy, M. M. (1996). An evaluation of construction time performance in the building industry. *Building and Environment*. [https://doi.org/10.1016/0360-1323\(96\)00031-5](https://doi.org/10.1016/0360-1323(96)00031-5)
- Costanza, R., Fisher, B., Ali, S., Beer, C., Bond, L., Boumans, R., ... Snapp, R. (2007). Quality of life: An approach integrating opportunities, human needs, and subjective well-being. *Ecological Economics*. <https://doi.org/10.1016/j.ecolecon.2006.02.023>
- Durdyev, S., Omarov, M., & Ismail, S. (2017). Causes of delay in residential construction projects in Cambodia. *Cogent Engineering*, 4(1), 1–12. <https://doi.org/10.1080/23311916.2017.1291117>
- Edward R. Fisk, & Reynolds, W. D. (2010). Construction Project Administration. In *Prentice Hall*.
-

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- Enshassi, A., Arain, F., & Al-Raei, S. (2010). Causes of variation orders in construction projects in the Gaza Strip. *Journal of Civil Engineering and Management*.
<https://doi.org/10.3846/jcem.2010.60>
- Fakunle, F. F., Opi, C., Sheikh, A. A., & Fashina, A. A. (2020). Major barriers to the enforcement and violation of building codes and regulations: a global perspective. *SPC Journal of Environmental Sciences*, 2(1), 12–18.
- Fakunle, F. F., & Fashina, A. A. (2020). Major delays in construction projects: A global overview. *PM World Journal*, IX(V), 1–15.
- Fashina, A. A., Abdilahi, S. M., & Fakunle, F. F. (2020). Examining the challenges associated with the implementation of project scope management in telecommunication projects in Somaliland. *PM World Journal*, IX(III), 1–16.
- Fenn, P., Lowe, D., & Speck, C. (1997). Conflict and dispute in construction. *Construction Management and Economics*. <https://doi.org/10.1080/014461997372719>
- Fulford, R., & Standing, C. (2014). Construction industry productivity and the potential for collaborative practice. *International Journal of Project Management*.
<https://doi.org/10.1016/j.ijproman.2013.05.007>
- Gebrehiwet, T., & Luo, H. (2017). Analysis of Delay Impact on Construction Project Based on RII and Correlation Coefficient: Empirical Study. *Procedia Engineering*, 196(June), 366–374.
<https://doi.org/10.1016/j.proeng.2017.07.212>
- Glasser, J. K. (2002). Factors related to consultant credibility. *Consulting Psychology Journal: Practice and Research*, 54(1), 28–42. <https://doi.org/10.1037/1061-4087.54.1.28>
- Global_Construction. (2015). A global forecast for the construction industry to 2030. *Oxford Economics and Global Construction Perspectives, London*.
- Griffis, F.H. and Bates, A. J. (2006). THE OWNER'S ROLE IN PROJECT SUCCESS. In *Construction Industry Institute*.
- Gündüz, M., Nielsen, Y., & Özdemir, M. (2013). Quantification of Delay Factors Using the Relative Importance Index Method for Construction Projects in Turkey. *Journal of Management in Engineering*, 29(2), 133–139. [https://doi.org/10.1061/\(ASCE\)ME.1943-5479.0000129](https://doi.org/10.1061/(ASCE)ME.1943-5479.0000129)
- Hammadi, S. Al, & Nawab, M. S. (2016). Study of Delay Factors in Construction Projects. *IARJSET*. <https://doi.org/10.17148/iarjset.2016.3420>
- Harrison, F., & Lock, D. (2017). *Advanced Project Management*.
<https://doi.org/10.4324/9781315263328>
- Hart, K. (1973). Opportunities and Urban Employment in Ghana. *The Journal of Modern African Studies*.
- Haseeb, M., Xinhai-Lu, Bibi, A., Maloof-ud-Dyian, & Rabbani, W. (2011). Problems of Projects and Effects of Delays in the Construction Industry of Pakistan. *Australian Journal of Business and Management Research*.
-

-
- Healy, P. (2007). Project management in construction. In *Design and Construction*.
<https://doi.org/10.4324/9780080491080>
- Hendrickson, C., & Au, T. (2008). Project Management for Construction, Fundamental Concepts for Owners, Engineers, Architects and Builders, Version 2.2. In *Perspective*.
- Huang, X., & Hinze, J. (2006). Owner's role in construction safety. *Journal of Construction Engineering and Management*. [https://doi.org/10.1061/\(ASCE\)0733-9364\(2006\)132:2\(164\)](https://doi.org/10.1061/(ASCE)0733-9364(2006)132:2(164))
- Hwang, B.-G., & Low, L. K. (2012). Construction project change management in Singapore: Status, importance and impact. *International Journal of Project Management*, 30(7), 817–826.
<https://doi.org/10.1016/j.ijproman.2011.11.001>
- Hwang, B.-G., Zhao, X., & Goh, K. J. (2014). Investigating the client-related rework in building projects: The case of Singapore. *International Journal of Project Management*, 32(4), 698–708.
<https://doi.org/10.1016/j.ijproman.2013.08.009>
- Ibironke, O. T., Oladinrin, T. O., Adeniyi, O., & Eboreime, I. V. (2013). Analysis of Non-excusable delay factors affecting Contractors' Performance in Lagos, Nigeria. *Journal of Construction in Developing Countries*.
- Issa, U. H. (2013). Implementation of lean construction techniques for minimizing the risks effect on project construction time. *Alexandria Engineering Journal*.
<https://doi.org/10.1016/j.aej.2013.07.003>
- Keane, P., Sertyesilisik, B., & Ross, A. D. (2010). Variations and Change Orders on Construction Projects. *Journal of Legal Affairs and Dispute Resolution in Engineering and Construction*.
[https://doi.org/10.1061/\(asce\)la.1943-4170.0000016](https://doi.org/10.1061/(asce)la.1943-4170.0000016)
- Kim, S., Kim, J.-D., Shin, Y., & Kim, G.-H. (2015). Cultural differences in motivation factors influencing the management of foreign laborers in the Korean construction industry. *International Journal of Project Management*, 33(7), 1534–1547.
<https://doi.org/10.1016/j.ijproman.2015.05.002>
- Knapp, S., Long, D., & Howell, G. (2014). The role of the Owner's Representative on IPD projects. *22nd Annual Conference of the International Group for Lean Construction: Understanding and Improving Project Based Production, IGLC 2014*.
- Le-Hoai, L., Lee, Y. D., & Lee, J. Y. (2008). Delay and cost overruns in Vietnam large construction projects: A comparison with other selected countries. *KSCCE Journal of Civil Engineering*.
<https://doi.org/10.1007/s12205-008-0367-7>
- Lester, A. (2007). Project Management, Planning and Control. In *Project Management, Planning and Control*. <https://doi.org/10.1016/B978-0-7506-6956-6.X5000-X>
- Li, B., Akintoye, A., Edwards, P. J., & Hardcastle, C. (2005). Critical success factors for PPP/PFI projects in the UK construction industry. *Construction Management and Economics*.
<https://doi.org/10.1080/01446190500041537>
- Mansfield, N., Ugwu, O., & Doran, T. (1994). Causes of delay and cost overruns in Nigerian

-
- construction projects. *International Journal of Project Management*. [https://doi.org/10.1016/0263-7863\(94\)90050-7](https://doi.org/10.1016/0263-7863(94)90050-7)
- Meng, X. (2012). The effect of relationship management on project performance in construction. *International Journal of Project Management*. <https://doi.org/10.1016/j.ijproman.2011.04.002>
- Mills, A. (2001). A systematic approach to risk management for construction. *Structural Survey*. <https://doi.org/10.1108/02630800110412615>
- Ndekugri, I., Braimah, N., & Gameson, R. (2008). Delay Analysis within Construction Contracting Organizations. *Journal of Construction Engineering and Management*, 134(9), 692–700. [https://doi.org/10.1061/\(ASCE\)0733-9364\(2008\)134:9\(692\)](https://doi.org/10.1061/(ASCE)0733-9364(2008)134:9(692))
- Neary, J. P. (2009). Trade costs and foreign direct investment. *International Review of Economics and Finance*. <https://doi.org/10.1016/j.iref.2008.06.004>
- Olander, S. (2007). Stakeholder impact analysis in construction project management. *Construction Management and Economics*. <https://doi.org/10.1080/01446190600879125>
- Omar, M. A., Fashina, A. A., & Fakunle, F. F. (2020). The status quo of Somaliland construction industry: A development trend. *PM World Journal*, IX(V), 1–18.
- Pérez-Lombard, L., Ortiz, J., & Pout, C. (2008). A review on buildings energy consumption information. *Energy and Buildings*. <https://doi.org/10.1016/j.enbuild.2007.03.007>
- Prajeesh, V. P., & Sakthivel, N. (2016). Management of Equipment & Machinery in Construction. *Ijiset*.
- Rahman, M. M., Yap, Y. H., Ramli, N. R., Dullah, M. A., & Shamsuddin, M. S. W. (2017). Causes of shortage and delay in material supply: a preliminary study. *IOP Conference Series: Materials Science and Engineering*, 271, 012037. <https://doi.org/10.1088/1757-899X/271/1/012037>
- Rathinakumar, V., Vignesh, T., & Dhivagar, K. (2017). Perception of Construction Participants in Construction delays: A case study in Tamilnadu, India. *IOP Conference Series: Earth and Environmental Science*, 80, 012047. <https://doi.org/10.1088/1755-1315/80/1/012047>
- Rauzana, A. (2016). Causes of Conflicts and Disputes in Construction Projects. *IOSR Journal of Mechanical and Civil Engineering*. <https://doi.org/10.9790/1684-1305064448>
- Sambasivan, M., & Soon, Y. W. (2007). Causes and effects of delays in Malaysian construction industry. *International Journal of Project Management*. <https://doi.org/10.1016/j.ijproman.2006.11.007>
- Shackleton, C., & Shackleton, S. (2004). The importance of non-timber forest products in rural livelihood security and as safety nets: A review of evidence from South Africa. *South African Journal of Science*.
- 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*. <https://doi.org/10.1108/ECAM-10-2016-0220>
-

-
- Shebob, A., Dawood, N., Shah, R. K., & Xu, Q. (2012). Comparative study of delay factors in Libyan and the UK construction industry. *Engineering, Construction and Architectural Management*, 19(6), 688–712. <https://doi.org/10.1108/09699981211277577>
- Shebob, A., Dawood, N., & Xu, Q. (2011). Analysing construction delay factors: A case study of building construction project in Libya. *Association of Researchers in Construction Management, ARCOM 2011 - Proceedings of the 27th Annual Conference*.
- Sheikh, A. A., Fakunle, F. F., & Fashina, A. A. (2020). The status quo of building codes and construction practices in Somaliland: practitioners' perceptions. *SPC Journal of Environmental Sciences*, 2(1), 4–11.
- Suprpto, M., Bakker, H. L. M., Mooi, H. G., & Moree, W. (2015). Sorting out the essence of owner–contractor collaboration in capital project delivery. *International Journal of Project Management*, 33(3), 664–683. <https://doi.org/10.1016/j.ijproman.2014.05.001>
- Susanti Djalante, S. D. (2019). Analysis of the Implementing Green Road Construction, Progress and Barriers (Study of West Java – Indonesia). *International Journal of Civil, Structural, Environmental and Infrastructure Engineering Research and Development*, 9(3), 37–50. <https://doi.org/10.24247/ijcseierdjun20195>
- Taleb, H., Ismail, S., Wahab, M. H., Mardiah, W. N., Rani, W. M., & Amat, R. C. (2017). An Overview of Project Communication Management in Construction Industry Projects. *Journal of Management, Economics and Industrial Organization*, 1–9. <https://doi.org/10.31039/jomeino.2017.1.1.1>
- Ward, S., & Chapman, C. (2008). Stakeholders and uncertainty management in projects. *Construction Management and Economics*. <https://doi.org/10.1080/01446190801998708>
- Wu, C., Fang, D., & Li, N. (2015). Roles of owners' leadership in construction safety: The case of high-speed railway construction projects in China. *International Journal of Project Management*. <https://doi.org/10.1016/j.ijproman.2015.07.005>
- Zhao, Z. Y., Lv, Q. L., Zuo, J., & Zillante, G. (2010). Prediction System for Change Management in Construction Project. *Journal of Construction Engineering and Management*, 136(6), 659–669. [https://doi.org/10.1061/\(ASCE\)CO.1943-7862.0000168](https://doi.org/10.1061/(ASCE)CO.1943-7862.0000168)
- Zidane, Y. J. T., & Andersen, B. (2018). The top 10 universal delay factors in construction projects. *International Journal of Managing Projects in Business*. <https://doi.org/10.1108/IJMPB-05-2017-0052>
- Zou, P. X. W., & Zhang, G. (2009). Managing risks in construction projects: Life cycle and stakeholder perspectives. *International Journal of Construction Management*. <https://doi.org/10.1080/15623599.2009.10773122>
- Zwikael, O. (2009). Critical planning processes in construction projects. *Construction Innovation*, 9(4), 372–387. <https://doi.org/10.1108/14714170910995921>
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