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Declaration

All papers in this publication have been through a review process involving a review of abstracts, peer review of full papers by at least two referees, reporting of comments to authors, revision of papers by authors and re-evaluation of the revised papers to ensure quality of content.

DETECTING AND PREVENTING UNBALANCED BIDDING IN SOUTH AFRICAN PUBLIC SECTOR CONSTRUCTION

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Unbalanced bidding in public sector infrastructure projects is a key challenge, involving the manipulation of unit prices without adjusting the overall bid. Unbalanced bidding increases the client's financial risks and the likelihood of project abandonment by the contractor. Existing literature provides guidelines for detecting and preventing bid price imbalances but inadequately addresses the practical implementation and efficacy of these approaches. This research aims to evaluate the practices for detecting and preventing unbalanced bidding in the South African public sector against existing formal models. This qualitative case study employs semi-structured interviews with quantity surveyors from public sector clients in Gauteng, South Africa. The purposive, non-probabilistic sampling targets professionals with relevant expertise. A thematic analysis of the interview data reveals insights into the awareness, consequences, and practices associated with unbalanced bidding in the South African public sector. The study findings highlight the need for strengthened governance and accountability, more robust strategies for detection of unbalanced bidding, and enhanced education of practitioners to promote fair competition and ethical practices in awarding projects.

Keywords: front-end loading, public sector construction projects, tendering, unbalanced bidding

INTRODUCTION

Public procurement serves as a feasible approach for meeting developmental needs in numerous democratic African governments (Dzuke & Naude, 2017). In South Africa, it is strategically utilised by the government to attain the socio-economic goals outlined in the Constitution (Ambe, 2016). The socio-economic rights outlined in the Constitution requires the procurement of public infrastructure by the government (The Constitution of the Republic of South Africa, 1996). Public sector procurement significantly impacts the country's economy, leading to the introduction of various policy frameworks to ensure effective governance in its implementation (Watermeyer, 2013). While the construction sector is widely acknowledged as a key driver of economic growth in numerous nations, there is a growing apprehension regarding the susceptibility of public sector procurement of construction projects to corruption and irregularities (Lukhele, et al., 2022). One such irregularity, unbalanced bidding, which has been recognised as a pivotal concern in public infrastructure procurement, warranting proper investigation and intervention (Su, et al., 2020; Nikpour, et al., 2017).

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According to Hyari (2023), unbalanced bidding refers to the strategic formulation of bids where the prices assigned to specific items do not align accurately with their anticipated costs, which include overhead expenses and profit margins. Contractors frequently employ this tactic when submitting bids for projects unit-price contracting strategy (Su, et al., 2020; Christodoulou, 2008; Stark, 1974). Furthermore, the practice of unbalanced bidding has been said to be more prevalent in public sector projects (Hyari, 2023; Bell, 1989).

There is a contentious ongoing dialogue in extant literature that has resulted in scholars in taking opposing stances on the morality of this unbalanced bidding. In a recent study reviewing this ongoing dialogue, Hyari (2023) observes that the scholars that represent the viewpoints of the contractor perceive unbalanced bidding as a valid pricing strategy and offer models to aid in its formulation and concealment. On the other hand, scholars advocating for the owner's perspective develop methods to identify and reject unbalanced bids (Hyari, 2023).

Unbalanced bidding poses significant risks for both the owner and the contractor. For the owner, these risks include the potential for the contractor to default on the project after receiving an undeserved advance payment (Polat, et al., 2020), leaving the owner with an overpaid project and limited options for finding another bidder with remaining funds (Skitmore & Cattell, 2013). This situation may also lead to additional costs for the owner and a reduction in the contractor's motivation to complete the project adequately (Li, et al., 2023; Hyari, 2017). Furthermore, unbalanced bidding can cause delays in project completion as both the contractor and the client may run out of budget later in the project's execution (Kenley, 2003). It also provides an unfair advantage to the least bidder and disrupts the tracking of project progress due to disturbed cash flow (Hyari, 2023). However, at the contractor's end, unbalanced bidding may reduce the negative impact of delayed payments by employers and ensure a smoother cash flow cycle throughout project execution (Christodoulou, 2008).

Recognising the adverse impacts of unbalanced bidding, various formal models to detect and mitigation unbalanced bidding have been advanced in extant literature. These include, but are not limited to; (1) the multi-criteria decision-making (MCDM) model that employs the VIKOR technique to detect imbalanced bidding (Wang, et al., 2019), (2) the unascertained model that uses the engineer's estimated cost as the evaluation criterion (An, et al., 2018); (3) the grading-based model (Polat, et al., 2020), and (4) the unascertained measurement theory and fuzzy comprehensive evaluation method (Wu & Xu, 2021).

Although literature offers various formal models for the detection of unbalanced bidding, it inadequately addresses their practical implementation and efficacy, leaving questions about their real-world application unanswered. This highlights the urgent requirement for empirical research to bridge the theory-practice gap and formulate actionable strategies for effectively combating unbalanced bidding.

This study aims to evaluate the practices used by quantity surveyors responsible for evaluating South African public sector bids to detect and prevent unbalanced bidding in construction projects against existing formal models. Utilizing South Africa as a case study, known for its documented challenges in public procurement related to corruption and bid-rigging scandals, this research addresses the issue of unbalanced bidding in public sector construction projects (Soni & Smallwood, 2024).

The subsequent sections of this paper provide a comprehensive review of existing literature pertaining to the factors that contribute to unbalanced bidding in various contexts. The research methodology employed in this study is then outlined, followed by the presentation and discussion of the findings obtained from the analysis. Finally, the paper concludes with a

synthesis of key findings and offers recommendations for stakeholders to address unbalanced bidding effectively within the South African public sector.

LITERATURE REVIEW

The aim of this unbalanced bidding is to gain an advantage over competitors and increase the likelihood of winning the project, lowering the project's overall cost, improving cash flow, and increasing the project's profit (Polat, et al., 2020). The literature reviewed in this section provides an overview of the forms of unbalanced bidding, the formal models proposed in literature to detect unbalanced bidding, and the bid evaluation processed in South Africa.

Forms of unbalanced bidding

Unbalanced bidding encompasses various strategies employed by contractors to gain advantages in the bidding process, often at the expense of fairness and transparency (Hyari, 2023). One prevalent form is front-end loading, where contractors inflate prices for items completed early in a project while reducing prices for those completed later (Liu, et al., 2009). This tactic aims to manipulate the timing of income from the project owner, improving the contractor's cash flow over the course of the project (Hoogenboom, et al., 2006). Another strategy is quantity error exploitation, where contractors adjust prices based on their expectations of quantity overruns or underruns for specific line items (Gransberg & Riemer, 2009). By exploiting their superior knowledge of resource requirements compared to project owners, contractors seek to enhance the profitability of contracts or increase their competitiveness in the bidding process (Mandell & Nystrom, 2011). Collusive bid unbalancing involves unethical agreements between contractors and project owners or their representatives (Prajapati & Bhavsar, 2017). In this scenario, one bidder receives exclusive information about potential changes or omissions in specific line items during the project. With this privileged knowledge, the bidder adjusts prices accordingly, potentially securing the contract through collusive arrangements that undermine fair competition. Additionally, convenience unbalancing simplifies measurement and invoicing processes by submitting a single unit rate for similar but distinct line items (Hoogenboom, et al., 2006). For instance, contractors may offer the same rate for soil and rock excavation or different types of wall painting. While seemingly innocuous, this practice can obscure actual costs and compromise the integrity of the bidding process. Overall, these various forms of unbalanced bidding serve different purposes, from managing cash flow to maximizing profitability. However, practices involving collusion and unethical behaviour pose significant risks to fair competition, project integrity, and the reputation of the construction industry (Hyari, 2023).

Detection and prevention models

In the field of detecting and preventing imbalanced bidding in construction projects, four models stand out for their effectiveness and innovative approaches. Wang et al. (2019) introduce the Identification and Prevention using VIKOR Method, which employs multi-criteria decision-making (MCDM) techniques, specifically the VIKOR technique, to identify imbalanced bids. By treating bidders and line items as criteria and alternatives, respectively, this model helps project owners detect pricing discrepancies and avoid awarding projects to imbalanced offers. Ding et al. (2018) propose the Unascertained Model, which utilizes an uncertain model weighted by entropy to calculate the degree of divergence of bidder quotations from engineer forecasts, offering a quantitative way to assess uneven bids effectively. Polat et al. (2020) present the Grading-based Model, an improved version with eight grading systems aimed at enhancing bid assessment. By considering both bid prices and balance scores, this model enables owners to identify and reject imbalanced bids, thus mitigating the risk of cost overruns. Lastly, Wu and Xu (2021) develop a model based on unascertained measurement

theory and fuzzy analytic hierarchy process to address quantity variation hazards in railway construction projects. This model focuses on quantity error exploitation and offers a hierarchical framework to accurately calculate risks associated with quantity changes across line items. These models collectively contribute to mitigating the detrimental effects of imbalanced bidding, empowering project owners to make informed decisions and ensure fair and efficient project outcomes.

Bid evaluation in South African public sector construction projects

Numerous policy frameworks have been implemented to guarantee effective governance in the execution of public sector procurement in South Africa. The policy frameworks governing public sector procurement in South Africa include; Constitution of the Republic of South Africa Act 108 of 1996, Public Finance Management Act 29 of 1999, Municipal Finance Management Act 53 of 2003, Prevention and Combating of Corrupt Activities Act 12 of 2004, Preferential Procurement Policy Framework Act 5 of 2000, Preferential Procurement Policy Framework Act 5 of 2000, Public Service Regulations, 2001, Competition Act 89 of 1998, Broad-based Black Economic Empowerment Act 53 of 2003, Promotion of Just Administrative Action Act 3 of 2000, and Promotion of Access to Information Act 2 of 2000 (Lukhele, et al., 2022). The main aim of these policy frameworks is to guarantee that the administration of public procurement processes is fair, equitable, transparent, and efficient in terms of cost (Dzuke & Naude, 2017; Ambe, 2016; Watermeyer, 2013; Lukhele, et al., 2022).

In conjunction with the policy frameworks that govern procurement in South Africa, the procurement of construction works is regulated by the Standard for Uniformity in Construction Procurement, which is issued in terms of the Construction Industry Development Board Act 38 of 2000. According to the Standard for Uniformity in Construction Procurement (Construction Industry Development Board, 2019), in the public sector, bids are typically evaluated using one of four tender evaluation methods. The first method involves assessing the tender solely based on the financial offer submitted. In contrast, the second method considers both price and preference during the evaluation process. The third method assigns equal weight to quality and price when assessing the tender. Finally, the fourth method evaluates tenders by balancing preference, quality, and price equally. Each of these methods aims to ensure fairness and transparency in the evaluation process while accounting for various factors such as cost, quality, and stakeholder preferences (Construction Industry Development Board, 2019). In each of the four methods outlined, those tasked with tender evaluation, usually the quantity surveyors appointed by the client, must meticulously check for arithmetic errors. This entails ensuring that the sums provided in responsive tenders align accurately with the quantities specified in figures.

The CIDB Inform Practice Note 2 allows for the correction of arithmetic errors, omissions and discrepancies by notifying the bidder and obtaining their acceptance of the correct amounts (Construction Industry Development Board, 2021). The International Standard for Construction Procurement includes provisions for evaluating risk in tendered rates and amounts (ISO 10845-3, 2010). It allows for the rejection of unduly high or low rates or amounts if they pose an unacceptable commercial risk to the employer.

According to the Preferential Procurement Policy Framework Act No. 5 of 2000, an ‘acceptable tender’ is any offer that “complies with the specifications and conditions of tender as set out in the tender document, in all respects. However, the standard conditions of tender outlined in the Standard for Uniformity in Construction Procurement as published by the Construction Industry Development Board in 2019, solely address the verification of arithmetic errors. There is no provision for scrutinizing the various types of unbalanced bidding, leaving quantity surveyors without a regulated mechanism to detect such practices. However, the Preferential

Procurement Regulations, (2022) issued in terms of the Preferential Procurement Policy Framework Act No. 5 of 2000 stipulates that there is no specified threshold for negotiating bid prices with preferred tenderers, government entities must decide through their policies whether it's necessary to establish such a threshold for negotiations (National Treasury, 2020). In this regard, professionals are referred to the implementation guide concerning negotiating a 'Fair Market Price'.

Fair Market Pricing refers to the process of determining fair and equitable pricing that is beneficial to both parties involved, taking into account factors such as quality, output performance, and other relevant considerations essential for the satisfactory completion of the work (National Treasury, 2020). This determination can be achieved through either price analysis, which assesses the overall price, or cost analysis, which evaluates the individual cost components contributing to the total price (National Treasury, 2020). Various techniques can be employed, including price competition (where the difference between the lowest and highest prices is less than 15%), reference to catalogue or established price lists, consideration of prices from similar purchases, utilization of historical pricing supported by appropriate documentation, pricing based on previous competition, independent in-house price estimates, and comparison to substantially similar items or prices in a specific geographical area. It is imperative that these techniques are conducted with accuracy, completeness, and current data. In this vein, the South African legislation does have a framework for detecting and mitigating unbalanced bidding. However, literature is not clear on whether this is implemented by the procurement practitioners in the South African public sector.

RESEARCH METHODOLOGY

This study employed an exploratory embedded case study approach to delve deeply into the experiences of infrastructure procurement practitioners in the South African public sector. The case study method was chosen for its effectiveness in providing in-depth exploration of specific phenomena within real-world settings, aligning with the study's objectives (Yin, 2018). Qualitative mono-method was used for data collection due to its ability to facilitate detailed investigation, conducted through semi-structured interviews to allow participants to elaborate on their viewpoints and experiences (Hamilton & Finley, 2019). Nine participants who are quantity surveyors with over 5 years of experience in public sector infrastructure procurement, were selected using non-probabilistic purposive sampling. Virtual interviews via Microsoft Teams were conducted, each lasting approximately 45 minutes. Interview recordings were transcribed for accuracy, followed by researchers familiarizing themselves with the data before thematic analysis. Thematic analysis involved initial coding to identify meaningful segments and patterns, which were then organized into higher-order themes capturing overarching concepts (Saunders, et al., 2019; Creswell, 2014).

RESULTS AND DISCUSSION

This section presents and discusses three key themes emerging from thematic analysis: the practitioners' understanding of unbalanced bidding, its impact and consequences, and the practices utilized by quantity surveyors responsible for evaluating bids in the South African public sector to detect and prevent unbalanced bidding.

Theme 1: Practitioners' comprehension of unbalanced bidding and regulatory guidelines

The analysis unveiled that all quantity surveyors possess familiarity with the concept of unbalanced bidding. However, within the sample, only 67% of participants reported

encountering unbalanced bidding during the bid evaluation stage. Conversely, 33% of respondents indicated they had yet to experience unbalanced bidding in any of their projects. This suggests that those with less experience rely primarily on academic and industry discourse rather than firsthand encounters. Participants identified front-end loading and convenience unbalancing as the most prevalent strategies, with quantity errors being more common than back-loading. Regarding participants' understanding of regulatory guidelines, it was observed that they were aware of and comprehended the regulatory policies concerning unbalanced bidding.

Theme 2: Consequences of unbalanced bidding in the South African public sector

The research findings underscore the intricate repercussions of unbalanced bidding practices within the South African public sector construction industry. Participants unanimously recognise that such practices exert financial strain on government budgets, stemming from inflated costs in specific bid items. This strain not only imperils project viability but also constricts the government's capacity to allocate funds to other critical development sectors. Additionally, participants highlighted the ripple effects of unbalanced bidding, including project delivery delays, potential resource shortages, and disputes, which exacerbate operational complexities. Furthermore, these delays not only escalate expenses but also jeopardize project schedules, potentially impacting the provision of public services and impeding economic growth. As Participant 3 aptly articulated, "These delays have a cascading effect on the entire construction industry, influencing overall efficiency and the quality of public-sector project delivery." Moreover, participants emphasized the detrimental impact of unbalanced bidding on trust and credibility within the public sector procurement process. Participant 4 succinctly remarked, "Unbalanced bidding undermines the bedrock of trust in procurement, casting doubt on its fairness and integrity." Additionally, participants noted the legal ramifications of unbalanced bids for both contractors and government entities. Violations of contractual obligations and procurement laws may result in prosecution and substantial fines. These punitive measures serve as a robust deterrent, underscoring the significance of ethical conduct in public procurement. These fines play a crucial role in preserving the fairness and integrity of the bidding process by discouraging contractors from resorting to unbalanced bidding tactics, which not only stifle competition but also compromise project quality. The findings in this section resonate with the consequences outlined by Hyari (2017), Li, et al. (2023) and Skitmore & Cattell (2013), with the fines levied by the South African government being in addition to the consequences outlined in literature.

Theme 3: Practices to detect and prevent unbalanced bidding

This research has revealed a notable gap between the theoretical frameworks proposed in existing literature and their practical application within the context of bid evaluation processes in South Africa, as evidenced by insights gleaned from individual interviews. Despite the availability of formal models for identifying unbalanced bidding practices in the literature, practitioners in South Africa have yet to integrate them into their current practices. However, our study presents several tangible strategies, drawn from existing literature, that offer promising avenues to address this disparity.

One such approach, inspired by the works of Wu and Xu (2021) and Ding et al. (2018), involves the adoption of advanced data analytics and modelling techniques. Through the analysis of historical bidding data, 67% of respondents concurred that procurement officers could employ quantitative methods to discern patterns indicative of unbalanced bidding. This not only facilitates the detection of outliers or anomalies but also enables the identification of suspicious bids warranting closer scrutiny. Additionally, the establishment of bid evaluation committees, as advocated by Ding et al. (2018), comprising experts from diverse disciplines, presents another effective strategy. These committees are poised to conduct comprehensive reviews of

submitted proposals, assessing not only their cost but also their technical merits and feasibility. By harnessing varied perspectives and expertise, these committees are better equipped to detect any inconsistencies or imbalances in bids, thereby promoting fairness and maximizing value for money in the procurement process. Moreover, this research underscores the critical importance of implementing continuous monitoring and auditing mechanisms throughout the procurement process, aligning with the findings of Polat et al. (2020). Regular audits of bidding documents, financial records, and project progress enable authorities to identify deviations from expected norms or benchmarks, thereby upholding transparency and accountability. Such measures not only serve to detect and deter unbalanced bidding practices but also bolster public trust in the integrity of South Africa's procurement processes. The insights provided by respondents further emphasize the significance of these strategies. Respondent 5 emphasised "In my experience, leveraging historical data has been instrumental in identifying irregularities in bidding patterns". Respondent 4 highlighted "It ensures a thorough assessment of both the financial and technical aspects of bids, preventing potential biases and promoting fair competition". Additionally, respondent 10 underscored the value of continuous monitoring through "Regular audits help detect deviations and irregularities early on, preventing any potential misconduct".

CONCLUSIONS

The findings of this study illuminate various facets concerning unbalanced bidding within the South African public sector construction industry. The study delved into practitioners' comprehension of unbalanced bidding and regulatory guidelines, revealing that while all quantity surveyors are familiar with the concept, only two-thirds of participants have direct experience during bid evaluation. This implies that some rely solely on academic discourse. Among the identified strategies, front-end loading emerged as the most prevalent, while quantity errors and back-end loading were less common.

Furthermore, the study thoroughly explored the consequences of unbalanced bidding in the South African public sector. It found that unbalanced bidding imposes significant financial strain on government budgets due to inflated costs in certain bid items, jeopardizing project viability and hindering funds allocation to other vital development sectors. Additionally, it exacerbates operational complexities, leading to delays in project delivery, resource shortages, and disputes, thereby affecting project schedules and public service provision. Moreover, it erodes trust and credibility in the procurement process, resulting in legal repercussions for both contractors and government institutions.

Regarding the formal detection and prevention models, the study noted limited practical implementation of formal models in South Africa. Nonetheless, the study proposes several strategies derived from existing literature, such as the adoption of advanced data analytics and modelling techniques, the formation of bid evaluation committees with multidisciplinary expertise, and the implementation of continuous monitoring and auditing mechanisms throughout the procurement process. These practices aim to uphold transparency, fairness, and integrity in the bidding process.

To address the challenges posed by unbalanced bidding, it is recommended to enhance training and education programs specifically targeted at quantity surveyors and other relevant stakeholders, thereby deepening their understanding and practical skills in identifying and managing unbalanced bids. Additionally, adopting advanced analytical tools such as data analytics and modelling techniques can significantly aid in the early detection and prevention of unbalanced bidding practices. Forming multidisciplinary evaluation committees can further improve the bid review process by ensuring a comprehensive and diverse examination of

proposals. Continuous monitoring and auditing mechanisms should be implemented to detect discrepancies early and maintain integrity throughout the procurement process. Strengthening the regulatory framework by updating and enforcing regulations that explicitly address unbalanced bidding will provide clearer guidelines for practitioners and deter malpractice.

In conclusion, addressing unbalanced bidding practices is crucial for the sustainable development of the South African public sector construction industry. By enhancing practitioners' understanding, implementing effective strategies, and ensuring compliance with regulatory guidelines, stakeholders can mitigate the adverse effects of unbalanced bidding, promote fair competition, and safeguard public resources and trust in the procurement process.

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