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The Interplay between Bidding Strategies and Tender Success Rate Among Small and Medium Enterprise Contractors in Tanzania

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Abstract

In the highly competitive construction industry, contractors must secure a sufficient volume of projects and execute them successfully to ensure long-term survival. However, many small and medium-sized enterprise (SME) contractors lack the requisite knowledge of effective bidding strategies, which hampers their ability to secure tenders. This study aims to assess the bidding strategies employed by SME contractors and examine their impact on tender success rates. A questionnaire survey was conducted with building contractors based in Dar es Salaam. The split sample model validation technique was applied, dividing the data into training and validation sets. Pearson correlation analysis was used to identify bidding strategies with a significant positive relationship with tender success rates, which were subsequently incorporated into the regression model. Moderated multiple regression analysis was performed to model the relationship between the dependent and independent variables, with company experience serving as a moderating variable. Among the bidding strategies examined, two emerged as having a significant positive linear relationship with tender success rates: Pricing Strategy and Market Intelligence. The developed model demonstrated moderate predictive power, with the moderation effect contributing to the explained variance. These findings provide valuable insights for SME contractors regarding the selection of effective bidding strategies to enhance their tender success. This study represents the first empirical investigation in Tanzania to model and quantify the influence of bidding strategies on the tender success rates of SME building contractors.

Keywords: *Bidding Strategies; Building Contractors; Construction Industry; Tender Success Rate*

1. Introduction

Contractors' survival in the competitive tender market is likely to be influenced by their ability to prepare competitive bids. This is due to the reason that competitive bidding is the key criterion for winning tenders in a highly competitive tender market (Hanák, Drozdová, & Marovi´c, 2021). Bidding is

the process whereby service providers compete with each other by submitting priced quotations (Fango, 2019). That makes tendering an important activity in any construction company which aims at excelling in the construction business. Winning tenders by contractors is becoming increasingly difficult due to the competitive nature of the industry, especially to new and un-experienced firms.

The construction industry is characterized by fierce competition which aims at obtaining a competitive price for works and services offered and in turn sandwich the contractor in a complicated situation between losing the tender or dwindling the profit margins (Kimms, 2007; Aje, Oladinrin, & Nwaole, 2016; Perez, Hitschfeld, Melia, & Dominguez, 2015a). This competitive nature of the construction industry has caused the mortality of many firms especially young and small ones in which according to Aje *et al* (2016) most of them fall out of business within five years of their establishment. In trying to establish factors that contribute to such failure researchers have established several causes in which one among many others is failure to secure tender in the highly competitive market (Chileshe, Kavishe, & Edwards, 2020; Alkhateeb, Hyari, & Hiyassat, 2020; Gazder & Khan, 2018; Fu, Drew, & Lo, 2002). Winning tenders is the key aim and survival ticket for firms in the construction industry.

Studies have shown that SMEs' contractors fail to secure tender from the market due to many reasons including inability to interpret construction drawings, prepare an accurate estimate, inability to tender, lack of the required skills, and failure to enter into negotiations (Lufele, 2020). These factors illustrate the poor bidding strategies used by the SMEs contractors' in the preparation of the tenders that minimize or even eliminate their chances of winning. Therefore Mwita (2013) suggests the need to improve the process of preparing responsive bids.

Bidding strategy is the skilful organization of resources and techniques that are employed by the bidder to achieve the objective which is winning the tender and carry out the works profitably (Wibowo, Astana, & Rusdi , 2015). The first step to save firms' resources is the decision on whether to tender or not, keeping in mind tendering process has cost implications to the company's resources (Aznar, Pellicer, Davis, & Perez, 2017). This area has been well covered and several crucial factors which determine bid or no-bid decisions by the contractors have been identified such as project size, the financial capability of the contractor, and many others (Prajapati, Pitroda, & Bhavasar, 2015**;** Chileshe, Kavishe, & Edwards, 2020**;** Alsaedi, Assaf, Hassanain, & Abdallah, 2019)**.** After deciding to bid, then a proper bidding strategy should be adopted to increase the probability of winning the respective tender amongst competing firms (Wibowo, Astana, & Rusdi , 2015; Perez, Cruz, Diego, & Pellicer, 2014).

Researches have been conducted on factors affecting the bid success rate of the contractors but most of these studies have mainly focused on the pricing strategies and establishment of the bid price (Aje, Oladinrin, & Nwaole, 2016). According to Oke, et al., (2017), several factors affect the success rate of a bid apart from price alone. Although price is given priority in the selection of the contractors, it is not the sole criteria to ensure the success of the bid (Perez, Hitschfeld, Melia, & Dominguez, 2015a; Pe Rez, Skitmore, Pellicer, & Lez-Cruz, 2015b). This gives an alarm not to strive to lower the bid price but to prepare a bona-fide tender price without ignoring other factors as well.

Existing researches have been conducted on the factors affecting bid or no-bid decisions in both developed (Shokri-Ghasabeh & Chileshe, 2016) and developing countries (Chileshe et al., 2021) as well as model development to improve contractors' winning chances (Perez, Cruz, Diego, & Pellicer, 2014;Perez, Hitschfeld, Melia, & Dominguez, 2015a). There is inadequate knowledge on the influence of contractors' bidding strategies on contractors' tender success rate where most of the research have been conducted in developed countries (Tan, Shen, & Langston, 2010;Hanák, Drozdová, & Marovi´c, 2021) with a few output from South Africa (Vandi, 2020). Therefore, this research aims at bridging the knowledge gap by assessing contractors' bidding strategies and their influence on tender success rate among small and medium contractors in Tanzanian construction industry. This study further aims at

modelling the relationship between bidding strategies and tender success rate. The model will be used to predict contractors' future winning chances. Survival of small and medium contractors in the market is of paramount importance looking at their contribution in GDP and employment rate.

2. Literature Review

2.1 The Construction Industry of Tanzania

Tanzanian construction industry mainly comprises of five types of contractors namely; building contractors, civil work contractors, mechanical contractors, electrical contractors and specialist contractors (CRB, 2021). These types of contractors are divided into seven classes according to their capacity, except for specialist contractors who are divided into three classes. These contractors can further be grouped into large (class I-III), medium (class IV and V) and small (class VI and VII) contractors (Chileshe, Kavishe, & Edwards, 2020). The focus of this study is mainly on small and medium building contractors.

Construction industry has been the economic pillar of the country during the corona virus pandemic in the year 2020 and 2021. Despite economic depreciation during the corona virus pandemic, construction industry has maintained its positive growth and contributed strongly to the national economy in Tanzania (ConsTrack360, 2021). The expected annual growth rate of the construction industry is expected to reach to about 11.8% with the GDP contribution of about Tanzanian Shillings 13070.0 billion by the year 2024 (ConsTrack360, anzania Construction Industry Databook Series – Market Size & Forecast (2015 – 2024), 2020). According to Chileshe, Kavishe, & Edwards, (2020); Chileshe & Kikwasi, (2014) about 70% - 96% of these works are likely to be undertaken by large foreign companies. Therefore to protect local small and medium class contractors further investigation should be conducted on how they can have an ample share of this growth.

2.2 Tendering Concept: Contractors Perspective

In the construction industry, tendering can be grouped into two major categories which are competitive tendering and non-competitive tendering (Aje, Oladinrin, & Nwaole, 2016). The later involves direct negotiation between client and contractor hence an element of competition is non-existent here; where the former is mostly opted to, especially in public entities. According to Ahmed, et al., (2015); Aje, et al., (2016) competitive tendering is preferred since it fosters trust, transparency, and accountability in public procurement.

The main objective of tendering for the contractor is to win jobs; therefore contractors adopt different combinations of strategies to achieve this goal (Oo, et al., 2012); (Oke, Aigbavboa, & Ijie, 2017). Other objectives of tendering to the contractor could be to gather market information, maintaining a good relationship with the client, show they still exist in the market as well as concealing their strategies from competitors (Oo, et al., 2012).

According to Smith (1995), the bidding process can be divided into two parts which are the estimation of tender/bid price and compilation of other documents to make a bona fide tender. Estimation of the tender price should normally be carried out by the professional estimator whereas the compilation task is the management activity. In general terms, all members participating in the tender preparation process at all levels should possess relevant skills and experience to be able to make and submit a competitive tender (Vandi, 2020). Different bidding strategies will be discussed here below,

2.3 Bidding Strategies

Biding strategy is a broad framework that involves the skilful allocation of resources, timing, and techniques to achieve the objective of winning tenders in a competitive market (Brook , 2008). Firms can have strategies at corporate, business, and functional levels and it is at the functional level where tendering strategies are found (Tan, Shen, & Langston, 2010). According to Darbar & Pitroda, (2018) different factors affect the selection of bidding strategy which are; project size, equipment availability, number and capabilities of firm's personnel, profitability (profit potential), and labour availability. At the end selection of the strategies, the combination of the strategies and their implementation depends on the experience of the manager.

Different bidding strategies have been discussed by researchers in different contexts. Vesper (1979) listed out for major bidding strategies including, present market protection, production expansion, specialization, and liquidation. Strategies identified by Pearce and Robinson (2003) include products expansion, innovation, integration, diversification, strategic alliance, joint venture, consortia, and liquidation. In addition, Hasegawa (1988) suggested several competitive bidding strategies based on the Japanese construction industry. These strategies include international expansion, integrated engineering, new business development, technology development, development project, and financial strategies. There are also strategies advocated by Warszawski (1996) for competitive bidding including quality products, standard products, timely project completion, and extensive services to the client. Furthermore, a study in Hong Kong construction industry by Tan, et al., (2010) identified several competitive bidding strategies including low bid strategy, high technology, and management innovation. Vandi (2020) through a qualitative study was able to identify several bidding strategies used by small and medium-class contractors. These strategies include, seek relevant information (market intelligence), aggressive bidding, the use of computer software, and teaming/partnering with established businesses.

Studies mentioned above based their study on the advanced and more developed construction industries such as Japan and China. This study in turn aims at studying bidding strategies applicable to the developing construction industries and in particular small and medium-class contractors. Based on the review of previous research findings nine (9) bidding strategies relevant to small and medium-class contractors have been identified. These strategies include focused strategic bidding, use of historic data, draft and review strategy, market intelligence, aggressive bidding strategy, bid preparation software, teaming with an established business, systematic bidding approach, and pricing strategy. These strategies are further summarised on Table 1.

Table 1: Description of Bidding Strategies

Bidding Strategies	Description
Focused Strategic Bidding	Bidding is done by scrutinizing all information before bid, to focus on only those bids that are most likely to be won. Rely on bid/no-bid decisions, bid/no-bid criteria, and bid decision models
Use of Historic Data	Bidders rely on past information to prepare a responsive bid. This information includes previous cost, bid success rate history, templates from previous tenders.
Draft and Review Strategy	This strategy involves reviewing all information obtained before bidding and all prepared documents before the submission of tender.

Market Intelligence	Market intelligence involves collecting all relevant information that will assist in the preparation of responsive bid. This information includes *inter alia* information about the client, other bidders, current market condition, and the financiers.
Aggressive Bidding Strategy	Used mostly when trying to penetrate a new market or survive a bad market. It involves bidding at a very low profit, no profit, or small calculated losses.
Use of bid preparation software	Using software in bid preparation increases accuracy of documents and reduces time. This increases the winning chances of the bidder.
Teaming up with established business	Teaming up with established business helps to build capacity and obtain entry point to the new market. Firms use methods such as partnership, consortia, joint venture, and strategic alliance.
Systematic Bidding approach Strategy	The internal bidding procedure of the firm may increase its chances of winning bids by having a scrutinized bidding framework in place.
Pricing Strategy	This determines how bid price is prepared. It gives greater influence on tender winning chances. Pricing strategy includes market-based price, cost-based price, use of standard rate table, price from previous tenders, sub-contractor-based price.

2.4 Contractors' Tender Success

To win tenders many success criteria must be considered. In previous years selection criteria were solely price-centred, but in recent years a multi-criteria approach has been adopted in the selection of contractors. Therefore, all the criteria need to be considered by the firm to increase the winning chances. According to Brook (2008), some of these criteria include; price, time, pricing strategy, method statement, safety and quality, the composition of the construction team, and presentation of the bid. These selection criteria are unique to each project and client, therefore there is a need to have a detailed study on the selection criteria and determine how they can be achieved in the best way.

Tender success can be measured by the bid hit ratio which is the total number of attempted bids divide by the total number of successful bids (Alkhateeb, Hyari, & Hiyassat, 2020). Alkhateeb, et al. (2020), further explained that hit ratio of 100% (1:1) is the perfect ratio but its achievement is nearly impossible, whereas 25% (4:1) and above is considered excellent, 10% (10:1) is considered a good performance but 2.90% (35:1) and below is considered very poor bid success rate. These categories will be used in this study to rank the success rate of contractors in bidding for building works.

A study conducted by (Hanák, Drozdová, & Maroviˊc, 2021) in the Czech republic found out that

about 48% of 70 companies had a tender success rate below 20%, 24% of the companies had a tender success rate ranging between 20% - 40% and 28% of the companies had a success rate above 40%. A similar study conducted by (Alkhateeb, Hyari, & Hiyassat, 2020) in Jordan found out that 75% of companies had a success rate below 20%. These studies indicate changing bid success rate with the change in the location at which the study was conducted.

2.5 Influence of Experience on Building Contractors' Tender Success Rate

Studies have shown contradicting results in the influence of experience on the tender success rate. According to Alkhateeb et al 2020 contractors, experience does not influence the tender success rate. While other researchers argue that experience could have a positive effect on the tender success rate, advocating for the strategy of SMEs to team up with experienced firms to leverage their experience in tendering (Vandi, 2020). Apart from the contradiction observed, the measure of experience differs from one researcher to the other. According to Banki (2009) contractors' experience is attained with an increased number of biddings done during the lifetime of the company whereas others measure through the number of years a company has been in existence or the class of the contractor. This study will measure experience based on the number of years the company has been in existence because experience is not only gained by tendering but also executing projects.

3.Methodology

3.1 Research Approach

The main aim of this research paper is to assess the influence of bidding strategies on contractors' tender success rate. Quantitative research approach was adopted in data collection and analysis. As advocated by Khalid, Hilman, & Kumar, (2012) this approach is useful in establishing quantitative relationships.

3.2 Population, Sample Size and Sampling

Small and medium building contractors were targeted in this study. The study employed the use of stratified random sampling in which contractor classes were regarded as strata (Class iv-vii) and the sample was selected randomly from each class/strata. Strata size was established as the proportionate size of the total sample size. The formula for calculating sample size given finite population size was used (National Council for Technical Education [NACTE], 2020).

$$\mathrm{n} = \frac{Z^2 P.q.N}{e^2.(N-1) + Z^2.P.q}$$

Where; n= proposed sample size Z= stands for confidence level (Z= 95%) P= degree of variability (P=50%) q= 1-P 8 e= acceptable of error (e=5%) N= population size

The sample size established was class iv (33), class v (70), class vi (54) and class vii (52).

3.3 Data Collection

In this study, primary data was collected, obtained from the respondents through the use of questionnaires survey. The questionnaire was designed to collect quantitative data from the small and medium class contractors targeting staff responsible with tendering process. It had four main sections which are Introduction section, section collecting demographic information, section assessing the extent of use of bidding strategies using a 5-point Likert scale, and the last section collection information about contractors' tender success rate. Questionnaires were distributed to random respondents via google forms for easy data collection. The link was sent to the contractors via emails which were obtained from contactors registration board website. A total of 131 questionnaires were responded to out of 209 links sent to the contractors making a total of 63% response rate.

3.4 Data Analysis

Like other questionnaire-based survey, data was analysed using IBM SPSS Statistics V25 2019. Data screening was done on the collected data and found all questionnaires fit further analysis. Statistical tests were then performed on the data to prepare them for further inferential analysis; these tests include reliability test and test of normality. Data were then transformed using square root transformation to adhere to normal distribution then dimension reduction was performed to group the strategies into 9 major groups. Correlation analysis and regression analysis was performed based on the factors generated in factor analysis.

3.5 Validity and Reliability

Before administration of questionnaire, a survey pilot test was conducted to 6 experts who were purposively evenly selected from academicians and building contractors in orders to achieve academic coherence and practical relevance of the questions. The results from the pilot study were used to improve the questionnaire before using them for data collection. Split sample model validation was used to externally validate the developed model in which 30 per cent portion of the split was a validation set. Internal consistency was achieved by using Cranach's alpha coefficient.

3,5 Ethical Consideration

Research work makes impact when there is interaction between researcher and society (Blumberg, Cooper , & Schindler , 2005), and therefore this research considered ethics in this interaction. Respondents had informed and free consent to participate in the research, no payment was made to persuade the respondents to participate and confidentiality and privacy of the respondents were protected.

4. Results

4.1 Demographic Characteristics

Examination of Table 2 shows that majority of respondents work in companies with less than five years' experience (n=88 or 67.2%) indicating that most of the small and medium companies are still young in the industry. The same is for personal experience with 81.7% of the respondents having experience of less than five years in the industry. The examination further shows that personnel most used in tender preparation are Quantity surveyors and Engineers amounting to 67.7% and 26.2% respectively. Most of the respondents have education qualification of bachelor's degree and above (94.7%) helping to ensure reliability of data collected.

Table 2. Socio-demographic information

Characteristics	Number of respondents	Per cent
Experience in the Construction Industry		
Less than 5 years	107	81.70
5-10 years	22	16.80
Over 10 years	2	1.50
Total	**131**	**100.00**
Experience with the Organization		
Less than 5 years	107	81.70
5-10 years	22	16.80
Over 10 years	2	1.50
Total	**131**	**100.00**
Education Level		
Master's degree	15	11.50
Bachelor's degree	109	83.20
Diploma	4	3.10
Certificate	3	2.30
Total	**131**	**100.00**
Position in the Organization		
Quantity Surveyor	88	67.18
Architect	4	3.05
Engineer	34	25.95
Project Managers	3	2.29
Technical Director	2	1.53
Total	**131**	**100.00**

4.2 Reliability Analysis and Normality of Data

Data were subjected to statistical analysis using SPSS software to enable relevant interpretation for this study. Reliability and Normality test were conducted to determine the nature of data collected and enable the selection of appropriate further statistical analysis. Reliability test results were satisfactory with Cronbach's Alpha values above the minimum 0.5 (Pallant, 2007) as can be seen in Table 3. On the other hand normality test indicated that original data were not normally distributed as the Skewness and Kurtosis Z-values were beyond the allowable Z-values of +/-1.960. To normalize the data, Squareroot transformation was performed on the original data and the transformed data conformed to the normality test as seen in Table 4. After the analysis, the reverse transformation will be performed to enable meaningful interpretation of the results (Pek, Wong, & Wong, 2017).

Table 3: Reliability Analysis

Variable	Cronbach's Alpha	Number of Items (Observed Variables)	Remark
Focused Strategic Bidding	0.837	3	Reliable
Use of Historic Data	0.674	2	Reliable
Draft and Review Strategy	0.858	6	Reliable
Market Intelligence	0.701	3	Reliable
Aggressive Bidding Strategy	0.768	2	Reliable
Use of bid preparation software	0.724	2	Reliable
Teaming up with established business	0.688	4	Reliable
Systematic Bidding approach Strategy	0.782	4	Reliable
Pricing Strategy	0.746	5	Reliable

Table 4: Z-Score Values of study variables

	Before Square Root Transformation		After Square Root Transformation	
	Z-Values		Z-Values	
Variable	$Z_{skewness}$	$Z_{Kurtosis}$	$Z_{skewness}$	$Z_{Kurtosis}$
Tender Success Rate	3.330	-0.860	0.990	-1.220
Focused Strategic Bidding	4.080	0.050	2.000	-0.390
Use of Historic Data	-2.220	2.340	-0.150	0.080
Draft and Review Strategy	-0.870	-1.870	1.370	-1.760
Market Intelligence	0.720	-1.530	-0.510	-1.650
Aggressive Bidding Strategy	1.010	-0.030	-0.770	-0.360
Bid Preparation Software	3.200	0.700	1.470	0.000
Teaming with Established Business	0.840	2.270	-1.730	1.550
Systematic Bidding Approach	-0.240	-1.460	-1.580	-0.700
Pricing Strategy	1.920	-0.430	0.110	-0.470

Factor analysis was then conducted before correlation and regression analysis to generate values to be used in regression and correlation analysis as well as reducing the variables into manageable groups. Correlation analysis was used to establish the relationship between bidding strategies and tender success rate whereas regression analysis was used to model the existing relationship for predictive purposes. Person correlation was used in establishing the relationship between variables whereas, for Regression, the Multiple Regression method was used to model the relationship between the variables. Prior to model formulation data was split into training and validation groups using random sorting technique in SPSS adopting a 70:30 ratio. 70% of the sample was used in model training and 30% of the sample was used in model validation.

4.3 Factor Analysis

Before the performance of correlation and regression analysis, dimension reduction was performed using factor analysis with principal component analysis. Since sample data conformed to the

normality test and component correlation matrix values do not exceed 0.32, orthogonal rotation (Varimax) was used to perform the factor analysis. The results indicated that sampling adequacy is satisfactory to allow further inferential analysis as the Kaiser-Meyer-Olkin (KMO) for sampling adequacy is above the allowable 0.5 value as can be seen in Table 5. On the other hand, the result shows there is an adequate correlation between independent variables as measured by Bartlett's Test of Sphericity ($P<0.05$) as seen in Table 5.

Table 5: KMO and Bartlet test of sphericity

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.699
Bartlett's Test of Sphericity	Approx. Chi-Square	3137.088
	df	465
	Sig.	0

Factors were then grouped based on the factor loadings of the rotated component matrix as seen in Table 6. The forced factors extraction method was used to arrange observed variables into nine groups as were identified in the literature. Some overlapping of factor loading can be seen in Table 6, but factors with the strongest loadings were selected for grouping in each specific group. Therefore, group names are as follows; Component 1: Pricing Strategy, Component 2: Marketing Intelligence, Component 3: Draft and Review Strategy, Component 4: Bid Preparation Software, Component 5: Teaming with Established Business, Component 6: Aggressive Bidding Strategy, Component 7: Use of Historical Data, Component 8: Systematic Bidding Approach and Component 9: Focused Strategic Bidding.

Table 6: Factor loadings based on principal component analysis

Rotated Component Matrix									
Bidding strategy	**Component**								
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Focused strategic bidding related Strategies									
Bid/no-bid criteria of the firm	0.855								
Bid/no-bid decision before bidding	0.820								
Bid decision models	0.797								
Check accuracy of issued drawings	0.749								
Find client and financier information	0.701								
Pricing related strategies									
Different mark-up to different BOQ items		0.806							
Cost-based pricing (cost + markup)		0.781							
Market-based price		0.746							
Bid at zero profit		0.727							

Bid below the profit margin	0.699					
Draft and review related strategies						
Prepare draft document before final document		0.633				
Proofread the document before submission		0.554				
Use attachment checklist for bid submission		0.528				
Check accuracy of issued Bills of Quantities		0.513				
Check the accuracy of the issued tender document		0.502				
Teaming with established business related strategies						
Consortia			0.799			
Partnership			0.782			
Joint venture			0.653			
Strategic alliance			0.583			
Market intelligence related strategies						
Competition-based price				0.793		
Find information about other tenderers				0.625		
Look for the market condition to prepare an estimate				0.501		
Aggressive strategic bidding related strategies						
Plan for bid preparation					0.900	
Select bid team with the manager					0.836	
Bid preparation framework					0.860	
Bid preparation software related strategies						
Estimation software						0.861
Bid decision software						0.827
Historic data related strategies						
Use historic data as part of bid submission					0.847	
Use price from previous tenders					0.820	
Systematic bidding approach related strategies						
Systematic bidding procedure						0.749
Bid decision models						0.636

Extraction Method: Principal Component Analysis; Rotation Method: Varimax with Kaiser Normalization[a]
a. Rotation converged in 25 iterations.

4.4 Assessment of Regression Model

Prior to performing regression analysis, the correlation was used to check the existence of any significant relationship between bidding strategies and tender success rate. The values of the correlation coefficient indicate the strength and direction of the relationship between variables (Akoglu, 2018). The

results showed that there is a significant strong relationship between tender success rate and two of the bidding strategies which are pricing strategies and market intelligence with the correlation coefficients of 0.589 and 0.365 respectively. There is also a significant weak negative relationship between tender success rate and Focused strategic bidding strategy with a correlation coefficient of -0.198. The relationship between the rest of the strategies and the tender success rate is not statistically significant as it can be seen from Table 7 and therefore these strategies will not be included in the regression model.

Multicollinearity was assessed using the Condition Index (CI) method, which relies on eigenvalues obtained from factor analysis, as shown in the formula (Sahin et al., 2018). Where E*max* is the largest eigenvalue and E*i* is the i^{th} eigenvalue.

$$CI = \sqrt{\left[\frac{Emax}{Ei}\right]}$$

A CI above 30 is typically seen as a sign of severe multicollinearity. Index values from 10 to 30 indicate moderate multicollinearity, whereas values under 10 suggest low multicollinearity (Sahin et al., 2018). The CI for all eigenvalues ranged from 1 to 7.58. As all Condition Indices were below 10, this indicates that multicollinearity is not a major concern. More so, all the assumption were met i.e., *inter alia* relationship between independent and dependent variables was linear, observations (errors) were independent, the variance of residues remained constant across all levels of independent variables and residues were normally distributed.

Then the prediction model was developed using the two identified independent variables in the correlation coefficient. Table 8 presents the results for the multiple regression models between Tendering Strategies and Tender success rate.

Table 7: Correlation between bidding strategies and tender success rate

		Tender Success Rate	Pricing Strategy	Market Intelligence	Draft and Review Strategy	Bid Preparation Software	Teaming with Established Business	Aggressive Strategic Bidding	Use of Historic Data	Systematic Bidding Approach	Focused Strategic Bidding
Tender Success Rate	Pearson Correlation	1.000	.589**	.365**	0.022	0.160	-0.143	0.122	0.019	-0.142	-.198*
	Sig. (2-tailed)		0.000	0.000	0.801	0.068	0.103	0.165	0.830	0.107	0.024
Pricing Strategy	Pearson Correlation		1.000	0.124	0.133	0.121	0.011	0.129	0.142	0.145	0.040
	Sig. (2-tailed)			0.101	0.301	0.202	0.015	0.114	0.103	0.107	0.313
Market Intelligence	Pearson Correlation			1.000	0.140	0.033	0.131	0.018	0.103	0.104	0.145
	Sig. (2-tailed)				0.070	0.202	0.001	0.603	0.340	0.034	0.108
Draft and Review Strategy	Pearson Correlation				1.000	0.130	0.113	0.161	0.118	0.109	0.144
	Sig. (2-tailed)					0.002	0.001	0.000	0.321	0.051	0.128
Bid Preparation Software	Pearson Correlation					1.000	0.111	0.135	0.061	0.103	0.119
	Sig. (2-tailed)						0.000	0.000	0.001	0.820	0.621
Teaming with Established Business	Pearson Correlation						1.000	0.109	0.125	0.061	0.103
	Sig. (2-tailed)							0.000	0.000	0.000	0.309
Aggressive Strategic Bidding	Pearson Correlation							1.000	0.105	0.069	0.023
	Sig. (2-tailed)								0.010	0.230	0.005
Use of Historic Data	Pearson Correlation								1.000	0.148	0.135
	Sig. (2-tailed)									0.178	0.106

Systematic Bidding Approach	Pearson Correlation	1.000	0.101
	Sig. (2-tailed)		0.334
Focused Strategic Bidding	Pearson Correlation		1.000
	Sig. (2-tailed)		

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

The results indicate moderate predictive power (Kissi, Agyekum, Baiden, Agyei, Eshun, & Badu, 2019) with the coefficient of determination of 0.474 (R^2) and coefficient of correlation of 0.689 (R). As discussed earlier in this paper coefficient of correlation indicates the existence of a strong positive linear relationship between bidding strategies and tender success rate. On the other hand coefficient of determination indicates that 47.4% of the variance in the tender success rate is caused by variance in these two tendering strategies whereas the remaining effect is the result of causes other than these two tendering strategies. The R-Square obtained satisfies the minimum required value of R^2=25% for the goodness of fit of the model (Zentner, 2017). Durbin-Watson's (1.756) test for serial correlation indicates that there is some degree of positive autocorrelation between successive observations but all within the allowable range.

Table 8: Regression model summary

Model	R		R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson Statistic	
	sample = 70% sample (Selected)	sample ~= 70% sample (Unselected)				sample = 70% sample (Selected)	sample ~= 70% sample (Unselected)
1	.689[a]	0.666	0.474	0.462	0.09017	1.756	1.993

a. Predictors: (Constant), Market Intelligence, Pricing Strategy

b. Unless noted otherwise, statistics are based only on cases for which sample = 70% sample.

c. Dependent Variable: Tender Success Rate

Table 9 presents model input results for transformed data. The standardized coefficients used to compare the contribution of each strategy in the model indicate that the Pricing strategy has a greater contribution with the standardized Beta value of 0.595 as compared to the Market Intelligence with the standardized Beta value of 0.359, but all variables are highly statistically significant with P<0.05. Inputs to the model (before reverse transformation) $Y = \beta_0 + \beta_1 X1 + \beta_2 X2$ presented in Table 8 are β_0 =0.476, $\beta_1 = 0.078$, $\beta_2 = 0.042$ as constant/intercept and coefficients for Pricing strategy and Market intelligence respectively. Therefore, the regression equation based on the given constants will be $Y = 0.476 + 0.078X1 + 0.042X2$. Interpretation of this model before reverse transformation will distort the intended meaning therefore model will be interpreted based on the reversed transformed data.

Table 9: Regression model coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.476	0.010		49.431	0.000
	Pricing Strategy (PS)	0.078	0.010	0.595	7.652	0.000
	Market Intelligence (MI)	0.042	0.009	0.359	4.621	0.000

a. Dependent Variable: Tender Success Rate

b. Selecting only cases for which sample = 70% sample

Reversing the square root transformation was performed by introducing the square root sign on the dependant variable and then squaring both sides of the equation to obtain the original values (Pek, Wong, & Wong, 2017). Equation (i) presents the final regression equation model which will be used in the interpretation.

$$\text{Tender Success Rate (Y)} = (0.476 + 0.078\mathbf{PS} + 0.042\mathbf{MI})^2 \quad \text{.....(i)}$$

4.5 Company Experience as Moderator Variable

As stipulated in the literature experience was the key moderator to tender success rate (Fu, Drew, & Lo, 2002). Among other forms of Experience, Company experience has appeared to have significant moderating effect on the model. Table 9 presents a summary for the regression model with company experience as the moderator variable. Findings indicate the existence of a significant moderation effect with an increment in the prediction power of the model by 6.8% (R^2 Change=0.068) at a 95% confidence interval. The coefficient of determination for the moderated model is 54.2% and the coefficient of correlation is 0.736, an increment from 47.4% and 0.689 respectively.

The findings of Table 10 also explain the prediction power comparison between the selected sample and unselected sample. With R-square comparison the difference between prediction power of selected and unselected samples is 0.86%, indicating a probability of having an optimum model fit.

Table 10: Regression model summary with company experience as a moderator

Model	R		R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics		Durbin-Watson Statistic	
	sample = 70% (Selected)	sample ~= 70% (Unselected)				R Square Change	Sig. F Change	sample = 70% (Selected)	sample ~= 70% (Unselected)
1	.689[a]		0.474	0.462	0.09017	0.474	0		
2	.736[b]	0.742	0.542	0.526	0.08466	0.068	0.001	1.599	2.201

a. Predictors: (Constant), Market Intelligence, Pricing Strategy

b. Predictors: (Constant), Market Intelligence, Pricing Strategy, Company Experience

c. Unless noted otherwise, statistics are based only on cases for which sample = 70% sample.

d. Dependent Variable: Tender Success Rate

Table 11 further explains the moderation effect of company experience by presenting the unique contribution of each moderator in the model. There is a slight reduction in the unique contribution of each variable in model 2, but there is an increase in the combined effect in the prediction power as explained in equation iii. Equation ii shows the summation of the unique contribution of each variable into the model. Company experience for this case has strengthened the contribution of the tendering strategies in predicting tender success rate.

$$\sum(Semi\ partial\ correlation)^2 = 0.529^2+0.295^2+0.260^2 = 0.43 \text{ …….. ii}$$

Combined contribution = R^2- Equation (v) = 0.542 - 0.430 = 0.112 ……..….. iii

Table 11: Regression model coefficients with company experience moderator variable

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations		
		B	Std. Error	Beta			Zero-order	Partial	Part
1	(Constant)	0.476	0.010		49.431	0.000			
	Pricing Strategy	0.078	0.010	0.595	7.652	0.000	0.588	0.634	0.595
	Market Intelligence	0.042	0.009	0.359	4.621	0.000	0.347	0.444	0.359
2	(Constant)	0.351	0.036		9.680	0.000			
	Pricing Strategy	0.071	0.010	0.541	7.250	0.000	0.588	0.616	0.529
	Market Intelligence	0.035	0.009	0.302	4.036	0.000	0.347	0.399	0.295
	Company Experience	0.051	0.014	0.272	3.562	0.001	0.440	0.359	0.260

a. Dependent Variable: Tender Success Rate

b. Selecting only cases for which sample = 70% sample

4.6 Model Validation

Three alternative models have been developed in this study, a base model and two moderated models. Among the three model alternatives, model one and model three have shown more consistent results between the training sample and validation sample. Further analysis has shown that model three has more prediction power compared to model one.

Further validation of model three was conducted by comparing the correlation coefficient of the two sample groups between predicted values and training values as by (Waterson, Griffiths, Stride,, Murphy, & Hignett, 2015). Results in Table 12 indicate a significant strong relationship between the predicted values and training values of the two sample groups. The correlation coefficient between the two-sample data indicates that 30% sample has slightly more relationship than 70% sample but their closeness indicates that this model does not overfit. For the 30% sample association between training values and predicted values is at correlation coefficient R = 0.742 and 0.736 for the 70% sample group. Therefore, it can be concluded that model three with dependant variable "tender success rate", independent variables pricing strategy and market intelligence and moderator variable company experience present an optimum fit.

Table 12: Correlation between training and predicted values

Sample			Tender Success Rate	Predicted
30% sample	Tender Success Rate	Pearson Correlation	1	0.742**
		Sig. (2-tailed)		0.000
		N	41	41
70% sample	Tender Success Rate	Pearson Correlation	1	0.736**
		Sig. (2-tailed)		0.000
		N	90	90

**. Correlation is significant at the 0.01 level (2-tailed).

The final model equation therefore will be as given in equation vii. As discussed earlier in this chapter reverse transformation need to be applied to have a meaningful interpretation of results. In this equation, contractors can attain only a 12.3% success rate if none of the bidding strategies are used while a 25.8% success rate can be attained with an increase in one unit of each of the bidding strategies used in the model.

$$\text{Tender success rate} = (0.351+0.071PS+0.035MI+0.051CE)^2 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\text{iv}$$

5. Discussion

Results from correlation analysis indicate the importance of bidding strategies in influencing tender success rate. According to Darbar & Pitroda, (2018), the skillful combination of different bidding strategies has a greater impact on tender success rate. Pricing strategies and market intelligence have surfaced to have a significant strong positive relationship with tender success rate among other strategies. This has affirmed finding from most studies that emphasized the importance of pricing strategies on winning tenders (Kissi, Agyekum, Baiden, Agyei, Eshun, & Badu, 2019); (Aje, Oladinrin, & Nwaole, 2016). Some of the selection criteria base on the price evaluation alone in awarding tenders, but even those which use multi-criteria have price given more scores than other technical criteria (Hanák, Drozdová, & Marovi´c, 2021). This strong relationship can also be credited to the fact most of the clients are more cost-conscious and always try to find contractors who fit their budget regardless of the future consequences (Lambropoulos, 2013).

On the other hand, Market Intelligence has been marked as a salient Strategy in winning tenders. It affirms the study conducted by Vandi (2020) that, if the proper market analysis is conducted there will be an increase in the tender success rate of the company. Also in line with the study by Perez et al, (2015) market information is a valuable resource in determining the winner in the competitive tenders. Perez further shows the importance of knowing competitors' tender position to devise the winning strategy in future tenders. This study also agrees with the study by Flynn & Davis, (2016) on the strategic use of market information to position a firm in an advantageous competitive position. This market information should also be updated regularly to keep bidding using the most recent market information.

While we can see bidding strategies have influenced success rate, some of the strategies in this study have portrayed contradicting results as compared to the literature. Teaming with an established business, a Systematic Bidding Approach, and Focused Strategic Bidding have a negative relationship with the tender success rate. These results call for the further study specifically on these strategies to uncover more what could be the reason. Studies on Teaming during bidding have shown an increase in competitiveness of the established team as well as tender winning chances (Vandi, 2020); (Yan, Liu, & Skitmore, 2018); (Tan, Shen, & Langston, 2010). Where a study by Deitz, et al, (2010) indicates, despite

an increase in the need for teaming most teams do not realize their intended goals which result in high failure rates. This study has not pointed out the cause of such failures in detail but trust and resource sharing have been said to be among the reasons.

The systematic bidding approach looks at trying to incorporate all administrative and technical demands of tender during the tendering process. It is the very essential strategy in winning tenders in competitive bidding and has been seen to have a positive relationship with the tender win rate (Flynn & Davis, 2016). The findings of this study on the contrary show an inverse relationship between this strategy and tender success rate contrary to the study by Flynn & Davis, (2016). This inverse relationship could be due to substantial time and resource requirements as well as lack of technical personnel (Karjalainen & Kemppainen , 2008) which are a serious problem to small and medium contracting firms.

The model explaining the relationship between bidding strategies and the tender success rate has shown a significant strong prediction power and the significant moderation effect of Expert experience. This study has contributed to a list of predictive research in the area of SMEs and public procurement. The study by Flynn & Davis, (2016) cited a problem of researches conducted in this area to rely more upon description than prediction. The study has shown how bidding strategies can be combined to predict tender success rate and the importance of using experts in the tendering process. On contrary to the study by Nield, (2017) which indicates no relationship exists between the use of consultancy and tender success rate, this study has pointed out how valuable expert contribution is to the tendering process.

6. Conclusion

There are several bidding strategies adopted by contractors for competitive bidding. Strategies adopted in developed countries are quite different from those used in developing countries as well as those used by large contractors to those used by small and medium contractors. This study focused on Small and medium contractors' bidding strategies and how they influence their tender success rate. Two bidding strategies have emerged to have a significant relationship with tender success rate which are Pricing strategy and Market Intelligence. With the use of these strategies and Expert Experience as moderators, a model with significant prediction power has been developed to aid contractors in predicting the tender success rate.

Contribution of the Study

This study has offered an insight on the most appropriate bidding strategies for small and medium contractors. From a number of bidding strategies used in tendering by contractors, this study has pointed out ‘pricing strategies and market intelligence’ to be the most relevant ones for SMEs contractors using Tanzania as a case. The study has shown there is a significant positive relationship between these two bidding strategies and tender success rate.

Furthermore, this study is the first to develop a model for predicting tender success rate of the SMEs contractors in Tanzania construction industry using bidding strategies as predicting variables. More so, this study has contributed to knowledge by showing the importance of experience as a moderator in the course of bidding. This study has emphasized the importance of building company experience in improving tender success rate.

Implications

This study, encapsulates managerial and policy implications for the practitioners during tender action and the government for capacity building and policy directives in the construction industry. First, the moderation effect of experience shows the importance of the firms to use experienced experts in

tendering process. Tendering is a multi-disciplinary activity that involves the use of many professions from quantity surveyors, engineers of several specializations, estimators, risk analysts, and even professional report writers. Accessing the service of all these experts could be financially challenging to the SMEs contractors but with use of joint ventures and all other forms of amalgamation as devised mechanisms in practice, could strengthen their financial muscles in the quest to pursue experienced bidding experts. Second, the contribution of pricing and market intelligence in the model have shown how important these strategies are in predicting success rate. Contractors should consider the use of these strategies to effectively achieve bona fide competitive pricing in the competitive construction business environment and make use of the model on encountered opportunities to enhance their win rate.

On the other hand, the finding from this study could enable the government, through CRB to provide capacity building to SMEs contractors by providing them with a tailor-made specific training on bidding strategies and how they can be applied during bidding process. This will increase contractors' understanding of the bidding strategies and enhance their success rate in the tender action. More so, understanding of the relationship between bidding strategies and tender success rate of the SMEs building contractors could provide policy makers with guidance for the formulation and implementation of the procurement guidelines, which could be custom-tailored to SMEs contractors of Tanzania.

Limitations and Further Studies

Despite the reported contributions, the main limitation of the study was around the lack of regional generalization as the survey sample consisted of SMEs contractors from one country, namely Tanzania. Obviously, findings may not generalize to other developing countries, and therefore future studies should be extended to other parts of Tanzania and beyond. Also, data from this study was collected from SMEs contractors, thus future studies could consider extending data to large contractors.

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