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Research article

Exploring the significant factors that influence delays in construction projects in Hargeisa

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ABSTRACT

Over the past decades, construction delays have been perceived as a global challenge that hinders the time delivery, budget, and quality of construction projects. It is the most common, expensive, and risky problem associated with both private and public construction projects. Within this context, the aim of this study is to investigate the significant factors that influence delays in construction projects in Hargeisa, using the road and building projects as a baseline. Through a questionnaire survey with 51 critical delay factors that are categorized into seven major groups, data were collected from 51 construction stakeholders selected based on simple random sampling from the different construction companies. Feedback from the respondents was analyzed using Relative Importance Index (RII) for ranking purposes. Results showed that delay in honoring payment progressively, underestimation or overestimation of the project cost, and delay in the approval of major changes in the work scope were ranked as the three major causes of delays in construction projects in Hargeisa. The implications of these results are vital to future projects as they clearly demonstrate how less attention is given to the application of project management tools such as robust cost, scope and risk management in construction projects. As such, construction stakeholders are recommended to make efforts to use the appropriate project management practices needed to manage the 16 identified critical delay factors, when executing future construction projects. Although, the current study focused on Somaliland construction projects, it expands and improves the understanding of delay factors in the global context, and as such can be applied to other countries and future studies.

1. Introduction

Unlike other industries, the construction industry has unique features that originate from various project's individual structure (Cooper et al., 2005; Kenley, 2012). These features include the category, scope, geographic location, and workforces of the construction project (Cooper et al., 2005; Loch et al., 2007; Kenley, 2012). Consequently, project implementation is fundamentally risky and the lack of a suitable tactic to address these risks has led to a lot of unwanted outcome during the course of executing construction projects (Gann and Salter, 2000; Blindenbach-Driessen and Van Den Ende, 2010). In an effort to meet up with the increasing human needs, new construction systems and projects are being implemented (Africa and Sachs, 2016). These include factories, hospitals, schools, bridges, Hydro dams and so on. In the current era however, construction projects are characterized by life-threatening complexity, and the extent to which the project time and cost can be managed (Pinto and Covin, 1989). As such, many parties are required to implement construction projects (Wang et al., 2004; Serpella et al., 2014). They include investors, contractors, architects, consultants, materials suppliers etc. The participation of the entire parties (i.e. stakeholders) in project implementation signifies a key challenge (Zou et al., 2007; Musonda and Muya, 2011; Falcone, 2018). However, the completion of a project within a specified time is one of the major objectives in project management.

Conventionally, the failure to accomplish the objective of most construction projects is due to inadequacies in the implementation processes, which eventually, leads to contractor and client's displeasure (Ika, 2012). These projects are regularly confronted with delays and cost overruns

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that pose countless problems to their implementations (Aibinu and Jagboro, 2002; Ika, 2012). Ideally, projects are expected to run recurrently without delays (Aibinu and Jagboro, 2002). Yet, construction delay is one of the major challenges faced by the global construction industry (Aibinu and Jagboro, 2002; Ika, 2012). Till date, the industry has come across a number of major projects that failed to meet up with the project deadlines as a result of not coping with delay in construction projects (Ika, 2012). These delays in construction projects downshifts economic activities (Global_Construction, 2015), diminish employment opportunities (Hart, 1973), and can discourage foreign investors (Onyeiwu and Shrestha, 2004; Neary, 2009), which implies that a delayed project will always have undesirable consequences on the contract's final outcome.

In addition, the characteristics of delay factors and their level of impact is dependent on the kind and time frame (this may range from a few days to years) of projects (Koushki et al., 2005). Generally, delays in construction are seen to be caused by project mismanagement that could have been avoided if an efficient way to analyze the related consequences was put in place (Ika, 2009, 2012). Many research works have also suggested that challenges associated with delay in different projects particularly, in construction project can be reduced drastically by a vigorous implementation of project management concepts (Azis et al., 2012; Fashina et al., 2020b). Hence, a vital factor that contributes to this challenge is the absence of project management practices in tackling these delays. However, findings from prior work has shown that in spite of adopting the various project management practices, construction project in most countries, particularly, in the low- and middle-income countries are still faced with the challenge of project delays (Africa and Sachs, 2016). Moreover, the impact of construction delay does not just affect the construction industry alone, but touches the whole economy of the concerned countries (Teo and Loosemore, 2001).

Despite the fact that for decades now, delay in construction projects has been a topic of research that many researchers have explored its impacts in public and private construction projects in other countries, particularly, the low-and middle-income countries (Ogunlana et al., 1996; Endut et al., 2005; Moura et al., 2007; Le-Hoai et al., 2008; Haseeb et al., 2011; Doloi et al., 2012; Kikwasi, 2013; Sepasgozar et al., 2019), none of such studies have been carried out in Hargeisa or Somaliland. Moreover, most of these studies concentrate on specific areas and their relevance in the Somaliland construction context remains unknown, which in turn limits the tools of the industry stakeholders in tackling the numerous delay factors accessible in the literature. And since Somaliland is presently witnessing an increasing growth in the construction industry, there is a need to identify a few numbers of delay factors that can help construction stakeholders to channel their efforts and the available resources on tackling the most significant factors that influence construction delays in order to attain optimal and productive outcomes. Within this context, the aim of this study is to fill a vital knowledge gap by investigating, evaluating and categorizing the factors that influence delays in construction projects and it would be limited to road and building projects in Hargeisa. The identification and evaluation of the significant delay factors is achieved via the primary and secondary data collection methods and validated through the use of statistical methods. However, based on the ranking of the identified delay factors it was possible to evaluate the most significant factors that influence delay in the road and building projects in Hargeisa.

The first part of the current paper provides the background introduction on delays in construction projects and continues with the review of relevant prior studies that have been carried out in other countries. In addition, the methodology adopted in this study and the research findings obtained via the use of statistical tools are also presented before exploring the implications of the study. The last part of this paper presents the concluding remarks and noteworthy recommendations geared towards the use of the appropriate project management practices that could guide the development of evidence-based measures required to manage and minimize the identified critical delay factors, when executing future construction projects in Somaliland and elsewhere.

2. Literature review

Over the years, a cope of studies has been carried out to establish the potential and actual causes of delay in construction projects in different countries and regions (Fugar and Agyakwah-Baah, 1970; Mansfield et al., 1994; Alaghbari et al., 2007; Endut et al., 2005; Le-Hoai et al., 2008; Sepasgozar et al., 2019). Several of the studies examined the delay in building projects (Fugar and Agyakwah-Baah, 1970; Assaf et al., 1995; Alaghbari et al., 2007; Abd El-Razek et al., 2008), some paid attention to delays in highway projects (Ellis and Thomas, 2002; Manavazhi and Adhikari, 2002), while other explored the delay in construction projects as a whole (Mansfield et al., 1994; Abd El-Razek et al., 2008; Emam et al., 2015). However, a number of the well-established studies carried out in precise locations have reported the complexity of analyzing delays in construction projects (Ogunlana et al., 1996; Ellis and Thomas, 2002; Arantes et al., 2016; Sepasgozar et al., 2019). Consequently, the literature centering on the delay factors that are perceived to be relevant to the current study is reviewed below.

Ogunlana et al. (1996) presented the results of a study in 1996 that explored the causes and effect of delays in building construction projects in Thailand. 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 and 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. Sambasivan and Soon (2007) in their investigation indicated that 17.3 percent of the public projects in the Malaysian construction sector encountered delay. The authors pinpointed improper planning, poor site management, inadequate experience of the contractor, inadequate finance of the client and payments for completed work, problems related to subcontractors, material shortage, labor supply, availability and failure of equipment, lack of communication between parties and mistakes during the construction stage are the most significant causes of project delay of the factors investigated.

Abd El-Razek et al. (2008) also conducted a research survey on the causes of delay in building construction projects in Egypt. The authors 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. Haseeb et al. (2011) via a quantitative approach explored the causative factors of delays in large construction projects in Pakistan and identified natural disaster, financial and payment problems, improper planning, poor site management, insufficient experience, and shortage of materials and equipment as the most significant causes of construction delay factors. Kikwasi (2013) explored the causes of delay in construction projects in Tanzania using a questionnaire survey study. The author 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.

Adopting the Last Planner System Theory, Lindhard and Wandahl (2015) explored the major factors that influence project delay in Denmark construction projects. Their findings indicated that connecting work, change in work plans, workforce, external conditions, material and construction design are the most recurrent causes of project delay among the 5,424 scheduled activities examined. Similarly, Emam et al. (2015) in another questionnaire survey study revealed the most significant delay factors in Qatar as changes in design, ineffective planning and scheduling, changes in scope project, under estimated project schedule, and shortage of skilled labor. Zidane and Andersen (2018a, b) identified the top 10 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. These 10 leading universal delay factors are as follows: design changes during construction/change orders; delays in payment of contractor(s); poor planning and scheduling; poor site management and supervision; incomplete or improper design; inadequate contractor experience/building methods and approaches; contractor's financial difficulties; sponsor/owner/client's financial difficulties; resources shortage; and poor labor productivity and shortage of skills.

In a recent and more comprehensive study, Durdyev and Hosseini (2019) systematical reviewed prior studies published on construction project delays (CPD) between 1985 and 2018. The findings from their study revealed a total number of 149 factors that influence CPD were identified from 97 selected articles. The ten most common CPDs identified by the authors are weather/climate conditions, poor communication, lack of coordination and conflicts between stakeholders, ineffective or improper planning, material shortages, financial problems, payment delays, equipment/plant shortage, lack of experience/qualification/competence among project stakeholders, labor shortages and poor site management.

In an effort to successfully identify the main causes of delay in construction projects, the relevant literature has been conducted. Based on the outcome of the review, it is clear that many studies have identified and examined the causes of construction project delay in other countries (Haseeb et al., 2011; Kikwasi, 2013; Zidane and Andersen, 2018a, b; Durdyev and Hosseini, 2019). However, findings obtained from studies in other countries and in unrelated project types may not be totally suitable for the scope and nature of the current study, as the jurisdictive Hargeisa and socio-cultural setting alongside the causes of delay vary from country to country and from one project types to another. Consequently, the current study aims to fill a significant knowledge gap by pointing out and examining the major factors that influence delays in road and building projects in Hargeisa, as identified in the literature. This will allow project managers and policy-makers to be aware of the fact that project delays are rather universal, making it essential to spot them as an initial step.

3. Research methodology

This study adopts a questionnaire survey technique to examine the major factors that influence delay in construction projects in Hargeisa. A quantitative research was used in collecting information and data from the study population through field sources. The target population consists of 61 respondents, that include 25 contractors, 15 consultants, 10 clients and 11 other key players in the construction industry. Simple random sampling method was used to select samples for the study.

In order to directly obtain first-hand information from the respondents, structured questionnaires were used to gather the primary data in this research survey through self-administration. The questionnaires were administered to the respondents to acquire their opinions and find out their knowledge concerning delay in construction projects, based on their work experiences and judgment.

The questionnaire survey was designed based on the common delay factors identified from the literature review carried out as well as the objective of the study. A total of 51 identified factors that influence delay in construction projects that are categorized into seven major groups were investigated in this study. These groups include the owner-related, contractor-related, consultant-related, labor-related, materials-related, equipment-related, and external factor-related delays. The questionnaire design comprises of two sections that include the general organization information and the factors that influence construction delays. Furthermore, these factors were rated in this study based on the Likert's scale of 5 ordinal measures from 1 to 5 according to the level of contribution (Allen and Seaman, 2007).

In an effort to ensure that a suitable level of quality in the research instrument is achieved in terms of its credibility and dependability, a pilot survey was conducted. This was achieved using a convenience sample of experts in the construction projects field to independently reviewed the questionnaire. Prior to the distribution of the questionnaires, the questionnaire was presented to a construction practicing expert and two academics to check the questionnaire content validity and to ascertain that the sentences are clear and precise, accordingly.

Although, the pilot survey was employed to determine the reliability or relevancy of the survey questionnaire to the construction industry, the need to analyze the reliability of the collected data using the Cronbach's Alpha method was also essential to this study (Cronbach, 1951). This was achieved by using Eq. (1) below to calculate the Cronbach's Alpha (Cronbach, 1951):

$$\text{Cronbach's alpha, } \alpha = \frac{K}{K-1}\left[1 - \frac{\sum V_i^2}{V_x^2}\right] \quad (1)$$

where K, represents the number of items; V_i represents the variance of scores on each item; and V_x, represents the variance of the observed total test scores.

SPSS Statistics Software (version 25) was employed to compute the Cronbach's Alpha, and the reliability coefficient was determined to show the internal consistency of the data.

In an effort to achieve the objective of the study, a Relative Importance Index (RII) was selected as a suitable analytical method (Doloi et al., 2012). This was used to analyze the ratings received through the questionnaires and establish a mean rating point, that represents the rating for each group contributors. Each calculation was carried out using RII formula in Eq. (2) (Doloi et al., 2012):

$$\text{Relative importance index, } \text{RII} = \frac{\sum W}{A \times N} \quad (2)$$

where W, represents the rating given to each factor by the respondents. For factors that cause delay for example, 5 is for very high contributing factor, 4 is for high contributing factor, 3 is for average contributing factor, 2 is for low contributing factor and 1 is for very low contributing factor. A is the highest weight (5 for this study) and N represents the total number of samples (48 for this study).

The study was conducted according to the ethical codes of Gollis University and standard ethical practices required of any reputable academic research. Respondents were informed both verbally and in writing about the purpose of the research work and their consent was confirmed before filling the questionnaires. It was made known to the respondents that their participation in the research survey was an exercise of their choice and were at liberty not to participate. They also were assured of confidentiality.

4. Results and data analysis

4.1. Survey results

Out of the 61 questionnaires that were distributed randomly among the target respondents selected from private and public construction companies in Hargeisa, 51 questionnaires were returned and 10 were unable to provide information regarding the questionnaires, 3 questionnaires were recorded invalid, and 48 questionnaires were deemed valid. This implies that a total of 83.6% responses were received from the companies/professionals that participated in the survey. This percentage is acceptable for analysis and reporting of the findings of this study (Woodside and Miller, 1993).

Regarding the category of respondents' company/organization, the building construction category has the highest frequency with a percentage of 52.1, followed by road construction with 25% while the road and building construction category has the least with 22.9%. Over half of the respondents possesses between 5 to 10 years of experience (52.1%), while 37.5 % have less than 5 years of experience. In addition, only one respondent has between 11 to 15 years of construction experience whereas the respondents with the most years of experience are four in number. Moreover, most of the respondents that took part in the

questionnaire survey are very experienced professionals in the construction industry and this added to the quality of the feedback and the findings of the study.

4.2. Cronbach's alpha data reliability test

Prior to the analysis of the results acquired from the questionnaire survey, Cronbach's Alpha data reliability results were obtained to measure the internal consistency of the answers provided by the respondents, using the Likert's scale. The results from the reliability test was obtained for seven categories of the factors that influence construction delays, as indicated by the research objective of this study. Moreover, the internal consistency of the delay is determined based on the Cronbach coefficient obtained, using Table 1 below.

Table 2 presents the results of the Cronbach's Alpha reliability test for the seven categories of the causes of delay in construction project in Hargeisa. As depicted in Table 2, the coefficient of internal consistency of the reliability test for the owner-related and contractor-related delay factors is found to be 0.827 and 0.813, respectively. This implies that 82.7% of the answers provided by the respondents regarding owner-related causes of delays and 81.3% regarding the contractor-related causes of delays have excellent reliabilities.

Furthermore, Table 2 indicates that consultant-related, equipment-related and external factors-related delay factors all have an internal consistency rated as good, with Cronbach's Alpha coefficients of 0.720, 0.737 and 0.730, respectively. The labor-related and material-related delay factors were recorded to have a satisfactory internal consistency with Cronbach's Alpha coefficients of 0.550 and 0.694, respectively. This means that the questions correlate to each other as individual groups. Besides, according to the scale of the coefficient of the internal consistency (Cronbach's Alpha) in Table 1, it can be concluded that the collected data for all the items in the seven categories of the delay factors are correlated, valid and reliable.

Moreover, the results of the overall Cronbach's Alpha reliability test conducted for the 51 factors shows that the internal consistency is excellent, with Cronbach's Alpha of 0.939. This indicates that the answers provided by the respondents regarding the 51 factors that influence construction delay has an excellent reliability of 93.9%.

4.3. Analysis of the factors that influence construction delays

As part of the aim of this study, 51 factors that influence project delays in Somaliland construction industry have been identified, evaluated and categorized into seven major groups before discussing the results of the analysis here. These factors are ranked in each category based on Relative Importance Index (RII) and Mean Values. Moreover, in an effort to establish the level of contribution of the different delay factors, the RII rankings are classified based on the RII classification table presented in Table 3.

Table 1. Internal consistency of Cronbach's Alpha (Gliem and Gliem, 2003).

S/N	Cronbach's alpha, α	Internal consistency
1	$\alpha \geq 0.8$	Excellent
2	$0.8 > \alpha \geq 0.7$	Good
3	$0.7 > \alpha \geq 0.5$	Satisfactory
4	$\alpha < 0.5$	Poor

Table 2. The results of the Cronbach's Alpha reliability test for the seven categories of the causes of delay.

Factors	Numbers of questions	Cronbach's alpha	Internal consistency
Owner	12	0.827	Excellent
Contractor	11	0.813	Excellent
Consultant	8	0.720	Good
Labor	4	0.550	Satisfactory
Material	6	0.694	Satisfactory
Equipment	4	0.737	Good
External Factors	6	0.730	Good

Table 3. Classification of RII.

Scale	Level of contribution	RII
1	Very low	$0.0 \leq RII \leq 0.2$
2	Low	$0.2 < RII \leq 0.4$
3	Average	$0.4 < RII \leq 0.6$
4	High	$0.6 < RII \leq 0.8$
5	Very high	$0.8 < RII \leq 1.0$

4.3.1. Analysis of delay factors related to clients/owners

Table 4 presents the results of the survey analysis of delay factors related to clients/owners. Regarding the most significant client-related factor, Table 4 shows that delay in honoring payment progressively (RII = 0.846) is the most preferred causes in terms of the level of contribution to project delay, as perceived by the respondents. Besides that, change orders during construction by owner (RII = 0.792) is ranked second in this category while poor communication and coordination with contracting parties (RII = 0.767) is ranked third. Although, the level of contribution of the following factors to construction delays is rated to be high; delay in the approval of sample materials (RII = 0.625), lack of complete documentation before commencement of project (RII = 0.642), and slow decision-making process (RII = 0.658), the three factors are the least significant causes of delay related to owner/clients, respectively.

4.3.2. Analysis of delay factors related to contractors

As shown in Table 5, underestimation or overestimation of the project cost (RII = 0.808), difficulties in project financing (RII = 0.783), and delays in sub-contractor's work (RII = 0.779) are the three most influential factors agreed upon by the respondents as the major causes of project delays related to contractors. Respondents ranked underestimation or overestimation of the project cost (RII = 0.808) as the first most significant contractor-related cause of delay in construction projects in Somaliland with a very high level of contribution to construction delay.

Table 4. RII ranking for Clients/Owners-related delay factors.

S/N	Owner-related causes of delay	RII	RII ranking	Level of contribution
1	Delay in honoring payment progressively	0.846	1	Very high
2	Delay in the provision or delivery of project site	0.742	4	High
3	Slow decision-making process	0.658	9	High
4	Errors in design and specifications	0.696	7	High
5	Lateness in the revision and approval of design documents	0.729	5	High
6	Poor communication and coordination with contracting parties	0.767	3	High
7	Difficulties in accessing credit facilities (E.g. Loan)	0.683	8	High
8	Change orders during construction by owner	0.792	2	High
9	Conflicts between project joint-owners	0.708	6	High
10	Indefinite suspension of work by owner	0.696	7	High
11	Lack of complete documentation before commencement of project	0.642	10	High
12	Delay in the approval of sample materials	0.625	11	High

Table 5. RII ranking for Contractors-related delay factors.

S/N	Contractor-related causes of delay	RII	RII ranking	Level of contribution
1	Difficulties in project financing	0.783	2	High
2	Errors during construction	0.696	8	High
3	Improper planning and preparation during construction project	0.721	6	High
4	Poor site management and coordination	0.700	7	High
5	Delays in sub-contractor's work	0.779	3	High
6	Underestimation or overestimation of the project cost	0.808	1	Very High
7	Conflicts between contractor and other parties	0.746	5	High
8	Delays in the mobilization of workers	0.650	10	High
9	Regular change of sub-contractor's technical staff	0.746	5	High
10	Conflicts in sub-contractor's schedule in execution of project	0.692	9	High
11	Underestimation of the project durations	0.763	4	High

Similar to the owner-related delay category, the three factors with the least significant causes of delay under the contractor-related category has high level of contribution to construction delays. These include: delays in the mobilization of workers (RII = 0.650), conflicts in sub-contractor's schedule in execution of project (RII = 0.692), and errors during construction (RII = 0.696), respectively.

4.3.3. Analysis of delay factors related to consultants

In Table 6, the results of survey analysis of factors of consultant-related delays are presented. From the point views of the respondents, delay in the approval of major changes in the work scope (RII = 0.800), poor communication and coordination (RII = 0.767), lack of significant experience of consultant (RII = 0.750) are the three most influential delay factors related to consultants, based on RII ranking.

Similar to the owner-related and contractor-related delay categories, the two factors with the least significant causes of delay under the consultant-related category has high level of contribution to construction delays. These include: delay in instructions from consultants (RII = 0.671), and back report of the consultant (RII = 0.692), respectively.

4.3.4. Analysis of delay factors related to labors

Table 7 presents the results of the survey analysis of delay factors related to labor. As shown in Table 7, the lack/shortage of labors (RII = 0.763) is the most preferred causes in terms of the level of contribution to project delay, as perceived by the respondents. Besides that, the lack of sufficient skilled labors (RII = 0.742) is ranked second in this category while labor strike (RII = 0.688) is ranked third.

Despite the fact that they all have a high level of contribution to project delays; the respondents ranked personal conflicts between labors (RII = 0.679) as the least significant causes of delay under the labor-related category.

Table 6. RII ranking for Consultants-related delay factors.

S/N	Consultant-related causes of delay	RII	RII ranking	Level of contribution
1	Delay in the approval of major changes in the work scope	0.800	1	Very high
2	Poor communication and coordination	0.767	2	High
3	Lack of significant experience of consultant	0.750	3	High
4	Mistakes and discrepancies in contract documents	0.700	6	High
5	Delays in creating design documents	0.733	4	High
6	Inadequate site survey and data collection before design	0.713	5	High
7	Delay in instructions from consultants	0.671	8	High
8	Back report of the consultant	0.692	7	High

Table 7. RII ranking for Labor-related delay factors.

S/N	Labor-related causes of delay	RII	RII ranking	Level of contribution
1	Lack/shortage of labors	0.763	1	High
2	Labor strike	0.688	3	High
3	Personal conflicts between labors	0.679	4	High
4	Lack of sufficient skilled labors	0.742	2	High

4.3.5. Analysis of delay factors related to materials

From Table 8, it can be seen that increase/fluctuation in the prices of materials (RII = 0.792), and materials procurement difficulties (Lateness) (RII = 0.763) are the two most influential delay factors related to materials, based on relative importance index (RII). From the point views of the respondents, Increase/Fluctuation in the prices of materials is ranked as the first most significant materials-related cause of delay in construction projects in Hargeisa, in spite of the fact that it has a high level of contribution to construction delay compared to its counterparts in the other categories that have very high level of contribution.

Similar to the other delay categories, the two factors with the least significant causes of delay under the materials-related category has high level of contribution to construction delays. These include: damage of sorted materials that are needed urgently (RII = 0.650), and changes in material types during construction (RII = 0.708), respectively.

4.3.6. Analysis of delay factors related to equipment

As shown in Table 9, the shortage/lack of equipment (RII = 0.767) is the most preferred delay factors related to equipment in terms of the level of contribution to project delay. Besides that, the breakdown/Failure of equipment (RII = 0.721) is ranked second in this category while the challenges with the efficiency and effectiveness of equipment (RII = 0.704) is ranked third.

Despite the fact that they all have a high level of contribution to project delays; the respondents ranked low level of equipment-operator's

Table 8. RII ranking for Materials-related delay factors.

S/N	Materials-related causes of delay	RII	RII ranking	Level of contribution
1	Materials procurement difficulties (Lateness)	0.763	2	High
2	Shortage/lack of materials in the market place	0.758	3	High
3	Increase/Fluctuation in the prices of materials	0.792	1	High
4	Delay in the delivery of materials	0.738	4	High
5	Changes in material types during construction	0.708	5	High
6	Damage of sorted materials that are needed urgently	0.650	6	High

Table 9. RII ranking for Equipment-related delay factors.

S/N	Equipment-related causes of delay	RII	RII ranking	Level of contribution
1	Shortage/lack of equipment	0.767	1	High
2	Breakdown/Failure of equipment	0.721	2	High
3	Low level of equipment-operator's skills	0.696	4	High
4	Challenges with the efficiency and effectiveness of equipment	0.704	3	High

Table 10. RII ranking for external factors-related delay factors.

S/N	External factors-related causes of delay	RII	RII ranking	Level of contribution
1	Unfavorable site conditions	0.763	1	High
2	Change in weather condition	0.733	2	High
3	Delay in securing permits	0.675	6	High
4	Occurrence of accident during construction	0.725	3	High
5	Introduction of new government policies, regulations, and laws	0.708	4	High
6	Delay in services provided by utility service providers	0.696	5	High

skills (RII = 0.696) as the least significant cause of delay under the equipment-related category.

4.3.7. Analysis of delay factors related to external factors

As depicted in Table 10, unfavorable site conditions (RII = 0.763), and change in weather condition (RII = 0.733) are the two most influential delay factors related to external factor, based on the point views of the respondents. Similar to the other delay categories, delay in securing permits (RII = 0.675) as the least contributing factor among the external factors-related delay factors has high level of contribution to construction delays.

5. Discussion

5.1. Ranking of the ten most significant factors that causes construction delays

Based on the RII ranking of the 51 identified delay factors, it was possible to assess the most significant factors that influence construction project delays in Hargeisa. The RII ranking is rated from position 1 to 32, which implies that the 51 delay factors explored in this study falls within these rank positions. This is because in some cases, a rank position could have more than one delay factor. For instance, rank position eight have four delay factors that falls under it with the same RII of 0.763. Table 11 presents the ranking of the top ten significant factors that influence construction delay based the respondents' perception. It can be noticed from Table 11 that among the 16 factors that made the top ten list of factors causing delays in construction projects in Hargeisa, four are related to contractors, nine are related to clients, consultants and materials (three for each) while labor-related delay, equipment-related delay and external factor-related delay all shared equally the remaining three factors. The top 10 factors are: (1) delay in honoring payment progressively (RII = 0.846), (2) underestimation or overestimation of the project cost (RII = 0.808), (3) delay in the approval of major changes in the work scope (RII = 0.800), (4) change orders during construction by owner (RII = 0.792) and increase/fluctuation in the prices of materials (RII = 0.792), (5) errors in design and contract documents (RII = 0.800), (6) delays in sub-contractor's work (RII = 0.779), (7) poor communication and coordination with contracting parties (RII = 0.767), shortage/lack of equipment (RII = 0.767), and, poor communication and coordination (RII = 0.767), (8) underestimation of the project durations (RII = 0.763), lack/shortage of labors (RII = 0.763), materials procurement difficulties (lateness) (RII = 0.763), and unfavorable site conditions (RII = 0.763), (9) shortage/lack of materials in the market place (RII = 0.758), (10) lack of significant experience of consultant (RII = 0.750). In an effort to validate the findings of this study, these significant factors are discussed and compared with findings of the related and relevant studies carried out in other countries.

Respondents ranked delay in honoring payment progressively and difficulties in project financing as the first and fifth most influential factor responsible for delay in construction projects in Hargeisa. This is however not astonishing since the Somaliland construction industry is mostly controlled by a few wealthy individuals. Moreover, this result is in agreement with the findings of Fugar and Agyakwah-Baah (1970) that ranked delay in honoring payment progressively as one of the top contributing factors that influences building project delay in Ghana. The late release of project funds has also been reported as one of the most significant delay factors in Ethiopian construction projects (Gebrehiwet and Luo, 2017). Other studies such as (Ogunlana et al., 1996; Mezher and Tawil, 1998; Wang et al., 2004) also ranked the difficulties or manner in which owners/clients finance and pay for completed work as the main contributing factor to time overruns in projects. Enshassi et al. (2009) however, suggested that any form of shortage in contractors' cash can lead to a number of problems that may include, slow work progress, deterioration in output of the personnel and failure to procure materials, equipment or hire labor for the project. This is also in line with the argument of Shi et al. (2001), that suggests that if payments are not properly management, it can lead to cost overruns in construction projects. To address this situation however, contracting parties in Hargeisa and other countries should make efforts to use project management tools such as robust cost management plan, risk management plan or cash flow forecasting to reduce this challenge (Assaf and Al-Hejji, 2006; Fashina et al., 2020c).

Increase/fluctuation in the prices of materials, materials procurement difficulties (Lateness), and shortage/lack of materials in the market place were ranked by the respondents as the fourth, eighth and ninth most significant delay factors causing project delay among the 51 factors

Table 11. RII ranking for the ten most significant factors that causes construction delays in Hargeisa.

RII ranking	Top ten significant factors	RII	Number of factors	Category
1	Delay in honoring payment progressively	0.846	1	Owner-related
2	Underestimation or overestimation of the project cost	0.808	1	Contractor-related
3	Delay in the approval of major changes in the work scope	0.800	1	Consultant-related
4	Change orders during construction by owner Increase/Fluctuation in the prices of materials	0.792	2	Owner-related Materials-related
5	Difficulties in project financing	0.783	1	Contractor-related
6	Delays in sub-contractor's work	0.779	1	Contractor-related
7	Poor communication and coordination with contracting parties	0.767	3	Owner-related
	Poor communication and coordination			Consultant-related
	Shortage/lack of equipment			Equipment-related
8	Underestimation of the project durations	0.763	4	Contractor-related
	Lack/shortage of Labors			Labor-related
	Materials procurement difficulties (Lateness)			Materials-related
	Unfavorable site conditions			External Factors
9	Shortage/lack of materials in the market place	0.758	1	Materials-related
10	Lack of significant experience of consultant	0.750	1	Consultant-related

investigated in this study, respectively. This is traceable to the fact that Somaliland construction industry depends on the importation of building materials, mainly, from China and some parts of Europe, which sometimes lead to the shortage of materials in the marketplace and invariably the deficiency of materials on site. This validates the findings of Fugar and Agyakwah-Baah (2010), who ranked the above-mentioned delay factors as part of the highest influential contributors to delay in construction project in Ghana. Some researchers (Frimpong et al., 2003; Assaf and Al-Hejji, 2006; Marzouk and El-Rasas, 2014) also believes that fluctuation or increase in the prices of materials is also caused by fluctuation in exchange rate and they recommend that the various construction industries should explore locally-made building materials. Prior studies (Frimpong et al., 2003; Sambasivan and Soon, 2007; Fallahnejad, 2013; Ruqaishi and Bashir, 2015) have also acknowledged materials procurement difficulties (Lateness) as one of the highest contributing factors that influences construction project delay. Their justification for including this factor was as a result of the poor transportation and road network system, particularly, in remote construction sites.

As perceived by the respondents, underestimation or overestimation of the project cost, underestimation or overestimation of the project duration and lack of significant experience of consultant were ranked as the second, eighth, and tenth most significant factors that is causing project delays in road and building projects in Hargeisa. Basically, unrealistic project cost and time arises as a result of improper planning and lack of significant experience of consultants handling most of the projects. As such, when the timeframe of a project is underestimated then it will clearly lead to delay. However, putting the workers under duress within the overtime context in order to make up for the unplanned time could cause physical fatigue on the side of the workforce. This can in turn lead to rework and cost overrun of the project. Moreover, these findings are in agreement with the results of other research works carried out in different countries as regards the evaluation of the most significant delay-factors (Frimpong et al., 2003; Sambasivan and Soon, 2007; Kaliba et al., 2009).

Furthermore, the respondents were of the view that among the 16 factors that made the top ten list of most influential factors causing delays in construction projects in Hargeisa, the lack/shortage of labors is one of four most significant factors that occupied the eighth position in the ranking. Since the large portion of the activities and operations in the construction industry are labor-intensive, construction globally serve as a vital employer of labor (Zhou et al., 2015) and as such improving the quality and efficiency of the construction workforce will positively reflect in the project success. Conversely, majority of the workers associated with construction projects in Hargeisa are mostly from the remote or rural areas of the country and are unskilled. However, regarding quality workforce, Somaliland construction industry to a large extent depends on the services of temporary foreign workers or expatriates from China, India, Yemen etc. However, this does not add value to the quality of the local workers but rather lead to shortage or lack of labor in the industry.

Delay in the approval of major changes in the work scope, and change orders during construction by owner were ranked third and fourth most significant factors while poor communication and coordination with contracting parties and consultant's poor communication and coordination were both ranked in the seventh position. Unlike in the studies carried out in other countries (Assaf and Al-Hejji, 2006; Sweis et al., 2008; Zidane and Andersen, 2018a, b; Sepasgozar et al., 2019), where change orders during construction by owner is the most significant delay factor, respondents rank it as the fourth most influential factor that causes project delay in Hargeisa. Over the years, change orders during construction by owner has been seen as a common challenge in the construction projects that normally leads to unnecessary disputes and delays in project timeline and schedule (Mahamid et al., 2012). Prior studies have traced the reasons of change orders during construction by owner to conflicts, poor communication and coordination with contracting parties, and consultant's poor communication and coordination (Austin et al., 2002; Love et al., 2002). The study by Memon (2014) also revealed that changes which are often made in designs or in the scope of project are mostly done by the owners/client who are faced with financial difficulties, and as such leading to late decision-making that eventually affect the completion deadline of construction project. There are a number of unreported cases of projects in Hargeisa that are faced with delays in completion as a result of one of the above-mentioned reasons of design change during execution. To lessen this problem causing undesirable delay in construction projects, it is important to employ project management tools like expert judgment, meetings and change control tools to manage the situation (Ika, 2009). Moreover, engagement the services of experienced consultant can also help minimize design errors or faulty design (Berggren et al., 2001).

Respondents ranked delays in sub-contractor's work as the sixth most influential factor responsible for construction project in Hargeisa. The failure of sub-contractors in a project is a clear problem since they play a vital part in the success of any construction project. This is in agreement with the results obtained by Haseeb et al. (2011) that any delay initiated by any subcontractor depending on the size of the project, may affect succeeding project activities and thus upsetting the entire projects timeline and cost. Consequently, any subcontractor-initiated delay can unpleasantly affect contractor's project completion timeline. Sadly, some major contractors in Hargeisa do fail to properly manage subcontractors but rather allow them to execute the assigned job the best way they could. This is why poor communication and coordination with contracting parties is also ranked among the 10 most significant delay factors in this study. Ideally, the subcontractors are briefed on the scope of work by the contractor before the commencement of their jobs which signifies the importance of communication among the contracting parties.

The respondents also ranked unfavorable site conditions as one of the four most significant factors that occupied the eighth position in the ranking. This validates the works by (Muhwezi et al., 2014) that identified unfavorable weather conditions as the first most significant external-related factors causing delays in building projects in Uganda, and (Chan and Kumaraswamy, 1997) who identified unfavorable weather conditions as one of the significant factors causing delay in building projects in Hong Kong.

The respondents agreed that shortage/lack of equipment and lack of significant experience of consultant are the seventh and tenth most significant causes of project delay in the Somaliland construction industry; especially in road construction projects, which are not common as the main causes in other studies. This is because most experts believe that unavailability of required equipment is not one of the main reasons for the delay since most of the equipment needed for construction work are available in most countries. However, few studies like (Mahamid et al., 2012; Aziz, 2013; Aziz and Abdel-Hakam, 2016) identified shortage of equipment as the third high-impact delay factor causing project delay in Egypt like in the case of Somaliland. Accordingly, the ranking of these 16 delay factors as the top 10 significant causes of project delay have been justified in this section.

6. Implications

The implications of the findings in this study are quite significant and focuses on social, practical, policy and research values as well as the originality of the study.

6.1. Social implications

The identification of the most significant factors that influence delays in Hargeisa construction projects is expected to guide policymakers, project developers, decision-makers and others key stakeholders within the construction industry on how to take proactive measures to reduce or prevent potential impacts of delays in construction projects in the industry. This will in turn improve the construction industry's processes and operations in terms of the timely delivery of the future construction of hospitals, education buildings and other essential infrastructure to the society.

6.2. Practical and policy implications

The findings from this study will provide project developers, contractors, business organizations, consultants and government agencies in Somaliland and elsewhere with information on delay-related factors and how to prevent future construction project delays. This will allow these stakeholders to easily identify the early indicators of delays in construction projects. The findings from this study could also guide the development and formulation of short- and long-term evidence-based measures/strategies required to minimize or eliminate the effects of construction projects delay.

An additional practical implication is that the findings from this study would help policy-makers, decision-makers and project managers to be aware of the necessity of first identifying delay factors when analyzing the potential risks in the initial stages of construction projects, since these delay factors are often universal.

6.3. Research limitations/implications

Regarding the identification and evaluation of the significant delay factors in construction projects in Hargeisa, the research survey is based on feedback obtained from 51 respondents via structured questionnaires. It is however, important to note that analyzing a larger sample size could be quite challenging as this could lead to vague findings (Ogunlana et al., 1996; Arantes et al., 2016). However, this study bridges the knowledge gap concerning the investigation of projects delays in the Somaliland construction industry. As such, it introduces a systematic and comprehensive document that serves as a benchmark for research areas related to project delays and construction management, particularly, in least developed countries. Moreover, impending researchers who may want to further explore areas related to this study in other part of Somaliland or other countries can validated their findings using the useful outcome of this study.

6.4. Significance/originality

This study expands the knowledge of construction project delays and thus provides an improved understanding on delay-related issues in road and building projects by offering useful information that can guide future construction consultants and contractors that may want to enter into the construction market in Hargeisa, Somaliland and other countries.

7. Conclusions

In conclusion, this study has explored the significant factors that influence construction project delays in the context of Somaliland construction sector. Internal consistency of the factors that influence project delays was tested and validated via Cronbach's alpha. Contractor-related delays are found to be the most significant category that causes construction delays, followed by the owner-related delays, consultant-related delays, and material-related delays as the second most significant groups, respectively. The least significant categories are labor-related delays, equipment-related delays and external factor-related delays, respectively. The results of the analysis of the feedback from the questionnaire survey also showed that out of the 16 factors that made the top ten list of factors causing delays in construction projects in Hargeisa, the top most influential factor agreed upon by the respondents is honoring payment progressively. The main contribution of this study is the provision of an improved understanding of delays in the Somaliland construction industry via a detailed investigation and documented reports. The findings from this study are therefore of significance to key stakeholders within the global construction industry. This is because the study could guide the development and formulation of short- and long-term evidence-based measures/strategies required to eliminate the effects of construction projects delay and in turn improve the construction industry's processes and operations.

Finally, in agreement with the research findings and in an effort to ensure that the management of delays in construction projects is appropriately improved, the following recommendations are significant:

- Honoring payment progressively to contractors by owners can help avoid delays, and improve the contractor's capacity to meet up with the required time and quality (Kamanga and Steyn, 2013; Gunduz et al., 2015);
- To increase contractors' managerial skills, it is important that they adequately practice project management principles, using the appropriate tools and techniques in managing construction project in order to minimize delays (Ika, 2012; Fashina et al., 2020a);
- Since the consultants serve as an intermediary between client and contractors, it is essential that consultants ensure that there is proper communication and coordination among project stakeholders (Berggren et al., 2001). This would help avoid delays related to the lack of proper communications on construction sites;
- The government of Somaliland in collaboration with other stakeholders and higher institutions should invest heavily in building the capacity to train construction workers with the appropriate and required technical skills in order to become effective and efficient (Ika and Donnelly, 2017).

Declarations

Author contribution statement

Adebayo Fashina: Conceived and designed the experiments; Analyzed and interpreted the data.

Mustafe Omar: Performed the experiments; Wrote the paper.

Ahmed Sheikh: Performed the experiments; Contributed reagents, materials, analysis tools or data.

Funke Fakunle: Analyzed and interpreted the data.

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Additional information

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