
Rank-Order Analysis of Factors Causing Claims on Road Construction Projects in Botswana

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Claims are considered to be one of the most serious disruptive forces to successful project delivery in the construction industry. In a small developing economy like Botswana, it is germane to identify the sources and the frequency of occurrence of claims so that the burden of project cost overrun, a hallmark of the country's construction industry is substantially reduced. Detailed literature review and preliminary field investigations were used to identify causes of claims related to road construction projects. The study identified six major types of claim and twenty seven causes of claims. Using questionnaire as research instrument, respondents (construction industry major stakeholders i.e. clients, consultants and contractors) were asked to rank the frequency of occurrence of the types and causes of claims in road construction projects on a Likert-type scale. Relative importance index (RII) method was used to analyze the data collected from the questionnaire survey. The analysis was carried out for each group of respondents and on the overall results (all the parties combined). A total of 27 useful responses made up of nine clients, ten consultants and eight contractors) were analyzed. Findings indicated that the clients and consultants specified delay claims followed by extra work claims were the most frequent type of claims in the construction of roads in Botswana. Contractors perceived differing site conditions followed by delay claims as the most frequent type of claims. From the overall response, delay claims were ranked first followed by extra work claims. Acceleration claims were ranked least. The top five most frequent causes of claims based on overall ranking were: variation in quantities, design errors, poor site management and supervision by contractor, ineffective planning and scheduling of project by contractor, and low price of contract due to high competition. Construction industry research in Botswana has never looked into the issue of claims and yet it is one of the hidden sources of construction project failure in the country. It is perceived that hedging against the most adverse causes of claims will stem the tide of incessant cost overrun, litigation and project abandonment on road projects in Botswana.

Keywords: Claims, road, construction projects, Botswana.

Introduction

The construction industry is a pivotal sector of any country's economy. In Botswana, the industry contributes on average about 5.3% to the country's economy and is responsible for a proportionate employment of labour. Despite its role as an engine of growth in the economy, the industry is characterized by poor project performance occasioned principally by time and cost overruns, claims, dispute, litigation and sometimes project abandonment. As noted by Zaneldin, (2006), claims permeates nearly all construction projects and is a direct result of growth phenomenon in an economy. Claims appear to be the hindrance to successful delivery of road projects in Botswana as it fuels project cost escalation and is linked to disputes in the industry. Botswana's government is investing millions of pula to improve road infrastructure in the country every financial year. The majority of these road projects are being constructed in cities and towns with arteries to the rural areas. Considering the land mass of Botswana (582,000

square kilometres) and the size of the road network required it is not surprising that the number of claims continues to increase.

Construction claims are considered by many project professionals to be one of the most disruptive and unpleasant events of a project (Ho and Liu, 2004). Bakhary et al. (2015), stated that claims in construction projects have increased to such a degree that they have become almost routine and can be caused by a number of factors. Therefore, understanding the causes of construction claims is a step towards avoiding them. Sambasivan and Soon (2007) stated that when a project is delayed, it is either accelerated or has its duration extended beyond the scheduled completion date and therefore it incurs additional cost. The conventional approach to managing the extra cost is to include a percentage of the project cost as contingency in the pre-contract budget (Aibinu and Jagboro, 2002). According to Bryan (2004), the ability to reduce the frequency and severity of claims stems from the identification of construction project risk factors and dealing with them and/or providing for them in the construction or design contracts.

Background

The major financier of road construction projects in Botswana is the Botswana government through the Ministry of Works and Transport represented by the Department of Roads. A number of foreign funding agencies have also contributed to road projects, studies and technical assistance. For example, contributions have been received from organizations such as ADB, BADEA, CIDA, DANIDA, EEC, IBRD, Kuwait Fund, NORAD, OPEC, UNCDF and USAID. Some of the projects that are externally funded are still ongoing. The Botswana Roads Department employs both competitive and selective tendering for projects. The criteria for selection of contractors as specified in the tender documents for construction include the following:

1. Competence and integrity.
2. Past performance of the contractor and its reputation in terms of similar jobs (track record).
3. The personnel strength of the contractor, its financial status and ability to co-finance projects.
4. The contractor's scheduled time of completion and final tender price.

The contractual arrangement is as shown on Figure 1. The client first appoints the consulting engineers to design and advice on a variety of specialist works, e.g. structural, civil works and pavement design. Consultants are also engaged to provide a site team during construction to ensure that the project is kept within cost and complies with the design. The principal contractor is employed by the client on the advice of the engineer by nomination or competitive tendering. They are required to administer the construction program within the engineer's direction. A domestic subcontractor is employed by the principal contractor to assist with the general construction or installation, e.g. bricklaying, fencing, and etc.

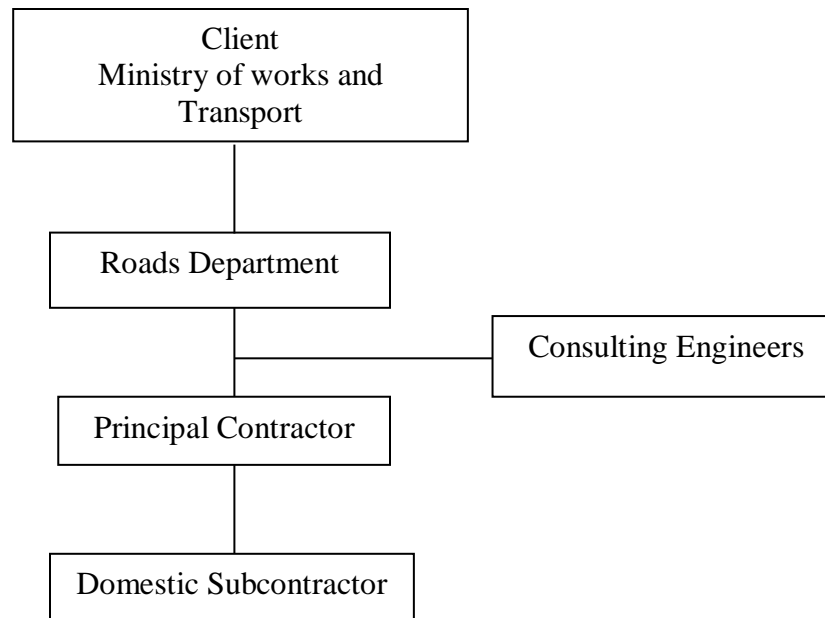


Figure 1: Contractual Arrangement for the Construction of Roads in Botswana (Segwabe, 2008)

The relative high resource commitment by Botswana Government to road construction projects has been highlighted in the Department of Roads website, (www.roads.gov.bw); during the years 1966 to 1986 more than P260 million (Botswana Pula) was invested in new road infrastructure. During the National Development Plan (NDP) 7, for the period from 1991 to 1997, P870,746,559.00 was spent for the development of the network. During the National Development Plan 8, for the period from 1997 to 2003, P2,661,274,384.00 was spent. For the period from 2003 to 2009 the estimated amount was P2,467,660,000.00.

The nature of work in highway construction projects in Botswana and other countries and the environment within which they are constructed make them susceptible to delays and claims. The influential factors (Segwabe, 2008) can be summarized as:

1. High uncertainty associated with such projects because they require operations such as excavating and crushing in varying soil conditions. A good example of such an uncertainty happened in the construction of the Dibete Mahalapye rehabilitation project. The parent rock that was to be crushed for production of road stones had a much higher strength than anticipated. This resulted in the crusher plant producing at lower rates than those estimated during the planning stage.
2. Work in these projects depends heavily on equipment and may be delayed because of the need for equipment repair, maintenance and at times transportation from overseas.
3. Numerous government authorities are involved in the project and each may require the contractor to obtain a permit with restrictions on time and work area such as mining licenses required before opening borrow pit areas. The logistics involved in going from one authority to another may take considerable time hence resulting in project delays.
4. Land expropriation process which can delay construction activities. This would happen when property owners within the road reserve are dissatisfied with compensations that are due to them. Such a case was experienced at the ongoing construction, Mahalapye – Kalamare road, where a farm owner refused to pave way to the contractor only because

he was not satisfied with the value of the compensation. The contractor then abandoned the section of the road to proceed with the works on the other sections. The normal practice is that the contractor will submit a claim for disruption of progress and for remobilizing his plant to the abandoned section when it has been sorted out.

These factors increase the likelihood of delay and claim in road contraction projects in Botswana as compared with other construction projects. Furthermore, associated delay problems can also result in dispute, arbitration, total abandonment and protracted litigation by the parties. Small citizen contractors in Botswana are experiencing cash flow problems and thus cannot afford to absorb costs of arbitration. This results in some of the contractors getting liquidated and abandoning projects. To some extent the contract parties through claims usually agree upon the extra cost and time extension associated with delay. This has in many cases given rise to heated arguments between the contractor and the owner. The question of whether a particular delay to progress of work warrants an extra cost and or extension of project duration is usually the cause of disagreement between the parties (Sambasivan and Soon, 2007).

Against the foregoing, the Botswana government is concerned with the quality of roads funded, and the time and cost overruns in delivering the projects. Out of the 31 road construction projects that were completed, between 1996 to 2005 by the Department of Roads, only 6.5% of the projects were completed within the scheduled completion dates and 32% were completed within budget. These indicate that there are serious problems within the construction industry in Botswana most especially on road project delivery. The motivation for this research therefore is a lack of required information relating to the factors causing claims on road construction projects in Botswana for the purposes of reducing its impact on project delivery. Such questions, usually involve questioning the facts, causal factors and contract interpretation. Synthesis of delay analysis techniques such as provided by AlKass et al. (1996) can address these questions.

Literature Review

Significant cost overrun on construction projects has given research impetus to the nature of claims in the construction industry in the last three decades. Zanelidin (2006), studied the types, causes and frequency of construction claims in the United Arab Emirates (UAE) by collecting information for 124 claims related to different construction projects in Dubai and Abu Dhabi Emirates. The data was collected from 71 different entities (29 contractors, 33 consultants and 9 owners) in the two emirates. The data for the 124 claims was mainly extracted from owners, consultants and contractors claims database. Owners and firms were also asked to provide information related to types of claims, causes of claims and frequency of each type and cause by completing a questionnaire. Data received indicated that the types of claims in construction projects in UAE can be classified into six main types and there were 26 possible causes of claims viz: Contract ambiguity claims, Delay claims, Acceleration claims, Changes claims, Extra-work claims and Different site conditions claims. The study found that the most frequent type of claim is “changes” type of claim and “extra-work” type of claim was ranked second. Of the 26 identified possible causes of claims, “change orders” are the most frequent causes of claims with an importance index of 52.5%. The types of projects considered included buildings, roads and highways, water and sewer lines, power plants and airports. Roads and building projects had the

highest percentage among all other types (34.7% and 30.6% respectively). In comparison to the current research the research by Zaneldin (2006) covered a wide range of projects including roads (34.68%), Buildings (30.65%) sewer line (12.10%), water line (11.29%), airport ((4.03%), power plant (3.23%) and others (4.03%). This research was deemed relevant to the current study because of the higher percentage of road construction projects covered.

Odeh and Battaineh (2002) conducted a survey aimed at identifying the most important causes of delay in construction projects executed under the traditional procurement system from the point of view of construction contractors and consultants. The survey included public and private buildings, roads, water and sewer projects in Jordan. The study was based on 28 causes of delay to which the participants were asked to indicate their perceived level of importance of each cause. The researchers categorized the delay causes into eight major groups as follows:

1. Client related factors – finance and payments of related work, owner interference, slow decision making and unrealistic contract duration imposed by owners.
2. Contractor related factors – site management, improper planning, inadequate contractor experience, mistakes during construction, improper construction methods and delays caused by subcontractors.
3. Consultant related factor - contract management, preparation and approval of drawings, quality assurance/ contractors, and long waiting time for approval of tests and inspection.
4. Material factors - quality and shortage.
5. Labor and equipment factors - labor supply, labor productivity and equipment availability and failure.
6. Contract factors - changed and mistakes and discrepancies in contract documents.
7. Contractual relationships factors - major disputes and negotiations during construction, inappropriate organizational structure linking all parties involved in the project, and lack of communication between these parties.
8. External factors - weather conditions, changes in regulations, problems with neighbors and site conditions.

The researchers found that according to the contractors, labour productivity was the most important delay factor. However, inadequate contractor experience was the most important delay factor to the consultants. The results also indicated that the two parties generally agreed on the ranking of individual delay factors. They agreed that inadequate contractor experience, owner interference and financing of work were among the top five most important factors. Moreover the researchers found that delays caused by subcontractors, slow decision making by owners, improper planning and labour productivity were among the top ten most important factors for both parties. Operation factors such as labour productivity, construction methods, site management and equipment availability and failure were more important to the contractors than to the consultants. Contractors were also more concerned with factors related to contract clauses that may alter their contractual obligations and rights. These factors included change orders, mistakes and discrepancies in contracts documents and major disputes and negotiations. However factors dealing with subcontracting, planning, organizing and communicating were more important to the consultants than to the contractors. This study focused on only two parties; the contractor and the consultant. These two parties will normally blame each other on certain issues concerning the execution of the work and therefore this can give rise to distorted/bias

information from either party. The client should therefore be brought in as a third party to add a sense of neutrality to the information. It was also possible for the two parties to be biased since the claims were categorized straight away as those emanating from contractors and those from consultants.

A similar study was conducted by Sambasivan and Soon (2007), to include the client as one of the parties surveyed. The researchers found that the main and top ten most important causes of delay were contractors improper planning, contractors poor management, contractors inadequate experience, inadequate client's finance and payment for the completed work, problems with subcontractors, shortage of material, labour supply, lack of communication between the parties and mistakes during construction stage. The study also identified the main effects of delay as time overrun, cost overrun, claim, disputes, arbitration, litigation and total project abandonment. Assaf and Al-Kahlil (1995) outlined the main causes of delay in large building projects and their relative importance. The researchers found that 56 causes of delay exist in Saudi Construction projects. According to the contractors surveyed the most important delay factors were preparation of shop drawings, delay in contractor's progress, payment by owners and design changes. The architects and engineers' views were cash problems during construction, the relationship between subcontractors and the slow decision making process of owner. The owners agree that the design errors, labour shortages and inadequate labour skills are important delay factors. This research was specific to building projects but most of the outlined delay factors are applicable to road construction projects.

Al-Khalil and Al-Ghafly (1999), conducted a survey to investigate three components of delay in the construction of water and sewerage works in Saudi Arabia. The components investigated were; (1) the frequency of delay projects, (2) the extent of delay and (3) the responsibility for the delay. Delay causes were compiled based on review of literature, interviews and discussion with some government authority representatives, contractor engineers, consultant engineers working on water and sewerage projects and personal pertaining to delay in public projects. The research was conducted by administering a questionnaire survey to the three groups of construction industry stakeholders. The respondents were requested to give their opinion on the frequency and severity of each cause on a four point Likert-type scale. Sixty causes of delay were identified by literature review and interviews. These delay causes were summarized into six major categories; contractor performance, owner's administration, early planning and design, government regulation, site and environmental conditions and supervision. The result showed that a large number of projects experienced delay, especially in medium and large size projects. They also found that the owners and the consultants assigned the major responsibility for delay to the contractor but the contractors placed it mostly to on the owner. On average the contractor was assigned most responsibility. The researchers outlined the important causes of the delay as cash flow problems and financial difficulties, followed by difficulties in obtaining work permits issued by various government authorities. The researchers opined that government practice of assigning contracts to the lowest bidder without regard to qualification is another important delay factor. Other factors are tendency to underestimate project duration, subsurface conditions and scheduling by the contractor and shortage of manpower. Although this research was based on water and sewerage projects, the findings may also be applicable to other projects.

Al-Momani (2002), investigated the causes of delays on 130 public contractors in Jordan. Projects investigated in this study included residential, office and administration buildings, school buildings, medical centers and communication facilities. The result indicated that poor design and negligence of the owner, change orders, weather conditions, late delivery, economic conditions and increase in quantities are the main causes of delay. The study suggested that special attention to factors will help industry practitioners in minimizing contract disputes. The research by Al-Momani, (2002) was more oriented to building projects and did not cover civil works. The outlined causes for the delay are also not specific, they were generalized. If we take an example of, “economic conditions”, the economic parameters were not defined by the study. In the case of Botswana, we could consider the devaluation of the Pula that happened in 2005. This can significantly delay the progress of works especially if we look at it from the perspective of material suppliers. Some contractors would find it difficult to mobilize their resources if the rates they used during tender stage have changed. A good example in this case will be the Dibete – Mahalapye road that is still ongoing. The Pula was devalued when the contractor was about to mobilize resources to the site. The devaluation significantly affected the mobilization of resources to the project site.

Assaf and Al-Hejji (2006), studied the causes for delay in construction projects in Saudi Arabia. The field survey studied frequency, severity and importance of the causes of delay. Seventy – three causes of delay were identified through research. The identified causes were combined into nine groups. The field survey included 23 contractors, 19 consultants and 15 owners. A questionnaire was developed in order to evaluate the frequency of occurrence, severity and importance of the identified causes. The researchers found that; owners specified that the causes of delay are related to the contractor and labour. The study also found that owners and consultants realize that awarding to the lowest bidder is the highest frequent factor of delay, while contractors considered severe causes of delay are related to owners. They also found that one cause of delay was common between all parties, which is “change orders by owner during construction’. Other common causes are: delay in progress payment, ineffective planning and scheduling by contractor, poor site management and supervision by contractor, shortage of labours and difficulties in financing by contractor. Though this work was not specific to the types of projects which were studied, the causes of delay identified are useful to the current research on claims in road construction.

Arditi and Pattanakitchamroon (2006) reviewed 20 research studies that discuss various aspects of delay analysis methods in resolving construction claims and summarized the advantages and disadvantages of widely used delay analysis methods, including the as-planned versus as-built, impact as-planned, collapsed as built and time impact analysis methods. The researchers found that time impact was the most accepted by the literature as the most reliable delay analysis method. The work by Arditi and Pattanakitchamroon was not directed towards finding the causes of claims or delay. The current research aimed at explicitly investigating the types and causes of claims in road construction.

Semple et al. (1994) identified that more than half of all claims constituted an additional cost of at least 30% of the original contract value based on their survey on construction projects in Canada. In addition about a third of the claims amounted to at least 60% of the original contract value. In some cases the claims were as high as the original contract value. Chan and

Kumaraswamy (1997), conducted a survey to evaluate the relative importance of 83 potential delay factors in Hong Kong construction projects. They found that the five principal and common factors to be: poor risk management and supervision, unforeseen site conditions, slow decision making involving all project teams, client oriented variation of works. They also compared their findings from Saudi Arabia and Nigeria and found that different perceptions of the causes for time overrun exist between respondents in Hong Kong and those in Saudi Arabia and Nigeria.

Aibinu and Jagboro (2002), conducted a study that was aimed at investigating by a questionnaire survey of construction practitioners, the effects of construction delay on project execution and by empirical method the effects of delay on completion cost and time in the Nigerian construction industry. The major conclusion of the study was that cost overrun and time overrun were the two most frequent effects of delay in the Nigerian construction industry. Delay had significant effects on actual project duration. Loss and expense claims arising from delay and fluctuation claim during the delay period had significant effect on cost overrun. The researchers stated further that acceleration of subsequent site activities in cases of delay to make up for the lost time has frequently failed in Nigeria building projects due to deficiencies in clients project management procedures and the contingency sums included in the pre-contract estimate of projects were not always adequate to offset cost overrun. The study was able to establish an allowance of 17.34% of total cost estimate as contingency. Even though the research focused on the effects of delays on construction projects, it can be deduced from the results that the effects of the delays are generally claims for extension of time and for loss and expense claims that would ultimately lead to cost overruns and thus the results are useful for research on road construction claims. While proffering several guidelines for managing extension of time (EOT) claims, Alnaas et al. (2014), warned against the concept of “wait and see” which results in contractors submitting their claims for extension of time at the end of the project or after the contract completion date. They advised contractors to submit EoT claim whenever they foresee delay event that will elongate the project completion date inasmuch the delay event is excusable and compensable.

Hassanein and Waleed El Nemr (2008), conducted a research with the objectives of knowing the status of claims management, change order claims and how to generate means of improving the status of change order claims management with respect to the contractors handling industrial construction projects in Egypt using 21 projects. Findings in this research showed that change order claims ranked first and represented about 54% of the total number of claims. This was followed by delays caused by the owner in the form of:

- Delay in supply of material and equipment.
- Delay in payments.
- Delay in providing construction drawings

In Palestine, Enshassi et al. (2009), investigated the problems associated with claim management from the perspective of local contractors by analyzing six groups of claim procedures namely: claim identification, claim notifications, claim examination, claim documentation, claim presentation and claim negotiation. Findings from this study emphasize the need for site personnel who can detect claims during project execution in addition to good project documentation.

Hardjomuljadi (2010) posit that the best way to avoid disputes, particularly to reduce its impact, is firstly to understand the main causal factors of claims and then the employer should try to find the pre-contract strategy and to improve the monitoring system of the project. He investigated the factors responsible for claims in the Indonesian construction industry through questionnaire distributed to the users of FIDIC Conditions of Contract made up of clients, consultants and contractors. Findings showed that possession of site and design changes were the main source of claims in Indonesia and that different interpretation of claims sometimes create disputes.

In Oman, Al Mohsin (2012) found that the main causes of claims are: delayed approval of schedules, change orders and slow processing of change order and lack of expertise. The clients were implicated as contributing about 41.36% to the occurrence of claims due mostly to the lack of experience while contractors and consultants contributed 21.47% and 20.94% respectively to claims. The rest 16.23% were attributed to inadequacies and errors in the contract documents.

According to Yoke-Lian et al. (2012), change orders by consultants resulting in project delay in the Malaysian construction industry is the most common reason for EoT claims. Further, Yusuwan and Adnan (2013a), in a questionnaire survey, asked respondents to rate the frequency of occurrence of eleven most contentious issues associated with EoT claims and their preferred method of dispute resolution as drawn from literature. Concurrent delay was found to be the most contentious issue associated with EoT claims. They (Yusuwan and Adnan, 2013b) submitted in another investigation that poor submission of claims by contractor (such as lack of details and particulars), late submission of claims by the contractor, and collection of relevant facts from site records to establish the principle of the claim ranked highest by the respondent as reasons for late assessment of EoT claim in the Malaysian construction industry. Further studies of claims in the Malaysian construction industry (Bakhary et al. 2015), revealed that the highest three reasons for claim in ranking orders were:

1. Design changes introduced at the post-tender award stage.
2. Hurried implementation of project without recourse to adequate site investigation, design work and contract documents.
3. Changes in the client/users requirement during the post tender stage.

In India, Kamble and Kambekar (2013), investigated the extent of delay claims on three types of project and found that claim was 14.5% of the contract sum for a mall project in Mumbai; 1.08% for the construction of hotel and casino in Goa and 400% total for power transmission tower at four locations in Raigad district of Maharashtra. The factor of delay damages for the mall project was shortage of shuttering materials; for the hotel and casino and the power station it was delay in allotting the site to the contractors. Also Chaphalkar and Iyer (2014), found that out of 52 arbitration awards available for study, 38 awards pertained to delay related claims. The delays were observed due to numerous reasons like late handing over of site, late issue of drawings, late supply of materials, delayed payments and delay on the part of sub-contractors.

Braimah (2013), reports on approaches to delay claims in the UK based on the views of practitioners in the construction and consulting companies using a nation-wide questionnaire survey. Findings from the survey revealed that:

- Delay claims are often resolved late and not close in time of occurrence of the delay events, creating more difficulties;
- Simplistic delay analysis approaches are widely used in practice and form the basis of successful claim resolutions, although they have major weaknesses;
- The sophisticated approaches, although are more robust, are generally not popular in practice.

He recommended improved programming and record keeping practices as means of promoting reliable approaches to claim settlement in order to minimize dispute.

Klee (2013), reported that claim management started to gain prominence in the Central European (CEE) countries due to recent recession forcing countries to compete for international jobs. The objective of this research was to suggest appropriate way for contractors management claim by identifying what the existing problems were through questionnaire survey. Respondents stressed that construction companies do claim but not systematically. The main problem associated with unsystematic claims was insufficient coordination of information flow between the respective project management and the superior company management.

In South Africa, Preez (2014), conducted ten interviews on project procuring professionals on the use of conciliation as a means of settling disputes arising from claims. Findings suggested that placing emphasis on conciliation will add value to claims management in project procurement and prevent the differences between parties from developing into disputes. It was recommended to Project Management Institute (PMI) to include conciliation as a fundamental method of dispute resolution in claims as this was missing where claims management was addressed in the Project Management Body of Knowledge (PMBOK).

In the United States, Shrestha et al. (2014) administered a questionnaire containing 14 questions on 40 construction professionals. The goal of the study was to determine the current procedures being adopted for delay claim analysis in the construction industry. It was found that the basis of delay claims were schedule changes (changes in the original schedule due to change in the scope of work and/or delay in the construction), drawing errors, change orders, geotechnical reports, and schedules. And the top three types of subcontractors that submitted the most delay claims were concrete, excavation, and steel subcontractors

Hadikusumo and Tobgay (2015), studied construction claim types and causes on large scale hydropower projects in Bhutan using archival records. It was reported that the dominant cause of claims was from differing site conditions (55% of claim amount), which resulted in both changes and delays that led to several claims. Negotiation was the primary mode of claim settlement used in this project and was determined to be the most effective in terms of cost and time. More than 95% of the claim cases were settled through negotiation and approximately 5% were dealt with by arbitration. The duration of the claim settlement varied from a minimum of six (6) months to as long as four (4) years. The claims that were settled through negotiation took considerably less time than the arbitration cases, which took up to four (4) years. Most of the cases that took longer to settle were due to omissions or ambiguous/conflicting contract provisions/clauses (1.64 years) and claims due to force majeure (1.63 years). All claims originated from the contractors. Overall, 39% of the amount claimed was successfully resolved for payment while 61% was unsuccessful. The various reasons for the high rejection of claims were as follows: (1) Quantity difference

between the contractor's claim amount and the actual site executed, (2) Ghost work, where some tasks were not executed but were claimed by the contractor, (3) Incompatibility with required contract provisions and (4) Disputed/unwarranted claims that needed to be referred to a higher level for settlement but were later dropped by the contractor.

It is evident from the literature that the problem of delays and claims in the construction industry is a global phenomenon. There is need for awareness in Botswana's construction industry on the impact of claims on project delivery. Information related to the causes of construction claims in Botswana and the ways to prevent or minimize them are to a large extent still missing. This study, therefore, presents the results of a questionnaire survey involving road construction professionals on the types and causes of claims (alongside their frequencies of occurrence) in road projects in Botswana.

Research Methods

Based on literature and the preliminary investigation conducted on road project stakeholders (Segwabe, 2008), it was possible to identify certain major types and causes of delay and claim on road project delivery. Six categories of claims identified are contract ambiguity claims, delay claims, changes claims, different site conditions claims, extra work claims and acceleration claims. The associated twenty seven causes of claims are:

1. Shortage of construction materials.
2. Change or variation orders.
3. Delays in handling site to contractor.
4. Different subsurface of jobsite conditions.
5. Abnormal weather.
6. Inadequate contract documentation.
7. Incomplete tender information.
8. Low price of contract due to high competition.
9. Variation in quantities.
10. Poor site management and supervision by contractor.
11. Contractor financial problems.
12. Change in government regulations.
13. Ineffective planning and scheduling of project by contractor.
14. Design errors or omissions.
15. Improper construction methods implemented by the contractor.
16. Poor communication by between parties.
17. Suspension of work by owner/client.
18. Unanticipated low productivity of labours and equipment.
19. Specification and drawing inconsistencies.
20. Subcontracting problems.
21. Changes in material and labour costs.
22. Delay in payment by owner.
23. Delay in decision making by owner/client.
24. Accidents on site.
25. Late supply of drawings by consultant.
26. Poor contract management.
27. Imported materials and plant items.

These 27 factors were the subject of a questionnaire sent to respondents for ranking. A total of 52 questionnaires were distributed to the road project stakeholders. Out of the 52 questionnaires, 27 usable responses were received, which represents 52% response rate. Responses included 8 contractors, 10 consultants and 9 owner's (client) representatives. The contractors surveyed were

those that registered within Public Procurement and Asset Disposal Board (PPADB) categories D and E and had an average experience of about 13 years while the respondent consultants were those that have an average of about 21 years of experience. All the respondents were practitioners related to road projects in Botswana and are either currently working on ongoing road projects or have completed some road projects in Botswana.

The respondents were in the first instance asked to rank the individual effects of construction delays on claims and next, to rank the individual effects of construction delays based on the frequency of occurrence on a Likert-type scale. A weight in the scale of 0 to 4 was given for each of the frequencies with weight of zero for never, 1 for rare, 2 for average, 3 for frequent and 4 for very frequent. No weight was given when a response was not provided. The five point scale was later transformed to relative importance index for each of the categories and causes of claims for ranking purposes.

Results

The relative importance index, RII was calculated for each factor as follows:

$$RII = \frac{4n_1 + 3n_2 + 2n_3 + n_4 + n_5}{4N} \dots\dots\dots (1)$$

where:

n1 = number of respondents for ‘always’; n2= number of respondents for ‘mostly’;
n3 = number of respondents for ‘sometimes’; n4 = number of respondents for ‘seldom’;
n5 = number of respondent for ‘never’; N = total number of respondents.

Categories of Claims

The primary data collected from the second part of the questionnaire was analyzed from the perspective of clients, consultants, and contractors. The study identified, through literature review that claims in construction projects can be classified into six main types; contract ambiguity claims, delay claims, changes claims, different site conditions claims, extra work claims and acceleration claims. Relative importance index (RII) was computed for each type of claim to identify the most frequent categories of claims. The categories of claims were ranked based on the RII values. The ranking of the categories of claims are presented in Table 1. The table shows that clients and consultants rank delay claims highest followed by extra work claim as the most frequent types of claims on road construction projects in Botswana. According to the table, contractors perceive different site condition followed by delay claim as the most frequent sources of claim. Table 1 also gives the overall ranking of the types of claim. On the overall, delay claim ranked first followed by extra work claim. Accelerated claim ranked least.

Table 1

Ranking of the Frequency of Occurrence of Categories of Claims

Types of Claims	Clients		Consultant		Contractor		Overall	
	Index	Rank	Index	Rank	Index	Rank	Index	Rank
Delay claims	0.833	1	0.700	1	0.844	2	0.787	1
Extra work claims	0.750	2	0.675	2	0.688	4	0.704	2
Different site conditions claims	0.611	3	0.475	3	0.875	1	0.639	3
Contract ambiguity claims	0.528	4	0.525	4	0.750	3	0.593	4
Changes claim	0.528	5	0.500	5	0.563	5	0.528	5
Acceleration claim	0.333	6	0.275	6	0.281	6	0.296	6

Delay claims

Delay claims ranked first among all the individual parties and on the overall basis. It is not surprising that this type of claim is the most frequent in Botswana. Most of the causes of claim identified in the study resulted in elongation of the project duration, e.g. different site conditions, variation in quantities, design errors or omissions and variation orders. The delay occurring in a project can be classified into a number of types depending upon the stages at which it occurs as well as the nature of the outcome, i.e. claims. This defines the criticality of the delay in the overall project completion and its impact thereafter. Different types of claims arising out of time delay and extension clauses are as follows: claim for price escalation of resources by the contractor when the work is not completed in time and extensions are to be allowed because of client's default, claim for idling resources by the contractor due to delay by the client, delay due to handing over of site, delay due to rework etc. It is evident from the literature that delay claims are of great concern to the construction industry practitioners.

Extra work claims

In a similar study conducted by Zaneldin, (2006) in the United Arab Emirates, this type of claim was also ranked as the second most frequent type of claim after "changes claim", out of the six types of claims which were also adopted for this study. The nature of construction industry is such that full scope of work cannot be decided at the time of tendering and change orders are inevitable for successful completion of the project. Subsurface conditions and clients changing requirements are often unpredictable leading to extra work. To avoid the claims and disputes related to extra work, experience plays a vital role in forecasting the probable areas of extra work and incorporating the relevant clauses in conditions of contract.

Different site condition claims

This type of claim was ranked third by clients and fifth by both consultants and contractors. Based on overall ranking, it was ranked third as depicted in Table 6. From the literature, different site conditions relate to the hard rock, black cotton soil encounter, subsurface water flow, archaeological things found on site, etc. however, the causes of change of site condition could be attributed to negligence of project designers and client. The client and project designer should give full and detailed underground information to the contractor. Usually designers sometimes assume the design factors in difficult conditions of site, which may differ during construction

works later. If it is not possible due to time constraint or whatever other reasons, then provision of proper compensation in case of changed conditions should be categorically mentioned in the contract document to avoid claims later. Change of site condition is a prominent problem in construction projects globally as revealed by previous studies; Arditi et al. (1985), Chan and Kumaraswamy, (1997) and Acharya and Lee, (2006). So it is not surprising to find this result true in the context of Botswana.

Change order claims

Change order claims was ranked fourth by clients and third by consultants. On an overall basis it was ranked fourth. It seems from the literature that variation orders are inevitable in any construction project. Needs of the client may change in the course of design or construction. Factors like community needs may influence design and the choice of the engineer. The engineer's review of the design may bring about changes to improve or optimize the design, hence the operations of the project. Furthermore, errors and omissions in drawings or construction may force a change. All these factors and many others necessitate changes that are most of the time costly and generally unwelcome by all parties to a contract. Management of changes and claims is the management of risks. It begins with the allocation of risk in the project owner's selection of a particular construction method. A study by Zaneldin, (2006) found this type of claim as the most frequent type of claim.

Causes of claims

Table 2

Ranking of the Causes of Claims

Causes of Claims	Clients		Consultant		Contractor		Overall	
	Index	Rank	Index	Rank	Index	Rank	Index	Rank
Variation in quantities	0.583	6	0.525	5	0.750	4	0.611	1
Design errors or omissions	0.500	12	0.475	9	0.875	1	0.602	2
Poor site management and supervision by contractor	0.778	1	0.650	2	0.281	24	0.583	3
Ineffective planning and scheduling of project by contractor	0.667	2	0.75	1	0.313	23	0.583	3
Change or variation orders	0.556	8	0.525	5	0.656	5	0.574	5
Different subsurface of jobsite conditions	0.528	10	0.450	12	0.781	2	0.574	5
Low price of contract due to high competition	0.667	2	0.600	3	0.438	16	0.574	5
Contractor financial problems	0.667	2	0.600	3	0.375	19	0.556	8
Specification and drawing inconsistencies	0.500	12	0.425	13	0.781	2	0.556	8
Shortage of construction materials	0.556	8	0.400	14	0.625	7	0.519	10
Unanticipated low productivity of labour and equipment	0.500	12	0.400	14	0.656	5	0.509	11
Poor communication between parties	0.528	10	0.500	8	0.469	13	0.500	12
Imported materials and plant items	0.389	19	0.525	5	0.594	8	0.500	12
Abnormal weather	0.639	5	0.350	22	0.500	11	0.491	14
Changes in material and labour costs	0.583	6	0.400	14	0.469	13	0.481	15

Poor contract management	0.500	12	0.400	14	0.563	9	0.481	15
Inadequate contract documentation	0.417	17	0.475	9	0.531	10	0.472	17
Improper construction methods implemented by the contractor	0.472	16	0.475	9	0.344	22	0.435	18
Late supply of drawings by consultant	0.417	17	0.375	19	0.500	11	0.426	19
Incomplete tender information	0.389	19	0.400	14	0.438	16	0.407	20
Subcontracting problems	0.389	19	0.375	19	0.469	13	0.444	20
Delay in decision making by owner/client	0.306	23	0.375	19	0.375	19	0.352	22
Changes in government regulations	0.333	22	0.325	23	0.375	19	0.343	23
Delay to hand site to contractor	0.306	23	0.275	24	0.406	18	0.324	24
Delay in payment by owner	0.306	23	0.275	24	0.219	25	0.269	25
Suspension of work by owner/client	0.222	26	0.275	24	0.219	25	0.241	26
Accidents on site	0.194	27	0.225	27	0.156	27	0.194	27

Table 2 is a summary of the RII ranking by the three parties and on the overall. Based on the ranking, the five most frequent causes of claims as perceived by clients were: Poor site management and supervision by contractor, contractor financial problems, low price of contract due to high competition, ineffective scheduling and planning of project by contractor and abnormal weather. The five most frequent causes of road construction claims as perceived by consultants were: ineffective planning and scheduling of project by contractor, poor site management and supervision by contractor, low price of contract due to high competition, contractor financial problems and variation orders. The five frequent causes of claims as perceived by contractors were: Design errors or omissions, different subsurface or jobsite conditions, specification and drawing inconsistencies, variation in quantities and unanticipated low productivity of labours and equipment.

From the above list, it is interesting to compare the causes of claims as perceived by three parties; consultants and clients generally agree on the top four most frequent causes of claims in Botswana. The two parties blame the contractor for financial problems, ineffective scheduling and planning of project and poor site management and supervision as the most frequent causes of claims. The two parties also agree that low price of contract due to high competition is one of the most frequent cause of claims. This is due to the fact that tenders are awarded to the lowest bidder to execute the road projects. Generally, the lowest bidders are unqualified contractors with shortage in resources and low capabilities. This results to low performance and cause delay in completion of the work. Contractors at times end up putting up claims in order to cover for the losses and for the tender price. All the three parties agree that accidents on site, suspension of work by client and delay in payment by owner are the least frequent causes of claims. From the overall ranking, the five most frequent causes of claims are variation in quantities, design errors, poor site management and supervision by contractor, ineffective planning and scheduling of project by contractor and low price of contract due to high competition.

Conclusion

The important issue focused on in this study is claims in the construction of roads in Botswana. Since claims are considered to be a serious problem in the construction industry for both client

(Roads Department, Botswana) and contractors, this study investigated the types and causes of claims in construction of roads in Botswana. From an extensive literature review and preliminary investigations conducted at the outset of this study, it was possible to identify major types of causes and claims on project delivery. The study identified six major types and twenty seven causes of claims.

A questionnaire was then designed and distributed among the three major groups of stakeholders (clients, consultants, and contractors) on the frequency of occurrence of each type and cause of claims. Relative importance index (RII) method was used to analyze the data collected from the questionnaire survey. The analysis was carried out for each group of respondents and on the overall results (all the parties combined). The indices were then used to determine the rank of each item. The responses were collected from 27 respondents (nine clients, ten consultants and eight contractors).

The results indicated that clients and consultants specified delay claims followed by extra work claims as the most frequent types of claims in construction of roads in Botswana. Contractors perceived different site conditions followed by delay claim as the most frequent types of claim. From the overall response, delay claims were ranked first followed by extra work claims. Acceleration claims were ranked last.

The five most frequent causes of claims as perceived by client were: poor site management and supervision by contractor, contractor financial problems, low price of contract due to high competition, ineffective scheduling and planning of project by contractor and abnormal weather. The five most frequent causes of road construction claim as perceived by consultants were ineffective planning and scheduling of project by contractor, poor site management and supervision by contractor, low price of contract due to high competition, contractor financial problems and variation orders. The five frequent causes of claims as perceived by contractors were design errors or omissions, different subsurface or jobsite conditions, specification and drawing inconsistencies, variation in quantities and unanticipated low productivity of labors and equipment.

Comparing the causes of claim as perceived by the three parties, the consultants and the clients generally agreed on the four top-most frequent causes of claims in Botswana. The two parties blame the contractor for his financial problems, ineffective scheduling and planning of project and poor site management and supervision as the most frequent causes of claims. The two parties also agree that low price of contract due to high competition is one of the most frequent cause of claims. All the three parties agree that accidents on site, suspension of work by client and delay in payment by owner are the least frequent causes of claims. The top five most frequent causes of claim based on overall ranking were: variation in quantities, design errors, poor site management and supervision by contractor, ineffective planning and scheduling of project by contractor, and low price of contract due to high competition.

The results of the study revealed differences in perceptions as to the causes of claim between the groups of contractors and clients and also between contractors and consultants. Clients and consultants generally agreed on the causes of claim. It is suggested that this apparent collective biases of different industry groups may often direct blame for claim to the other group and this

discourages a search for the root causes of claim and solutions to same. The origin of such biases may be traced to group conditioning as well as to the present adversarial nature of the contractual systems, including the clashes and the blame allocation. Perhaps the wording of the factors in the questionnaire itself might also be re-examined to minimize any defensive posturing by different groups but a residual is apparent even if allowances are made for this possible distortion.

Recommendation

From the literature review, the traditional practice of awarding contract to the lowest bidder has been implicated as a source of time and cost overruns and consequently claims. It is customary to award road contracts through traditional procurement in Botswana. It will be recalled that traditional procurement gives preference to the lowest bidder who in most cases are the least competent to manage the risk associated with the work. The continued adoption of traditional procurement system (TPS) for public infrastructure is a misnomer most especially when considering road projects. Love (2008) reported a general move away from the TPS in Australia due to multifarious problems associated with it which include delay claims. This paradigm shift is common to all developed countries whereby procurement system such as design-build, management oriented procurement system (MOPS) and recently performance information procurement system (PIPS) is preferred to TPS. Adeyemi and Kashiwagi (2014) treatise low-bid infrastructure procurement system as unsustainable and dissuaded African governments from its continued adoption. In the same vein, Adeyemi et al. (2015) analyzed 40 public infrastructure projects and found that all the projects incurred cost overrun to the tune of 622.00 million Botswana pula for projects implemented through TPS between 2009 and 2014. It is therefore recommended that road infrastructure procurement in Botswana shift to best value procurement typified by PIPS where emphasis is placed on the construction process rather than price.

In this procurement system the best value contractor, that is, the contractor that can identify and manage the risks associated with the project is selected through stage by stage sieving and past records (Adeyemi et al. (2011). The issues of delay claims, extra work claims, change orders and different site conditions as encountered in this research are endogenous risk factors which a best value contractor can foresee.

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Appendix

List of Abbreviations

ADB	African Development Bank.
BADEA	Arab Bank for Economic Development in Africa
CIDA	Canadian International Development Agency
DANIDA	Danish International Development Agency
EEC	European Economic Community
IBRD	International Bank for reconstruction and Development
NORAD	North American Aerospace Defense Command
OPEC	Organisation of Petroleum Exporting Countries
UNCDF	United Nations Capital Development Fund
USAID	United States Agency for International Development