

Identifying Context-Relevant Factors for Addressing Delayed Payment to Contractors in the Construction Industry: A Case Study

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Abstract

The subject of delayed payment to contractors for works executed has been and is still being studied. Several recommendations have been made, yet the menace of delayed payment is increasing by the day. It may be reasonable to conclude that this challenge persists because the solutions proposed so far have been too generic and not sufficiently tailored to the specific context. Therefore, it is imperative to localise the causes, effects, and mitigation strategies. Consequently, this research focuses on contextualising the critical factors underpinning the causes and effects of delayed payments, as well as identifying actionable, context-specific mitigation strategies to address these challenges. The mixed method of research strategy was adopted, and the mirror imaging tool was used for the quantitative analysis of participants' responses. The research revealed that out of the ten generic causes evaluated, four were found to be relevant to the context of the research. Similarly, seven critical factors responsible for the effects and four factors as suitable mitigation strategies were identified. This research recommends that the Project Manager, as the interface between the client and the project execution team (PET), should coordinate the implementation of the identified factors to reduce the incidence of delayed payment to the barest minimum, in Mpumalanga Province of South Africa.

Keywords

Delayed payment, Causes, Effects, Mitigation strategies, Mirror imaging.

1.Introduction

The delay of payment to contractors for works executed in the construction and engineering projects environment has

been an issue of global concern. Several research efforts have been dedicated to the study of the cause, effect, and mitigation strategies. Several suggestions or solutions have been proffered, yet the incidence of delayed payment is still being experienced (Almutairi, 2016). “Delay in payment has multi-dimensional impacts on the construction process. The effects include a delayed or derailed programme of works, constraints on cash flow, disputes that may escalate to litigation, and, in extreme cases, abandonment of the construction site. (Akinsule and Ajayi, 2016; Bissoon and Outridge, 2020; Idowu et al., 2022). The Parliamentary briefings and oversight committee reports (2023/24), revealed that over 60% of public infrastructure projects in Mpumalanga Province were either behind schedule or stalled, due to late payment to contractors (Republic of South Africa, 2024).

Many existing research efforts have focused on broad geographic scales, such as regions, nations, or groups of countries, with very limited attention given to contextualising these wider findings for local application. Adopting a context-specific approach has the potential to identify the most relevant solutions to the subject of delay. Furthermore, this approach will narrow down the generic solutions postulated from several research efforts to a few critical factors, for ease of implementation. This research, therefore, seeks to identify the most critical causes, effects, and mitigation strategies of delayed payments relevant to Mpumalanga province, thereby providing actionable insights for improving project delivery and compliance with statutory frameworks such as the Public Finance Management Act (PFMA) of South Africa.

1.1 Objectives

The objective of this research is to examine a collection of research results on the cause, effect, and mitigation strategies discussed in existing literature on how to manage the challenges of delayed payment and identify the most critical factors influencing payment delays relevant to the construction industry in Mpumalanga Province of South Africa. This paper is an excerpt from a larger research project examining delayed payments to contractors in Mpumalanga Province of South Africa. The structure of this paper progresses from a brief introduction to a detailed literature review, which guided the identification of suitable factors recommended in previous research. Section three provides information on the research method, while section four provides the results of the analysis and the identification of the research findings. Section five discusses the research findings, culminating in the conclusions and recommendations presented in section six. Furthermore, the research seeks to contribute to the academic discourse on the challenges of delayed payment to contractors for work executed and its impact on effective infrastructure delivery.

2.1 The occurrence rate of delayed payment

The delay of payment to contractors for works executed is a global problem in the construction industry, occurring in developed and developing countries alike, to varying degrees. According to the research efforts of Rahman et al., (2018), globally, 70% of contractors experience delays in payment in one or more of their projects. The literature survey across individual countries and regions indicates that Nigerian contractors experience delayed payments in up to 75% of their projects (Oladapo and Ayodele, 2019). Similarly, in India, 70% of contractors report delays in payment (KPMG, 2020), while in Kenya, 68% of contractors encounter delayed payments (Mutua, 2021). Across South America, contractors experience an average delay rate of approximately 65% (Mohammed and Bello, 2020). However, in Chile, an estimated 50% of contractors receive their payments late. (Construction News, 2023).

The Federation of Master Builders reported that contractors in Britain encounter an average late payment rate of 60% (Federation of Master Builders, 2022). Likewise, in South Africa, 60% of contractors in the construction sector are affected by delayed payments (Smith and Makheta, 2021; Adekunle et al., 2023). In Germany, 35% of contractors experience delayed payments (Europe Construction Industry Federation, 2020), while in Asia, Japan records a comparatively lower figure, with only 20% of contractors facing delayed payments (Construction Industry Trends Japan 2021 (Coface, 2021). This synthesis highlights that delayed payments to contractors for completed work constitute a global issue across the industry.

2.2 Causes of delayed payment on engineering projects

Delayed payments in construction engineering projects may be attributed to three interconnected stakeholders: the contractor, the consultant, and the client. Several research efforts have explored the contribution of these three interrelated entities to the causes of delayed payment from different regions of the world.

The research efforts of Almutairi (2016) focused on the construction projects executed in Kuwait and identified 10 factors, classified under the contractor and client responsibilities. According to the analysis, the contractors’

contribution to the delays in payments includes: the contractor's poor performance, delay of payments to suppliers and sub-contractors, shortage of local labour, the use of inexperienced staff, poor management of sub-contractors, routine changes of sub-contractors, and non-compliance with health and safety methods. On the part of the client, the factors include adopting the practice of awarding a contract to the lowest bidder, delayed decision-making, and conflict between the project stakeholders. Similarly, Bagesi (2024) conducted a detailed literature review of the causes of delayed payments in public construction projects in Saudi Arabia. The exercise resulted in identifying 61 causes of delayed payments, but the 13 highest recurring factors in the literature are classified along the three clusters of contractors, consultants, and clients' responsibilities. The contractors' contribution to the payment challenges includes the failure to substantiate their claims and poor estimation of project costs. On the part of the consultants, they are responsible for the delay in solving technical issues on site and the slowness in certifying payments. On the other hand, the client's responsibilities include delayed fund allocation, deliberate underpayment, deliberate delay for their financial gain, corruption, mismanagement, and inefficiency. The next set of factors can be the shared responsibilities of the consultants and clients, namely, multiple stages of payment certificate reviews, unfair contract terms, and a drawn-out paperwork process before payment. Acharya et al. (2004) identified 22 factors responsible for delayed payments in Malaysian construction projects. However, Ismail et al. (2023) identified the seven factors considered most critical as: changes in government regulations and Laws, technological advancement, red tape in government agencies, conditions of weather changes, Site access, Project type, and procurement methods.

In the West African sub-region, Odenigbo et al. (2020) investigated the causes of delayed payments in construction projects in Nigeria. The research established that under the client, payment delays are due to disagreements with the submitted valuations, as well as too many administrative processes. Additional factors involve the withholding of payments arising from inaccuracies in the valuation certificate, as well as insufficient budget allocations to process payment claims within the designated budget period. The contributions of the project consultants to payment delays are due to errors on the working drawings and specifications, valuation disagreements with suppliers and contractors for work done, delays in the preparation of valuation certificates, slow movement of information within the project execution team, and delays in the processing and approval of variation orders. Contractor-related factors include insufficient comprehension of contract agreements and payment terms as outlined in the contract conditions, disputes regarding progress valuations performed by engineers and project quantity surveyors, delays in submitting monthly progress claims and accompanying documentation, substandard workmanship, and non-compliance with specified requirements, scope, and approved work schedules. Similarly, Ansah (2011) explored the causes and effects of delayed payments by clients on construction projects in Ghana. From the clients' perspective, contributing factors include inadequate financial management practices, delayed payments occasionally influenced by expectations of incentives from contractors, unreliable sources of funding, disputes regarding the valuation of completed work, and insufficient commitment to fostering a constructive approach to contractor payments. The consultants' contribution includes the delay in certification of payments by the engineer, architect, and the project quantity surveyor. In the same sense, the contractors' factors include late submission of claims, the submission of progress claims with errors, and failure by the contractor to follow guidelines for submission of claims. The contractors should not be in a hurry to sign any contract, merely because of the attractive contract sum, without understanding the associated terms and conditions of the contract. On the other hand, the consultants and the client should ensure fairness and equity in the developed terms and conditions of the contract to achieve a win-win relationship.

In the Southern African sub-region, notably South Africa, Adekunle et al. (2023) identified three generic factors responsible for the delay in payments to contractors for work executed in the South African construction industry. The factors include poor contract administration, late certification of completed works, and bureaucratic payment processes. Mewomo (2019) and Bangani (2023) added that gross unethical practices and a lack of transparency are factors responsible for the delayed payments in the South African construction industry. The research efforts of Radebe (2021) focused on the activities of the small and medium enterprise (SMME) contractors in South Africa. Noting that the sources of delayed payments experienced by this group of contractors emanate from disputes over the quality of work output, variation orders, scope changes, and poor progress. Similarly, the research effort of Djokoto (2017) focused its attention on the delayed payments experienced by the contractors serving the construction industry in Gauteng Province of South Africa. The research identified many factors, without any clear classification along the three sectors. The factors identified include disputes over payment claims and response, payment culture of the industry, chain payment, and work first get paid later, attitude of the payer, dishonest/unethical conduct, improper supervision and financial control, cost overruns and contract failure, lack of knowledge or experience in the field, and financial difficulties due to a drop in building prices. The South African National Treasury (1999) reports provided the icing on the cake for the causes of delayed payments to contractors for work executed. The report summarized the

causes for the delay as “undermining systematic failures in complying with the Public Finance Management Act (PFMA)” [Section 38]. The Public Finance Management Act (PFMA) of South Africa clearly states that suppliers must be paid within a period of 30 days of receiving an invoice, unless agreed otherwise in the contract documents. Specifically, the Parliamentary briefings (Republic of South Africa, 2024) showed that Mpumalanga Province was in default in effective public infrastructure projects delivery, to the tune of over 60%. Largely because of late payment to contractors. This corroborates the findings of the provincial audit of 2024, noting that non-compliance with PFMA guidelines was observed in 42% of sampled projects across the country (Auditor-General South Africa, 2024). This statutory breach highlights the gap between legislative intent and practical implementation, reinforcing the need for reform.

Table 1 provides the synthesis of the ten most common causes of delay gleaned from the literature reviewed.

Table 1. Ten common causes of delayed payment in construction projects

Item	Causes of delayed payment in construction engineering projects
1	Long payment approval processes.
2	Disagreement of works valuations between the contractor and the quantity surveyor.
3	Late submission of progress claims.
4	Failure to submit progress claims without supporting documents.
5	Inaccurate claims submission.
6	Delayed payment by the client
7	Bureaucracy and red tape
8	Poor performance by the contractor
9	Conflict amongst parties.
10	The client has poor financial management

2.3 Impact /effects of delayed payment

According to global research conducted by Deloitte (2019), the results showed that 48% of the contractors suffered from cash flow problems due to payment delays. This, in turn, impacts project delivery schedules, imposes financial pressure on subcontractors and suppliers of goods and services, and can lead to job losses and additional societal challenges. In the West African sub-region, Akinsule and Ajayi (2016) investigated the impact of payment delays to contractors on construction project delivery in Nigeria. The research identified 10 effects, which include, but are not limited to: the delay in the delivery of construction projects, construction disputes, contract abandonment, increase in construction costs, poor quality output, and the creation of cash flow problems for the contractor. Similarly, Idowu et al. (2022) identified some of the impacts as suspension of work on site by the contractor, bankruptcy, claiming for interest, wastage of resources, delay of repayment of loans by the contractor, disputes, cost overruns, negative social impact, and loss of employment for both men and women. Furthermore, Seman, et al. (2023) and Oshungade (2015) enumerated other impacts to include litigation, arbitration, disputes, site abandonment, cost and time overruns, bad public relations, poor quality, and loss of employment by workers. The scenario in the Southern African sub-region, depicted by reference (Oshungade, 2015), showed that some of the impacts include disruption of cash flow for contractors, affecting procurement processes of material and labour. This leads to work stoppage, time and cost overruns. The risk of bankruptcy caught the attention of Adekunle et al. (2023), especially among the SMME contractors. In a nutshell, the impact of the delayed payments to contractors has both short and long-term effects on the contractors, the economy, and the larger society.

The synthesis of the ten most common factors identified in the reviewed literature is presented in Table 2.

Table 2. Ten common effects of delayed payment on construction projects

Ref	Effects/Impact of delayed payment on construction projects
1	Abandonment of works
2	Increase in construction costs
3	Extension of time

4	Bankruptcy
5	Negative social impact
6	Loss of employment by local communities
7	Dispute and Litigation
8	Cost overrun
9	Arbitration
10	Uncertainty for the contractor to complete the works

2.4 Mitigation strategies for delayed payment

Several research efforts have been dedicated to the study of mitigation strategies to ameliorate the incidence of delayed payments to the contractor. The suggested mitigation strategies can be classified under two categories, namely the pre-contract phase and the project execution phase. The pre-contract phase includes the tender and tender adjudication processes. The project execution phase includes the project management processes, the pragmatism of the contractor, and the client's obligations to ensure the effective delivery of the planned project.

The start points of effective pre-tender management should be the pre-qualification of contractors for any specific construction project. The pre-qualification documents should clearly outline the categories of contractors eligible to bid for the proposed project and detail the documentation required from prospective contractors for vetting purposes. The client's agent is responsible for conducting physical verification of submitted documents and must ensure that only pre-qualified contractors are invited to participate in the bidding process (Jafari, 2013). Furthermore, tender documents should be comprehensive, presented in a user-friendly format, free of ambiguity, and accompanied by detailed requirements for supporting documents from contractors. Vacanas and Danezi (2018) observe that a comprehensive tender document facilitates the ease of evaluating the contractor's capacity, financial status, the quality and practicality of the work programme. During the process of tender adjudication, efforts should be made to discourage the use of the practice of awarding the contract to the lowest bidder, because it is fraught with more disadvantages than advantages (Deep et al., 2018). If this practice is discontinued, it allows the tender adjudication process to screen the contractors' submissions objectively, adopt the use of 'balanced pricing', which enables the ease of disqualifying the contractors who provide inaccurate information, particularly with unit pricing for some items (Deep et al., 2018).

Regarding the content of the contract documents, Idowu et al. (2022) suggested better structured contracts with the provision of suitable clauses in the terms and conditions of the contract for advance payments, payment bonds, advance bonds, and payment guarantee systems. Furthermore, Olatunji (2020) suggested the inclusion of appropriate legal clauses in the contract document for the use of payment of an insolvency bond, building of safe security payment schemes, direct payment, and the payment of interest by the client. In addition, Rautenbach (2024) suggested the inclusion of time-bound payment terms in contracts and penalties for non-compliance. Vacanas and Danezi (2018) suggested that the contract document should include a provision for the use of the arbitration process to resolve the challenges of delayed payments. The success of the execution of any construction project and, by extension, the payment for work done, is influenced by the quality of the contract documents. These documents should include the working drawings, bill of quantities, and the terms and conditions of the contract. These documents should be simple but comprehensive, without ambiguities, enhance the ease of managing the claim process, and provide for checks and balances for all stakeholders in the project execution team.

The quality of the project management process has a significant influence on the mitigation of the challenges of delayed payments. The research efforts of Idowu et al. (2022) suggested the practice of continuous training and educating Project Execution Team (PET) members on the need for effective documentation of periodic valuation, claims, and provision of adequate supporting documents, to reduce the time for processing payment. The contributions of Dela Cruz and Polinar (2023) and Daripa and Mangaraj (2022) challenge the project management team to develop the project documents with a clear and detailed project scope. During the construction process, the team should ensure frequent and effective communication, monitoring, and evaluation of the project schedule, and the adaptation of new technology. The mitigation strategy suggested by Bissoon and Outridge, (2020) is the challenge that all stakeholders in the project execution team should be well acquainted with the details of the project management process stipulated in the terms and conditions document of the contract, which is developed according to the specific contract administration system, such as the International Federation of Consulting Engineers (FIDIC) and the Joint Building Contracts Committee (JBCC) framework. In addition to being conversant with the content of the contract documents,

the project managers should adopt the soft skills of effective communication, coordination of the project team, and adapt the blend of advocacy and mediation between the client and the contractors to navigate the challenges of delayed payment to ensure the smooth execution of projects (Strong et al., 2021). The synthesis of the mitigation factors with the highest frequency from the literature review is presented in Table 3.

Table 3. Ten common mitigation strategies for delayed payment on construction projects

Ref	Description of Mitigation Strategies for Delayed Payment
1	Arbitration
2	Payment of the guarantee
3	Contractor must chase payment
4	Retention bond to secure money
5	Payment of interest by clients
6	Insolvency Insurance
7	Cession contracts – Direct payment
8	Improve the process of claims, valuation, and certification.
9	Contractors must submit claims without errors
10	Manage all risks associated with the delay of payment

Several research exercises have been dedicated to the study of the causes and effects of delayed payments. In the same sense, multiple mitigation strategies have also been suggested. However, the incidence of delayed payments is still a common occurrence in the construction industry worldwide. The reason for the persisting challenge may be that the proffered solutions are not context-specific. In this regard, this research adopted a context-specific approach and identified a few critical factors relevant to the construction industry in Mpumalanga Province of South Africa.

3. Research strategy

This study adopted a mixed-method research strategy, combining qualitative and quantitative approaches to provide both context and depth to this research (Crosswell and Plano Clark, 2018). The qualitative component captured the common factors identified in the literature, such as the causes, effects, and suggested mitigation strategies for addressing the incidence of delayed payment to contractors in the construction industry. The quantitative component of the research analysed the information collected from the qualitative research through systematic quantification of data from the participants in this research, which allowed the research to locate the results in the context of Mpumalanga Province of South Africa (Guest et al., 2006). A key analytical tool employed in this study is the mirror imaging system (Ogbeifun and Pretorius, 2024). The import of this approach is to locate the response of the participants in either the positive or negative perspective, by allocating zero value to the middle integer of the Likert scale. The integration of qualitative narratives with quantitative ranking ensures that the findings are both empirically grounded and contextually relevant, supporting actionable recommendations for necessary reforms in the construction industry on how to manage the challenges of delayed payment.

3.3 Population, sample, and sampling method

The population for this research involves professionals actively involved in the delivery of construction engineering projects in Mpumalanga province in South Africa, specifically, the participants in the development of three healthcare facilities in the province. The sample of the participants was purposively selected from among the Project Managers, Consulting Engineers, contractors, and clients' representatives, Quantity surveyors, and financial managers in both the client and contractor organisations (Tarek et al., 2022). The sample of 50 participants was targeted, but 43 professionals responded and participated actively throughout the research exercise (Sakhare and Patil, 2019). The Selection was guided by the principle of relevance, which motivated the choice of participants based on their strategic roles in project implementation and their firsthand exposure to payment-related challenges. This selection process ensured that the sample provided an adequate representation of the key stakeholders mostly affected by payment delays. Thus, strengthening the validity and alignment of the research's findings with its objectives.

3.5 Data collection and analysis

The qualitative data were collected from the synthesis of information from the literature review, as shown in Tables 1, 2., and 3, respectively. The questionnaire containing the factors gleaned from the literature was circulated to the participants for rating on a Likert scale of 1-5, where 1 = very low, 2= low, 3 = fair, 4 = good, and 5 = very good. The

three sets of data generated during this research are the factors gleaned from the literature, the demographic information on the participants, and the rating of the factors by the participants. The participants' submissions were analysed using the mirror imaging technique. The results of the analysis were circulated to the participants for validation, and they affirmed the results. Consequently, this enhances the reliability and validity of the research results within the relevant context. The details of the execution and analysis of the data are presented in the section for results, findings, and discussion section.

4. Results, findings, and discussion

This section of this paper presents the results and analysis of the quantitative data of this research, progressing from the demographic information about the participants of this research, to the analysis of participants' responses to the survey question, and the collation of the findings of the research

4.1 Demographic information by stakeholder

The demographic information of the participants was collected according to the stakeholders' representation, reflecting the representation of the stakeholders during project execution. The questionnaire for the research was circulated to the targeted population of 50 prospective participants, and 43 responded, as shown in Table 4.

Table 4. Demographic information by stakeholder

S/No	Stakeholder	Targeted number of participants	No of Participants	Percentage %
1	Main contractor	15	14	33%
2	Consulting Engineers	10	8	18.5%
3	Quantity Surveyors	5	4	9%
4	Project Manager	10	9	21%
5	Client	10	8	18.5%
	Total	50	43	100%

The demographic profile of the study participants shows the critical stakeholders actively participating in the management of the construction process, who are knowledgeable about the issues of delayed payment to contractors for works executed. The participation of 43 (86%) of the targeted 50 stakeholders shows a strong commitment to the research exercise.

Three additional pieces of information were collected from the participants, which include the years of experience in the construction industry, the educational qualifications, and the role played by the participant during project development. Table 5. presents this dynamic information.

Table 5. Additional demographic information

S/No	Years of Experience	No of Participants	Percentage %
1	0 to 2 years	0	0%
2	3 to 5 years	1	2.4%
3	6 to 9 years	7	16.6%
4	10 years and above	35	81%
5	Total	43	100%
	Qualification Acquired		
1	Grade 12 Metric	6	14%
2	Diploma	9	21%
3	B. Tech degree	6	14%
4	Honours Degree	12	28%
5	Master's Degree	7	16%
6	PhD	0	0%
7	Others	3	7%
	Occupation in the Built Environment		

1	Engineer	7	16%
2	Senior Engineer	5	12%
3	Contract Manager	5	12%
4	Quantity Surveyor	7	16%
5	Project Manager	9	21%
6	Finance Manager	3	7%
7	Construction Executive Director	7	16%
8	Total	43	100%

The demography shows that 42 (97%) of the participants have more than six years' experience in the construction industry. Similarly, 15 (35%) hold the Metric and Diploma certificates, qualifications suitable for leaders in the operational levels of leadership. However, with long years of service, this group of participants can rise to higher levels of leadership in the construction industry. 16 (37%) of the respondents are in the tactical levels of leadership with a Bachelor's and Honours degree, while another 7 (16%) of the participants hold a master's degree and are functioning at the strategic levels of leadership. Interestingly, 3 (7%) participants indicated that they do not possess any of the qualifications indicated in the questionnaire. This group of participants is likely among the actors in the construction industry who grow into leadership positions from the artisanal cadre, with long years of experience. Furthermore, all the participants play responsible professional roles in the construction and client organizations they represented. They serve in positions such as engineer or senior engineer, quantity surveyor, project, contract, and finance managers, as well as executive directors. In a nutshell, all the participants are credible and competent stakeholders who provided reliable information to address the research questions.

4.2 Data analysis

The data collected through the questionnaire survey was analysed in three stages: first stage was the causes of delayed payment, secondly, the effects or impacts of delayed payment, and the third stage was the analysis of the response to the suggested mitigation strategies. In each of the clusters, the analysis was executed in three steps. Step 1: The presentation of the factors gleaned from the literature review and the response to each factor by the participants, on the Likert scale 1-5. Step 2: The results of the analysis using the mirror imaging system and the application of the chosen benchmark.

In a typical Likert scale, where all the integers are linearly positive, the number of participants adopting the middle integer will influence the outcome of the research exercise positively or negatively. Thus, the middle integer has been a source of concern to many researchers. This is because many participants who are not certain about what their response should be, use the middle score as an escape route or dumping ground for unsure or non-applicable responses (Kulla et al., 2008). Baka et al. (2012), To ameliorate the effects of the middle position, in an odd-number Likert scale, the middle number is allocated a zero integer, the integers to the left are given negative ratings, and the integers to the right are given positive ratings. This constrains the analysis of the response to be either positive or negative, revolving around the middle position, to form a mirror image. The mirror image concept allows for the timely resolution of the research question and achieves the principle of the 'fewer is better' (Walser et al., 2019).

Another component of this analytical tool is the choice of benchmark, a figure agreed upon as a mark for accepting consensus (Piotrowski et al., 2023). The operational principle, commonly adopted, is that the benchmark should not be too high or too low. A low benchmark would mean repeating the circle of data collection and iteration many times, with minimal changes in the information set. This may lead to frustration and lack of interest and result in high attrition (Ogbeifun and Pretorius, 2024). Conversely, if the benchmark is too high, consensus may be reached too soon, without effectively capturing the opinions of participants (Hall et al., 2016; Zhang et al., 2019). Therefore, a moderate-level benchmark is ideal. In this research, the figure 0.4 was chosen as the benchmark.

Step 3: The identification of critical factors and their distribution to the three stakeholders in the construction project (Client, Consultants, and Contractors). The identified critical factors then serve as the findings of the research.

4.3 Executing data analysis

The three-step analytical process suggested is demonstrated in this sub-section, starting with the analysis of the response to the causes of delayed payment.

Step 1. The response of the participants and the aggregated score for each Likert scale are tabulated in columns 1-5 of Table 6.

Table 6. Factors, numeration of participants, and analysis

Ref	Causes of delayed payment in construction engineering projects	1	2	3	4	5		W/ted Ave.
1	Long payment approval processes.	1	2	8	7	24	215	0.47
2	Disagreement of works valuations between the contractor and the quantity surveyor.	7	5	12	10	9		0.08
3	Late submission of progress claims.	5	5	14	13	6		0.09
4	Failure to submit progress claims without supporting documents.	3	8	11	11	10		0.16
5	Inaccurate claims submission.	3	3	14	13	10		0.22
6	Delayed payment by the client	0	0	0	9	31		0.66
7	Bureaucracy and red tape	0	4	11	9	18		0.41
8	Poor performance by the contractor	9	4	5	16	7		0.07
9	Conflict amongst parties.	3	7	17	9	7		0.09
10	The client has poor financial management	1	4	9	7	21		0.40

Step 2: The results of the analysis using the mirror imaging system and the application of the chosen benchmark.

Using a mirror imaging approach, the integers from 1 to 5 are assigned dynamic equivalent numerals as follows: 1 corresponds to -4, 2 to -2, 3 to 0, 4 to +2, and 5 to +4. Secondly, when calculating the scores, it is assumed that every participant gave a 'very high' rating for each question, awarding the maximum of 4 points (Pasipatorwa et al., 2022). Multiplying this by the total number of participants (4 x 43) yields a weighted score of 215. Therefore, to compute the weighted average for each factor, divide the arithmetic sum of the score for each factor by the weighted score, as shown in Equation 1.

Weighted average for each factor:

$$X = [-4x_{n_1} - 2x_{n_2} + 0x_{n_3} + 2x_{n_4} + 4x_{n_5}] / \text{Weighted score} \quad (1)$$

Where n_1 represents the number of participants that rated the factor as 1, similarly, n_2 , n_3 , n_4 , and n_5 represent the number of participants that rated the factor accordingly.

Example factor 1.

$$\begin{aligned} \text{Weighted average} &= [(-4 \times 1) + (-2 \times 2) + (0 \times 8) + (2 \times 7) + (4 \times 24)] / 215 \\ &= [-4 - 4 + 0 + 14 + 96] / 215 \\ &= 102 / 215 \\ &= 0.47 \end{aligned}$$

This method was used to calculate the weighted average for all the factors, and the results are displayed in the last column of Table 7. The benchmark of 0.40 was considered moderate and adopted for consensus in this research. The factors marked in bold black did not meet the requirement (Ogbeifun and Pretorius, 2024). Therefore, four of the ten factors are identified as the critical factors influencing delayed payments to contractors for completed work in Mpumalanga Province, South Africa.

Step 3: The identification of critical factors and their distribution to the three stakeholders in the construction project (Client, Consultants, and Contractors).

The four critical factors identified were distributed according to the responsible stakeholder, as shown in Table 7.

Table 7. Critical factors and the responsible stakeholder

S/No	Factors	Responsible stakeholder
1	Long payment approval processes	Consultants and client
2	Delayed payment by the client	Client
3	Bureaucracy and red tape	
4	The client has poor financial management	

The analysis revealed that the consultants and clients are the main contributors to the cause of delayed payment to contractors. The consultants, being the first port of call in the process of initiating payments for work done, have the responsibility of ensuring that the bill of quantities is in consonance with the realities in the executed portions being evaluated. They hold the responsibility of vetting the submission of the contractor before processing it further for the client. Research shows that clients return payment certificates several times due to errors in the computation and inadequate supporting documents (Adekunle et al., 2024). These avoidable errors are traceable to the negligence of the consultants. to extended payment approval processes.

Similarly, the client, through bureaucracy, red tape, and poor financial management causes delays in payments for works executed by contractors. The client-side procedural requirements and administrative factors, as well as challenges related to financial management, are evidence of their default in adhering to the requirements of PFMA (Republic of South Africa, 2024; Auditor-General South Africa, 2024).

Tables 8 present the analyses of the effects of delayed payments. After the application of the 0.4 benchmark, seven out of the ten factors examined were confirmed as relevant to the construction industry experience in Mpumalanga Province. The other three factors, marked in bold black, were discarded from further consideration.

Table 8. Factors, numeration of participants, and analysis

Ref	Effects/Impact of delayed payment on construction engineering projects	1	2	3	4	5		W/ted average
1	Abandonment of works	1	3	6	15	17	215	0.41
2	Increase in construction costs	0	1	4	12	24		0.55
3	Extension of time	0	0	2	18	22		0.58
4	Bankruptcy	3	1	13	14	12		0.33
5	Negative social impact	0	3	8	12	18		0.42
6	Loss of employment by local communities	0	3	5	13	22		0.50
7	Dispute and Litigation	2	6	11	10	14		0.26
8	Cost overrun	0	0	8	12	23		0.54
9	Arbitration	1	9	9	10	14		0.25
10	Uncertainty for the contractor to complete the works	1	4	3	10	25		0.50

Subsequently, the seven critical factors were distributed according to the responsible stakeholders, as shown in Table 9. The three cluster of stakeholders had their fair share of the impact of delayed payment.

Table 9. Critical factors and responsible stakeholders

S/No	Critical factors	Responsible stakeholder
	Abandonment of works	Contractors
	Increase in construction costs	Client/Consultants/Contractors
	Extension of time	
	Negative social impact	Contractor/Client
	Loss of employment by local communities	
	Cost overrun	Client/Consultants/Contractors
	Uncertainty for the contractor to complete the works	

The factors identified in this research, such as the impact of delayed payment, are in tandem with the information from research across the globe, suggesting that delayed payment simultaneously affects all stakeholders connected to the construction projects. Furthermore, delayed payments slow down the pace of work and may lead to the abandonment of the project, causing an increase in cost and time, as well as negative socio-economic impacts on the beneficiaries of the construction projects (Chauke, N., 2023).

Out of the ten factors suggested as mitigation strategies for managing the challenges of delayed payments, the analysis of the response from the participants showed that only four factors reflect the scenario in Mpumalanga Province. They were the factors that satisfied the requirements of the benchmark, as shown in Table 10.

Table 10. Factors, numeration of participants, and analysis

Ref	Description of Mitigation Strategies for Delayed Payment	1	2	3	4	5		
1	Arbitration	5	12	11	10	5	215	-0.02
2	Payment of the guarantee	2	4	10	16	11		0.03
3	Contractor must chase payment	7	10	6	8	11		0.06
4	Retention bond to secure money	1	4	19	10	9		0.20
5	Payment of interest by clients	3	1	5	8	26		0.49
6	Insolvency Insurance	3	2	16	9	13		0.25
7	Cession contracts – Direct payment	4	3	6	11	19		0.35
8	Improve the process of claims, valuation, and certification.	0	0	1	14	28		0.69
9	Contractors must submit claims without errors	1	2	7	11	22		0.47
10	Manage all risks associated with the delay of payment	0	0	2	13	28		0.64

The identified critical factors were distributed according to the responsible stakeholders, as shown in Table 11. The analysis showed that each stakeholder has a role to play in mitigating the challenges of delayed payments. The findings presupposed that if the contractors ensure submitting their claims without errors, the consultants make adequate improvement in the process of claims, valuation, and certification of works executed for payment, the clients and consultants jointly manage all risks associated with the delay of payment, the challenges of delayed payment would be reduced to the barest minimum.

Table 11. Critical factors and responsible stakeholders

S/No	Critical factors	Responsible stakeholders
1	Payment of interest by clients	Clients
2	Improve the process of claims, valuation, and certification.	Consultants
3	Contractors must submit claims without errors	Contractors
4	Manage all risks associated with the delay of payment	Clients and consultants

In summary, the identification of the four context-relevant causes, seven critical effects, and four mitigation strategies directly addresses the research objective of contextualising delayed payment factors for Mpumalanga Province, thereby moving beyond generic recommendations to actionable local solutions. The context-relevant factors identified in this research are presented in Table 12.

Table 12. Context-relevant factors

S/No	Item	Context-relevant factors	Responsible stakeholder
1	Causes of delayed payment	Long payment approval processes	Consultants and client
		Delayed payment by the client	Client
		Bureaucracy and red tape	
		The client has poor financial management	
2	Effects/Impact of delayed payment	Abandonment of works	Contractors
		Increase in construction costs	Client/Consultants/Contractors
		Extension of time	
		Negative social impact	Contractor/Client
		Loss of employment by local communities	
		Cost overrun	Client/Consultants/Contractors
		Uncertainty for the contractor to complete the works	
3	Mitigation strategies for delayed payment	Payment of interest by clients	Clients
		Improve the process of claims, valuation, and certification.	Consultants
		Contractors must submit claims without errors	Contractors
		Manage all risks associated with the delay of payment	Clients and consultants

5. Discussion of findings

The findings discussed in this section include the analytical tool used in the research analysis and the benchmark, the critical factors identified as the causes of delayed payment, the impact of delayed payments, and suitable mitigation strategies for delayed payments.

5.1 The analytical tool and benchmark

The Likert scale is used in a wide range of research, either using the even or odd numbers scale. Notably, in the odd number scale, several researchers have raised concerns that respondents use the middle integer as a ‘dumping ground’ for unsure or non-applicable responses or neutrality (Kullas et al., 2008; Baka et al., 2012). Some of the most probable reasons for this action could be to hide their ignorance, indecision, or sincere moderate choice (Murray et al., 2016; Ogbeifun and Pretorius, 2024). When using the Likert scale 1-5, the middle integer is 3. If a great proportion of the participants identify with the middle figure in the Scale, this could negatively impact the results or require several rounds of data collection and iteration to be able to reach consensus. In a research exercise designed to provide information for precise decisions, within a short period of time, it is reasonable to allocate zero to the middle position to eliminate the effects of the middle number challenges. The mirror imaging system of analysis provides suitable, assign negative numerals to the integers on the left of the middle point and positive numerals to the right of the middle point, thus allowing the analysis to produce a mirror image (Pasipatorwa et al., 2022). Thus, constraining participants to align their response to either the positive or negative positions, allowing the analysis to achieve the mirror image. This is the strength of the ‘mirror imaging systems of analysis, as it enhances the ease of reaching a consensus and timely decision making.

The term benchmark is used differently by different people, depending on the purpose and setting. In this research, a benchmark refers to the agreed-upon value used to determine whether a factor qualifies as critical. The choice of benchmark is important in any consensus-building exercise (Piotrowski et al., 2023). The prevailing guideline is that benchmarks should be set at a moderate level, avoiding extremes; excessively high or low thresholds may hinder effective engagement in consensus-building activities (Hall et al., 2016; Zhang et al., 2019). The chosen benchmark should ensure the effective ‘buy-in’ of all participants (French-Brown and Crow, 2015). Once the benchmark has been established and the analysis is complete, any factor whose value falls short of the benchmark is eliminated. In this research, the value 0.40 was selected as a benchmark and used to analyse participants' responses to the questionnaire survey. Tables 3, 5, and 7 showed the results of the analysis. Factors that failed to meet the benchmark criteria were highlighted in bold black and excluded from further review. The accepted factors then constitute the critical factors identified in the research.

In a nutshell, adopting the mirror image analytical tool and its relevant benchmarks is advantageous when there is a need to narrow options to the essentials for prompt and effective decision-making. They are equally useful for reducing generic solutions to context-relevant solutions and applications (Pimentel, 2010).

5.2 The causes of delayed payment

In the context of the construction industry in Mpumalanga Province of South Africa, the causes of delayed payments to contractors for work executed were traced to two stakeholders - the consultants and clients, as shown in Table 4. The incidence of ‘long payment approval processes’ is first the responsibility of the consultants, coordinated by the Project Manager (PM), and then the client. The PM is expected to coordinate the verification and documentation of the contractors’ claim, alongside the certification of the different consultants, before processing the final payment certificate to the client, ensuring that the certificate is accompanied by all necessary supporting documents. However, Adekunle et al. (2023) identified poor contract administration and late certification of completed works as the primary responsibilities of the PM and his team of consultants. Specifically, the consultants’ contribution to the incidence of the delayed payments includes the delay in certification of the contractors’ claim for work done by the engineer, architect, and the project quantity surveyor (Ansah, 2011). The delay from the consultants was due to their inability to resolve emerging technical issues around variation order, scope change, and fluctuation adjudication (Bagesi, 2024). Others include errors in the valuation certificate due to the variance in the working drawings and specifications, valuation disagreements with contractors for work done, and slow movement of information within the project execution team (Odenigbo et al., 2020).

The PM must meet industry standards in construction project management, diligently verifying that all documents submitted by consultants and contractors are accurate, complete, and accompanied by the appropriate supporting

materials prior to forwarding them to the client for payment processing. The PM, as the interface between the PET members and clients in the project, should be able to resolve the queries from the client along with the responsible PET member(s) to reduce the incidence of delayed payment (Idowu et al., 2022).

Conversely, this research attributes the issue of payment delays to the client, which is corroborated in the research effort of Adekunle et al. (2023). The authors observed that the delays from the client are due to their bureaucratic payment processes and red tape in administration. The bureaucratic obstacles are characterized by intentional delays that serve financial interests, as well as instances of corruption, mismanagement, and operational inefficiency. Additional factors contributing to delayed client payments include ineffective financial management procedures, insufficient funding sources, a lack of commitment by clients regarding timely contractor payments, and disputes over the valuation of completed work. (Ansah, 2011). The report of the National Treasury of South Africa (1999) summarized the causes for the delay as failure to adhere to the guidelines provided in the Public Finance Management Act (PFMA), especially Section 38. The PFMA stipulates that suppliers (Including contractors) must be paid within a period of 30 days of receiving an invoice or certificate of payment, unless agreed otherwise. In addition, the Act requires government agencies to ensure sufficient funding is secured before initiating tender processes for any proposed projects.

If these identified causes are addressed in Mpumalanga Province, the incidence of delayed payments to contractors for work executed will be eliminated or reduced to the barest minimum.

5.3 The effects or impacts of delayed payment

Out of the ten common factors identified in the global search for the effects of delayed payments, the participants in this research endorsed seven of them as relevant to the construction industry in Mpumalanga Province of South Africa. The seven factors were distributed as shown in Table 6. Noting that a factor affects the contractors only, while two affect the clients and the contractors, the other four factors affect all three stakeholders (clients, consultants, and contractors) identically.

Consistent with global trends, when contractors encounter cash flow challenges, both the contractors and various sectors of the economy and society experience financial strain. This situation can result in prolonged or periodic construction disputes, insolvency, failure to meet project deadlines, and, ultimately, project abandonment. (Akinsule and Ajayi, 2016; Idowu et al., 2022; Deloitte, 2019). Abandoned projects can result in significant negative impacts, such as resource wastage, inconvenience to nearby communities, including the physical debris and ruination left behind, infrastructure deficits, and the misalignment of socio-economic development efforts, among other concerns. (Idowu et al., 2022; Ogbeifun et al., 2022).

Delays in payments to contractors on construction projects can result in significant negative social impacts and job losses within nearby communities. Such issues reflect equally on both the contractors and the client, potentially damaging their reputations. Consequences include postponed or missed salary and wage payments, employee lay-offs or terminations, and delayed payments for goods and services provided by third parties to the contractor. Furthermore, the indirect employment provided to community members equally suffers (Akinsule and Ajayi, 2016; Vacanas and Danezi, 2018).

As shown in Table 6, the increase in construction costs, cost overrun, extension of time, and the uncertainty of project completion negatively impact the reputation of all the construction stakeholders. When a planned infrastructure project is not executed, it delays or derails the development agenda of the client, slows down the intended improvements in the proximate communities, the economy, and national developments (Ansah, 2011; Oladapo and Ayodele, 2019). The irk of uncompleted projects arouses the displeasure of the beneficiaries toward the project actors. Without knowing the details surrounding the projects' delays or abandonment, the first victim is the contractor. Their assets are molested, vandalised, and in extreme cases, the staff members suffer different degrees of harm. In the political cycle, uncompleted projects negatively impact the ability of the constituency's representative to secure appreciable votes to enable a return to elective positions and, by extension, impact the credibility of the party (Falamarzi and Suliman, 2018; and Darip and Mangaraj, 2022).

5.4 Mitigation strategies for delayed payment

Out of the ten generic mitigation strategies for managing the challenges of delayed payments to contractors, this research adopted four context-relevant factors. On the part of the contractors, they should ensure that they submit their

claims without errors and provide the necessary supporting documents. Jointly, the consultants, especially the PM and the client, should work together to manage all associated risks connected to delayed payments.

The issues associated with delayed payments may be broadly categorised into two main areas. The first pertains to the quality of valuation certificates and accompanying documentation, while the second relates to the financial reliability of the client. If the project execution team ensures the production of quality valuation certificates, the problems of delayed payments would be half solved. Clients typically employ one of three generic methods when addressing claims submitted by contractors for completed work: they may approve the claim as presented, reject it due to insufficient documentation or inadequate supporting evidence, or adjust the claim's net value downward. (Banwo, et al., 2015). The challenges of presenting adequate claims along with necessary supporting documents are a major issue with many contractors. Similarly, in the context of requests for an extension of time (EOT), numerous submissions are declined as a result of insufficient documentation and inadequate supporting materials (Yusuwan et al., 2017; Aminuddin et al., 2024). It is, therefore, important that each contractor is conversant with the details outlined within the terms and conditions of the contract document to aid the correct submission of claims. This is where the role of the consultants, especially the PM, is critical; to ensure that the documents from each consultant and the contractors are complete before processing them for the client for payments.

Furthermore, if the PM adopts the soft skill of effective communication and persuasive interactions, it is possible to educate the client on how to reduce the risks associated with delayed payment and avoid disputes, which may lead to arbitration or litigation and payment of interest (Strong et al., 2021; Olatunji, 2020; Rautenbach, 2024). In the contract administration system used for any construction project, such as the International Federation of Consulting Engineers (FIDIC) and the Joint Building Contracts Committee (JBCC) framework, the project administration processes are spelled out (Bissoon and Outridge, 2020). Therefore, the PM, clients, consultants, and contractors should be acquainted with the details of the project management process stipulated in the terms and conditions document of the contract. Similarly, the clients should adhere to the provisions of the Public Finance Management Act (PFMA).

6. Conclusion and recommendations

The objective of this research was to identify the context-relevant factors suitable for addressing the challenges of delayed payment to contractors for works executed in the construction industry of Mpumalanga Province of South Africa. The research adopted the mixed method approach, integrating qualitative and quantitation methods to address the research exercise. The qualitative approach enabled the researchers to harness the factors identified in previous research as the causes, effects and mitigation strategies for addressing the challenges of delayed payment to contractors, worldwide. The synthesis of the information led to the development of ten generic factors responsible for the causes, effects and suggested mitigation strategies. These sets of generic factors were distributed to the research participants, to rate them according to the perceived relevance of these factors to the construction industry in Mpumalanga Province of South Africa. Guided by the principle of "the fewer, the better," their response was analysed using the 'mirror image' tool and adopted 0.4 as benchmark for accepting the critical factors that reflected the scenario in Mpumalanga Province. The result showed that four out of the ten generic factors identified as the causes of delayed payment were considered relevant to the context of Mpumalanga Province. Similarly, seven and four factors were accepted as effects and mitigation strategies, respectively. The identified factors were distributed according to the responsible stakeholders. In this regard, it becomes easier for the responsible stakeholder to address the concerns of the few factors within their domain, as compared to the long list of factors found in the broad-based research exercise. Therefore, the objective of this research was achieved; the few factors identified is easier to manage by the respective stakeholders.

As laudable as these findings of this research may be, the researchers acknowledge the limitation of generalising the result due to the limited number of samples used for this research. The health care facilities used for this research is a small subset of the infrastructure developed in Mpumalanga Province. However, the exercise has highlighted a significant point; context-relevant factors should be developed from the generic information to enhance effective application of proposed solutions.

Therefore, this research recommends that the operatives of the infrastructure development unit of Mpumalanga Province should adopt these factors, developed in this research, for pilot implementation. Review the outcome and extend the research to include a wider range of infrastructure type. Furthermore, additional research exercise could be conducted by evaluating what is being done by other provinces, to allow for dynamic comparison, to ameliorate the incidence of delayed payment for works executed and enhance effective infrastructure delivery.

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