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Evaluation of Unit Rates Bids of Common Building Items

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Abstract: It is important to assess firms' financial health in the harsh construction market of developing countries. This study seeks to achieve this by assessing locally owned construction firms' (LOCOFs) financial performance through evaluating firms' bill of quantities (BOQ) contract sums and bid unit rates of common building items. Accessible 60 BOQ of the 79 BOQ of building projects awarded to various LOCOFs from 2007 to 2015 by federal universities and federal universities teaching hospitals in Southwest Nigeria were obtained from the institutional archives. Regression analysis of the contract sums and bid unit rates of common building construction items of works such as concrete, sandcrete block, iron, mortar and floor tiles were carried out. LOCOFs' bid unit rates were compared with published unit rates and Nigeria consumer price index (CPI) within the study period and inferences bothering on firms' pricing pattern and financial viability of firms based on items of work unit rates were highlighted and discussed. The results showed that 119 out of a total 461 unit rates values representing 25.81% of the LOCOFs bided unit rates were higher than the published unit rates. LOCOFs unit rates trend decreased within 3 to 4 consecutive years while the Nigeria CPI trend increased all through the years considered in the study. This implies that LOCOFs common items of work bids unit rates were not always influenced by the prevailing prices of goods and services in Nigeria. A possible reason for this is the lowest tender selection criteria which influences LOCOFs' bided unit rates thereby leading to the acclaimed compromise in the quality of construction output and stunted financial performance.

Keywords: Locally owned construction firms (LOCOFs), bill of quantities, bid unit rates, financial performance.

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1. Introduction

It has been observed that if micro and small scale enterprises (MSEs) are not encouraged, it will be difficult to achieve and sustain effective holistic economic growth (Kwamikorkor and Yeboah, 2013; Ajuwon et al., 2017). This is attested by the rapidly growing economy of developed countries, as their economies have been improved by the various MSEs business operations (Schaper, 2002; USITC, 2010). Locally owned construction firms (LOCOFs) are majorly MSEs construction contracting organisations (Oladimeji and Ojo 2012; Oladimeji and Aina, 2018; Tsado et al., 2019). Specifically, MSEs construction firms are mostly involved in the construction of private residential, offices and commercial buildings (Opoko, 2004; Tsado et al., 2019). They serve as contractors for maintenance work and as subcontractors for construction labour and specialised work items. (Ng and Price, 2002; Laryea, 2010). One of the ways by which MSEs survive and bridge the economic gap, is the ability to maximise the use of materials and skills commonly available in their areas of operations (Akugri et al., 2015). One important way of strengthening this is to assess LOCOFs construction financial performance in relation to its common building construction items of work unit rates.

Unit rates of work items in bills of quantities (BOQ) of construction projects provide financial details that can assist in the evaluation of unit rate pricing strategies and the LOCOFs' bidding practice necessary for the financial health of firms. Meanwhile, unit rates of building items of work have been used by researchers in reaching veritable conclusions on various construction operations. Laryea and Hughes (2009) observed that in addition to firms' profit margin, the unit levels used in the BOQ of contractors in Ghana require a risk allowance of 5-7.5 per cent. Forbes et al. (2009) analyzed the labour rates of 80 BOQs in the United Kingdom and found that the variation in the labour cost coefficient between houses of the same type is greater than between houses of different types. Mac-Barango (2012) took advantage of the unit rates obtained from the intentionally synthesized and prepared BOQ in Port Harcourt to achieve a percentage cost difference of 0.53% to 17.79% cost variance in the construction of the same design area, having the same construction conditions but different shapes (i.e. square and rectangular). The BOQ unit rates were used by

Ogundiran and Adedeji (2012) in Abuja to obtain a comparative overview cost differential between buildings constructed from traditional sandcrete blocks and expanded polystyrene. These studies suggest that BOQ unit rates can be used to measure LOCOFs' operation and evaluate its survivability in order to improve firms' efforts. Earlier studies scarcely evaluated LOCOFs construction operation financial performance through the assessment of firms' unit rates of common building construction items of work.

This study assessed the financial performance of LOCOF's construction operations by evaluating their BOQ-bided unit rates of common building construction items of work. Specifically, this study seeks to know what significant relationship exists between building contract sum and the unit price of common building construction items of work such as concrete, sandcrete blocks, iron, mortar and floor tiles. It secondly seeks to know what comparative price difference exist in LOCOFs bid unit rates and rates published in the Consol's Nigerian Building Price Book for Builders and Developers; and economic data on Nigeria consumer price index (CPI) for goods and services for the year 2009 to 2015. There is the need for continual assessments of LOCOFs' construction financial performance so as to improve firms' efforts. This will enable the identifications and recommendations of measures that will enhance the performance of LOCOFs in developing countries' competitive construction markets.

2. Literature Review

2.1. Tendering and Bidding Strategy for Construction Works

Brett (1997) describes tendering as "the development and submission of a bid price for the execution of some specified construction works based on the study of the contract documents". Estimates are converted to bids in a process called tendering which involves the preparation and submission for acceptance a conforming offer to carry out work for a price. This is the usual contractors' way of winning the right to deliver a construction project. It is described as a means to an end (Connaughton, 1994; Hoxley, 2000). Tendering is not between clients and contractors alone. It could be between contractors and subcontractors, contractors and suppliers and clients and consultants.

A firm price tender is a form of tender that requires work to be done at a prescribed cost; it could in form of a cost reimbursement or cost plus tender which stipulates an amount of profit on the prescribed cost of work. Competing contracting firms submit tenders based on prepared BOQ, bill of approximate quantities or other bill specifications. This is with the aim of ensuring a high level of uniformity and accuracy by the various bidders. The method of tender selection dictates the degree of competition and could either be open, selective or negotiated competitive tendering. In open competitive tendering, contractors tend to present low bids by assigning low mark-up because the number of bidders is expectedly high making it highly competitive for contractors to win a bid (Musa and Dada, 2015). This is unlike the selective and negotiation competitive tendering designed to have restricted numbers of contractors (bidders).

2.2. Unit Rates and Performance of Contractors

The unit rate in the bill of quantities is calculated, computed and build up through the estimation of cost components of construction materials, labour, plant and equipment, waste, overheads, risk and profit during tendering. Unit rates principally influence cost estimate of projects, its computation must be devoid of estimator motivational and cognitive biases, design ambiguity and inadequate specifications as these can result in inaccurate cost estimates that may be grossly unreliable (Smith, 1991; Birnie and Yates, 1991; Mensah, 2018). Unit rates of construction items of work are influenced by various economic factors which in turn escalate the total cost of construction projects. For instance, an escalation in concrete cost will ultimately result in the increase in the total cost of concrete of a project. The highly complex effect of various economic elements such as supply and demand, the added value of products, value of money amidst others, induced fluctuations in prices. This effect is highly correlated with the pattern of escalation indices publicly published from time to time (Oyamada and Yokoyama, 1986). Estimators may not be able to fully comprehend and compute the effect of these fluctuations in all the components rates that is in the unit price of work items. An underestimated unit price results might enhance the chance of a contractor winning a bid under an aggressive lowest bidder open tendering system, it however can result in a serious cost overburden for contractors and cost overrun of projects (Jackson, 2002; Ameyaw et al., 2015). Jarkas (2013) itemised fourfold decision criteria of firms that win such bids: (1) sell the contracts, which technically means subcontracting the contract to lower grade contractors in a concealed manner. Such lower grade contractors would have been disqualified or may not bid as they do not measure up to the projects' pre-qualification criteria; (2) find substitutes or replacements with weaker technological requirements and methods of work; (3) cope with the inherent possible losses; or (4) officially remove their bids from any additional award requirements and thus risk both the liquidation of bid-bonds and the potential blacklisting by the concerned clients/clients' consultants.

Unit rates of items are significantly influenced by firms' mark-up size decisions which is critical to firms' profitability and achievement of its goals and objectives. Most times, mark-up covers the risk and opportunity allowance, corporate overheads cost, and pre-tax profit. Some firms use statistical or mathematical models and techniques to assess bid competitiveness and mark-up while others base their decisions on past experiences of bided construction projects. Various factors influencing bid mark-up sizes had been classified and rated in numerous studies. Carr and Sandahl (1978) identified competition conditions, economic environment and job characteristics. In the same vein, Ahmad (1990) considered related factors such as firm, job and market and recourses. Akintoye and Skitmore (1990) named environmental, profitability and procurement factor. Later category by Shash and Abdul-Hadi (1993), Dulaimi and Shan (2002) and Hai (2009) itemised: (1) project characteristics; (2) project documentation; (3) company's/contractor's characteristics (4) tendering/bidding situation; and (5) economic conditions. At the turn of the 21st century, three major contributory factor groups influencing contractors' mark-up decisions were assigned by Bennett (2003), Egeman and Mohamed (2007), and Enshassi et al. (2010):

(1) project related (2) company/firm related; and (3) market conditions/expectations and strategic considerations related factors. An expanded version of these groups was itemised by Bagies and Fortune (2006) and Oo et al., (2007), they summarised them into two main groups while a more recent grouping was by Jarkas (2013). This author itemised tendering situation, economic conditions, project's characteristics, project documentation and contractor's characteristics as very important in the determination of bid mark-up. Important factors determining bids mark-up ultimately influence the unit price of items of work since mark-up are significant components of unit rates of items of work in BOQ. Most recently, Jaśkowski and Czarnigowska, (2019) made use of these various mark-up decisions to develop a probabilistic method that assumes the existence of positive correlations between the prices offered by the competitors expectedly based on the aforementioned factors determining bids mark-up. It is expected that firms' decisions on mark-up sizes and its eventual effect on unit rates of items of work and contract sums eventually influence construction financial performance.

2.3. Bill of Quantities and Items of Work Unit Rates

The prime purpose of the Bill of Quantities (BOQ) is to enable all contractors tendering for a contract to price on exactly the same information (Ashworth and Hogg, 2007; Davis et al., 2009; Lee, 2011). Subsequent to this, it is widely used for post-tender work such as material scheduling (Mohd Hisham and Azman, 2008)); construction planning (Ashworth and Hogg, 2007); cost analysis and cost planning (Davis et al., 2009). It is a document used in tendering for construction works in the construction industry. Materials, plant and equipment, labour and overheads standardised descriptions and individual costs and categorised sums are itemised. Ideally, It also details terms and conditions of constructions or repairs contracts and itemises all works to enable contractors to price the works they are bidding for. Hoare and Broome (2001) recommended that the BOQ may be more appropriate for building and minor civil works, provided their design is comprehensive and only minor changes are foreseen.

The cost of construction works is obtained from the Bills of quantities prepared by "taking off" which involves obtaining a measurement of construction work from various drawings prepared by construction professionals. Cost estimates are created from this and they are in form of linear, square areas and a cubic meter of floors, walls, roofs, numbers of windows and doors and building electrics, heating and plumbing services. Various items are brought together into various groups according to their similarities in a process termed "abstracting". Relevant cost of construction materials, labour, plant and equipment rates and trades are provided in relevant estimating books. These costs are used to build up the unit rate of each item of work in the bills of quantities. The essence of the BOQ as identified by many researchers is clearly emphasised in Table 1.

There have been drives to improve BOQ presentation for better efficient usage. Kodikara et al. (1993) found out that, quantities, quantity units, and unit rates are the key elements of the BOQ information that need to be presented in a more meaningful format. The unit rates may either be expressed in numbers, linear meters, square or cubic meters, kilograms and tones. Labour and material rates are published by quantity surveying firms, construction professional bodies and the dailies from time to time. It aids easy and quick computation of unit rates for an adequate decision on unit price rates of items of work during tendering. A good example of such published articles is those published by Consol (2008, 2009, 2010, 2011 and 2013) employed in this study.

Table 1. The fundamental usage of the BOQ by clients and contractors

	Importance/Use	For Whom	Source
1	The BOQ breaks down the contract works in a, detailed, formal and well-structured manner for tendering.	Clients, Consultants and Contractors	AIQS (Australian Institute of Quantity Surveyors), (2001)
2	BOQ serves as a post-contract administration tool, cost control and serves as basis for payments after evaluating the progress of work.	Clients, Consultants and Contractors	Davis et al. (2009) Adnan et al. (2011)
3	BOQ provides a proper, common basis for the valuation of variations	Contractors and Consultants	Cartlidge (2009) Davis et al. (2009)
4	The prices in the BOQ are basis for comparing contractors' prices with current market trends. This provides a basis for determining the likely causes of risk factors by managements	Consultants and Clients	Davis et al. (2009)
5	Preparing materials schedule and for material reconciliation	Contractors	Rashid et al. (2006) Adnan et al. (2011)
6	Preparation of final accounts	Contractors and Consultants	Rashid et al. (2006) Adnan et al. (2011)
7	Procure Sub contractors	Contractors	Rashid et al. (2006) Adnan et al. (2011)
8	Effective and efficient project management (and site management)	Contractors and Consultants	Rashid et al. (2006) Adnan et al. (2011)
9	Act as legal document	Contractors and Clients	Kodikara et al. (1993)

3. Methodology

3.1. Population, Sampling, Sample Choice and Size

This study purposively evaluates BOQs bids of building construction contracts awarded to LOCOFs in the year 2007 to 2015 by federal universities and federal universities teaching hospitals in southwest Nigeria. This

period witnessed a significant improvement in funding of Nigeria tertiary institutions and improvement in university capital expenditure (Bamiro, 2012; Famade et al., 2015). Due to inadequate logistic, funding and time limitations of the research, three out of the six states federal universities and university teaching hospitals were selected for the study. Lagos state was selected in preference to Ogun state as it is the central commercial hub for the southwest geopolitical zone and a former federal capital territory of Nigeria; Ondo state was chosen to represent one of the oldest states in the south-west zone in preference to Ekiti state and the Federal University located there is much larger and older than the Federal University in Ekiti state; Osun state was preferentially selected to Oyo state to represent one of the newest created states in Southwest Nigeria. The selected institutions have significant numbers of newly constructed educational and health building infrastructures when compared with other educational and health institutions in Nigeria.

The building projects were bided for by the use of a selective tendering system assessed through a two-stage process, involving pre-qualification and bid evaluation. The pre-qualification stage involves LOCOFs that were registered with the corporate affairs commission (CAC) of Nigeria, have audited financial statements and have been prequalified by the Bureau of Public Procurement (BPP). At the second stage; the bidding stage, a detailed assessment of all responsive bids (bid evaluation of contractors BOQs) were made in order to award the contract to the best bidder (Musa and Dada, 2015).

Out of the seventy-nine BOQ bid of LOCOFs surveyed, sixty BOQs representing 76% of the total BOQs surveyed were accessed for this study and this was due to difficulty in accessing all the surveyed BOQ bids financial data. This limitation is peculiar to developing countries due to institutions poor information storage and retrieval systems and firms' unwillingness in releasing such financial sensitive information. Specific data extracted from the BOQs were 60 projects' contract sum values and 461 bid unit rates values of selected common items of works which are: concrete (1:2:4), blockwork (225 mm) and iron reinforcement in substructure and superstructure, mortar for wall rendering (1:4) and floor tiles.

Consol's Nigerian Building Price Book for Builders and Developers published basic net unit rates of building construction items of work were accessed for this study. These rates are rates surveyed in Nigeria and regularly published by Consol Associates, a renowned quantity surveying consulting firm accredited by the Nigerian Institute of Quantity Surveyors. The published rates are net rates presented under heading in the Standard Method of Measurement Seventh Edition (SMM7) as published by the Royal Institute of Chartered Surveyors and amended to suit Nigeria's local condition. These published rates are the unit cost of materials, labour, plant and equipment excluding any profit or overhead charges within the period considered in this study (Consol, 2008; 2009; 2010; 2011 and 2013).

Economic data from the National Bureau of Statistics (NBS) 2018 on consumer price index (CPI) for goods and services for the year 2009 to 2015 were also obtained for this study. Calculations of the Nigeria CPI are based on the collection of prices of 740 goods and services from either rural or urban for each state from outlets in each sector. Each item prices are then averaged per sector across all the states in Nigeria. The basic index for each commodity is calculated using these average prices and the current year price of each commodity is compared with a base year's price to obtain a relative price. Specific CPI for building construction material and labour are not available in Nigeria presently, however, CPI of "all items", "all items less farm produce" and "Miscellaneous goods and services" were deemed relevant for comparative analysis in this study.

3.2. Method of Data Analysis

Unit rates of concrete (1:2:4), sandcrete blockwork (225 mm x 225 mm x 450 mm) and iron reinforcement in substructure and superstructure, mortar (1:4) for wall rendering and floor tiles were tabulated, classified and evaluated for ease of inference. The eight items selected are largely the most common items of work in building construction projects in Nigeria and most developing and developed countries of the world (Okekere, 2007; Mehta et al., 2014). Regression analysis to test the cost significance and significant relationship of the selected common items and each building contract sum were carried out. LOCOFs' bid unit rates were compared with the rates published in the Consol's Nigerian Building Price Book for Builders and Developers and economic data on Nigeria CPI for goods and services for the year 2009 to 2015. Tables and Charts were used to demonstrate the various cost features and trends of the selected common items of work.

4. Data Presentations, Analysis and Results

4.1. Contract Sum and Common Items of Work Bid Unit Rates

The results of the correlation analysis between project contract sums and eight items of work bid unit rates showed in Table 2 revealed that all the correlations of each two variables are statistically significant at 0.01 levels (Table 2). This indicates that any of the two variables are related and may mean that any influence on the unit rate of any identified items may influence the unit rates of other items of work and the various building projects' contract sum. It can be inferred from this that the selected common items of works' bid unit rates employed in this study can be used to substantially assess items of work bid unit rates of building projects awarded to LOCOFs.

Table 3 showed that F-value is equal to 3.624 and ρ-value is equal to 0.003 that is less than 0.05 ($F= 3.624$, $\rho=0.003 < 0.05$). This result implies that the combination of all the variables (bid unit rates) to predict the project contract sum is statistically significant. This indicates that the sampled unit price rates of the selected items of work can substantially influence or predict building projects contract sum. Table 3 also showed that the multiple correlation coefficients R is 0.639, R square is 0.408 and the adjusted R square is 0.296. These results indicate that 40.8 % of the variance in the project contract sum can be significantly predicted from the selected building projects construction items of work bid unit rates employed in this study.

However, it was observed in Table 3 that there is a high variance inflation factor (VIF) in the independent variables indicating high multicollinearity. High multicollinearity affects the coefficients and ρ-values, but it does not

influence the predictions, precision of the predictions, and the goodness-of-fit statistics (Kutner et al., 2004).

Table 2. Correlation results of unit rates of building projects

Test	CSI	Project Sum	Conc_ Sub	Conc_ Sup	Block_ Sub	Block_ Sup	RC_ Sub	RC_ Sup	Floor_ Tiles	Mortar
Pearson	Project Sum	1.00	0.56	0.57	0.36	0.38	0.56	0.56	0.51	0.43
Correlations	Conc_Sub	0.56	1.00	0.90	0.83	0.83	0.72	0.76	0.76	0.58
	Conc_Sup	0.56	0.90	1.00	0.73	0.68	0.68	0.70	0.69	0.61
	Block _Sub	0.36	0.83	0.77	1.00	0.86	0.48	0.54	0.60	0.59
	Block _Sup	0.38	0.83	0.66	0.86	1.00	0.43	0.56	0.59	0.45
	RC-Sub	0.56	0.72	0.68	0.48	0.43	1.00	0.90	0.44	0.53
	RC-Sup	0.56	0.76	0.70	0.54	0.53	0.90	1.00	0.49	0.49
	Floor tiles	0.50	0.76	0.69	0.60	0.59	0.44	0.49	1.00	0.46
	Mortar	0.43	0.58	0.61	0.59	0.45	0.53	0.49	0.46	1.00
Sig. (2-tailed)	Project Sum		0.00	0.00	0.01	0.003	0.00	0.00	0.00	0.00
	Conc_Sub	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Conc_Sup	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00
	Block _Sub	0.01	0.00	0.00		0.00	0.00	0.00	0.00	0.00
	Block _Sup	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00
	RC-Sub	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00
	RC-Sup	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00
	Floor tiles	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
	Mortar	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

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

Table 3. Regression analysis result of the contract sum and common items of work bid unit rates

	Unstandardized	Coefficient	Standardized Coefficients								
	B	Std. Error	Beta(β)	T	Sig (α)	VIF	R	R^2	Adj. R	F	Sig
(Constant)	-213665842	63338428		-3.37	0.01		0.639	0.408	0.296	3.624	0.003
Conc_Sub	2297.79	4943.26	0.14	0.47	0.64	6.50					
Conc_Sup	2858.66	2949.82	0.20	0.97	0.34	3.14					
Block _Sub	-39996.40	29258.87	-0.37	-1.37	0.18	5.10					
Block _Sup	13208.40	30793.09	0.11	0.43	0.67	5.06					
RC-Sub	475121.90	1621490	0.23	0.30	0.77	44.16					
RC-Sup	318013.8	1768168	0.15	0.18	0.86	44.16					
Floor tiles	16714.06	15506.65	0.18	1.08	0.29	2.05					
Mortar	55118.54	72731.22	0.15	0.76	0.46	2.69					

*Dependent variable: building project contract sum

In order to understand the role of each independent variable, there is a need to reduce severe multicollinearity. A solution to multicollinearity is to leave out highly correlated variables that are essentially predicting the same variability as another (Hinton, 2005). In this case, two multivariate regression analysis left out superstructure items of work unit rates independent variables in one analysis (Table 4) and substructure items of work unit rates independent variables in the other analysis (Table 5) thereby reducing the VIFs tolerably. VIFs between 1 and 5 as observed in the two Tables 4 and 5 suggest that there is a moderate correlation, acceptable for this type of study.

The significant value (α) of each of the criterion in Table 4 and 5 shows that each criterion except that of iron in substructure and superstructure is greater than 0.05, indicating that the β scores for each criterion except that of iron are statistically insignificant. This indicates that only the unit rates of iron in substructure and superstructure can individually in a substantial way influence or predict a building project contract sum. 37.8% and 39.2% variance in the project contract sum can be significantly predicted form the 5 items of work considered in Tables 4 and 5. It is important to note that these percentages (37.8% and 39.2%) are close to the 40.8% obtained for all the 8 items of work unit rates in Table 3.

Table 4. Regression analysis result of contract sum and substructure common items of work only

	Unstand. B	Coefficient Std. Error	Stand. Coefficients Beta(β)	T	Sig (α)	VIF	R	R^2	Adj. R	F	Sig
(Constant)	-200000000	6000000		-3.46	0.01		0.626	0.392	0.324	5.804	0.001
Conc_Sub	5155.02	3940.35	0.32	1.31	0.20	4.30					
Block _Sub	-30074.2	23466.76	-0.28	-1.28	0.21	3.42					
RC-Sub	770848.8	287775.6	0.38	2.68	0.01	1.45					
Floor tiles	18680.20	14906	0.20	1.25	0.22	1.97					
Mortar	57141.24	56548.51	0.15	1.01	0.32	1.69					

*Dependent Variable: Building Project Contract Sum

Table 5. Regression analysis result of contract sum and superstructure common items of work

	Unstandardized B	Coefficient Std. Error	Standardized Coefficients Beta(β)	T	Sig (α)	VIF	R	R^2	Adj. R	F	Sig
(Constant)	-200000000	6000000		-3.43	0.01		0.615	0.378	0.311	5.594	0.001
Conc_Sup	2931.79	2704.12	0.20	1.08	0.28	2,56					
Block _Sup	-7458.71	20430.50	-0.62	-0.37	0.72	2.16					
RC-Sup	858488.9	318011.6	0.38	2.72	0.01	1.44					
Floor tiles	12318.18	14473.42	0.13	0.85	0.40	1.72					
Mortar	49229.18	58648.98	0.13	0.84	0.41	1.69					

*Dependent variable: building project contract sum

4.2. Comparison of LOCOFs and Published Unit Rates

Locally owned construction firms' 461 unit rates values were tabulated into various projects in each year of the study period and unit rates that are higher than published rates were asterisked as seen in Table 6. The highest and average unit rates were identified, calculated and tabulated as shown in Table 7. These unit rates were compared with 40 unit rates values published by the Nigeria Institute of Quantity Surveyor accredited consultant, Consol associates (Consol, 2008, 2009, 2010, 2011 and 2013) as shown in Table 8. The result obtained in Table 6 indicates that 119 (25.81 %) out of the total 461 unit rates values were higher than the published rates. Out of the 119 unit rates identified as rates higher than the published rates, 70 (58.82 %) unit rates belong to unit rates values of iron in substructure and superstructure. Note that iron in substructure and superstructure were identified in the analysis results of Tables 4 and 5 as being able to individually statistically significantly determine building project contract sum amidst the selected items of work unit rates. Comparison of the highest and mean rates with the published rates shown in Table 7 indicate that 35 (54.69 %) of the total 64 highest unit rates values and 16 (26.29 %) of the 64 mean unit rates are higher than the published rates.

4.3. LOCOFs' Annual Mean Unit Rates Comparison with Annual CPI

The charts in Fig. 1 to 3 showed an unsteady trend in the annual mean unit rates of all the items over the study period. Most items' mean unit rates except 225 mm sandcrete block substructure and iron reinforcement in superstructure increased within various specified period of 3 years: (1) concrete in both substructure's and superstructure are from the year 2013 to 2015 (Fig. 1); (2) sandcrete block in superstructure from the year 2010 to 2012 (Fig. 2); (3) tiles from the year 2013 to 2015 (Fig. 2); (4) iron reinforcement in substructure from the year 2010 to 2012 (Fig. 3); and (5) mortar from the year 2013 to 2015 (Fig. 3). There was a decrease in mean unit rates in 3 to 4 years period of all the selected common items of work unit rates except tiles: (1) concrete work in substructure and superstructure from the year 2011 to 2013 (Fig. 1); (2) blockwork in substructure and superstructure from the year 2011 to 2014 and 2012 to 2014 respectively (Fig. 2); (3) iron reinforcement in both substructure and superstructure from the year 2012 to 2015 (Fig. 3); and (4) mortar from the year 2011 to 2013 (Fig. 3). Meanwhile, the annual Nigeria CPI for "all items", "all items less farm produce", and "miscellaneous goods" increased all through the study period (2009 to 2015) (see Fig. 4). This is in sharp contrast to the fluctuations (increase and decrease) in LOCOFs' unit rates shown in Fig. 1 to 3. This implies that LOCOFs common items of work bid unit rates were not always influence by the prevailing prices of goods and services in Nigeria.

4.4. Discussion of Result

The results of the analysis revealed that the selected eight items of work unit rates used in the study are not only common items of work bid unit rates but are also cost significant. This finding is strongly supported by Mehta et al., 2014; and Okekere, 2007; they concluded that concrete constitutes between 50 – 70 % of the total cost of materials used for buildings and it the most widely used construction material in, not only Nigeria, but all over the world.

Table 6. LOCOFs' bid unit rates of common items of works of building projects for the year 2007 to 2015

Year	No.	Con.Sub. (N/m3)	Con.Sup. (N/m3)	Blk. Sub. (N/m2)	Blk. Sup. (N/m2)	RC Sub. (N/kg)	RC Sup. (N/Kg)	Flr. Tiles (N/m2)	Mortar (N/m2)
2007	1	19,000	19,000	1,800	1,700	150	150	NA	300
	2	16,000	17,000	2,300	1,800	150	150	NA	280
2008	1	22,500	22,500	2,200	2,000	230	230	2,500	350
	2	15,000	15,000	1,500	1,500	190	190	2,000	300
	3	18,000	18,000	1,850	1,500	250	250	3,300	300
	4	15,000	15,000	1,200	1,200	140	140	1,550	300
	5	16,500	16,500	1,600	1,600	165	165	1,500	300
	6	18,000	18,000	2,000	1,900	200	200	2,500	600
	7	20,000	20,000	2,500	2,500	170	175	2,500	400
	8	18,379	18,379	2,100	1,735	242	90	NA	NA
2009	1	15,000	20,000	2,000	1,000	300*	250*	1,000	1000*
	2	26,000	25,000	2,800	2,400	250*	250*	2,500	510
	3	26,000	25,000	2,400	2,400	260*	260*	2,700	600
	4	26,500	26,500	3,200	2,600	255*	255*	3,200	650
	5	20,000	20,000	2,700	2,500	250*	250*	2,000	300
2010	1	19,500	19,500	1,875	1,875	284*	284*	2,295	325
	2	20,000	22,000	2,500	2,200	210*	210*	2,500	450
	3	23,000	23,000	2,400	2,400	210*	210*	2,300	350
	4	23,500	23,500	2,250	2,170	225*	225*	2,500	350
	5	25,000	25,000	2,750	2,500	230*	230*	2,500	450
	6	21,000	21,000	2,200	2,200	190*	190*	3,700	450
	7	21,000	21,000	2,200	966	190*	190*	3,200	450
	8	21,000	21,000	2,200	2,200	190*	190*	3,700	450
	9	22,000	22,000	2,500	2,500	200*	200*	2,500	400
	10	17,000	18,000	2,300	2,100	160*	180*	2,250	350
	11	19,500	19,500	1,950	1,800	175*	175*	2,860	400
	12	19,500	19,500	1,950	1,800	175*	175*	3,000	400
2011	1	24,000	24,000	2,300	2,400	240*	240*	2,800	600
	2	26,000	26,000	NA	2,700	250*	250*	2,600	600
	3	27500*	27500*	3800*	2,700	210	210	3,200	750
	4	27500*	27500*	3800*	2,700	210	210	3,950	750
	5	27500*	27500*	3800*	2,700	210	210	3,950	850
	6	27,000	27,000	2,800	2,600	230*	230*	-	400
2012	1	24,000	2,400	2,500	2,500	220*	220*	2,500	350
	2	24,000	24,000	2,500	2,500	220*	220*	2,500	400
	3	29250*	29250*	3950*	3950*	280*	280*	3,600	625
	4	25,000	25,000	3,250	3,200	230*	230*	3,500	550
	5	23,500	23,500	2,550	2,250	220*	220*	2,500	350
	6	28000*	28000*	3,000	3,000	240*	240*	3,800	550
	7	27,000	27,000	3,700	3700*	256*	256*	3,000	900
2013	1	29000*	29,000*	3,100	2,800	270*	270*	3,000	600
	2	25,500	25,500	2,500	2,500	NA	NA	2,500	350
	3	25,000	25,000	3,000	2,500	230*	230*	2,700	500
	4	25,000	25,000	3,000	2,300	220*	220*	3,000	450
	5	22,500	22,500	2,650	2,250	225*	225*	2,250	500
	6	25,500	25,500	3,150	2,850	230*	230*	2,125	550
	7	30,000*	30,000*	2,950	2,950	220*	220*	4,000	520
2014	1	31,000*	31,000*	3900*	3,000	300*	300*	3,100	700
	2	27,000	27,000	3,400	3,200	260*	260*	3,500	800
	3	25,000	25,000	3,550	2,900	225*	225*	3,400	500
	4	18,000	18,000	2,118	2,118	169	147		400
	5	23,000	24,000	2,800	2,550	185	185	2,900	450
	6	55,360*	55,360*	NA	NA	433*	433*	6055*	865
	7	27,387	27,387	2,933	2,933	229*	229*	4,494	569
2015	1	24,000	25,000	3,000	2,500	230*	230*	4,200	600
	2	25,000	25,000	2,500	2,500	200	200	2,500	800
	3	24,000	24,000	2,700	2,550	165	165	1,800	450
	4	24,500	24,500	3,000	3,000	232*	232*	NA	450
	5	35,000*	35,000*	3,000	3,000	245*	245*	4,200	1,200
	6	33,000*	33,000*	4050*	4050*	253*	253*	5,000	750

Note: The symbol * indicates unit rates that are higher than the published rates

Table 7. LOCOFs' highest and mean bid unit rates of common items of works of building projects for the year 2007 to 2015

Year/Rates	Con.Sub. (N/m3)	Con.Sup. (N/m3)	Blk. Sub. (N/m2)	Blk. Sup. (N/m2)	RC Sub. (N/kg)	RC Sup. (N/Kg)	Flr.Tiles (N/m2)	Mortar (N/m2)
2007/08								
Highest Rate	22,500	22,500	2,500	2,500	250	250	3,300	600
Mean Rate	17,838	17,938	1,905	1,744	189	174	2,265	348
2009								
Highest Rate	26,500*	26,500*	3,200	2,600	300*	260*	3,200	1,000*
Mean Rate	22,700	23,300	2,620	2,180	263*	253*	2,280	612
2010								
Highest Rate	25,000	25,000	2,750	2,500	284*	284*	3,700	450
Mean Rate	21,000	21,250	2,257	2,060	204*	204*	2,776	403
2011								
Highest Rate	27,500*	27,500*	3,800*	2,700	250*	250*	3,950	850
Mean Rate	26,584	26,584	3,300	2,634	225*	225*	2,750	659
2012								
Highest Rate	29,250*	29,250*	3,950*	3,950*	280*	280*	3,800	900
Mean Rate	25,822	25,822	3,065	3,015	238*	238*	3058	533
2013								
Highest Rate	30,000*	30,000*	3,150	2,950	270*	270*	4,000	600
Mean Rate	22,813	22,813	2,907	2,593	233*	233*	2,447	434
2014								
Highest Rate	55,360*	55,360*	3,900*	3,200	433*	433*	6,055*	865
Mean Rate	25,844	25,969	2,672	2,386	226*	223*	2,982	536
2015								
Highest Rate	35,000*	35,000*	4,050*	4,050*	253*	253*	5,000	1,200*
Mean Rate	27,583*	27,750*	3,042	2,933	221*	221*	3,540	708

Note: The symbol * indicates unit rates that are higher than the published rates

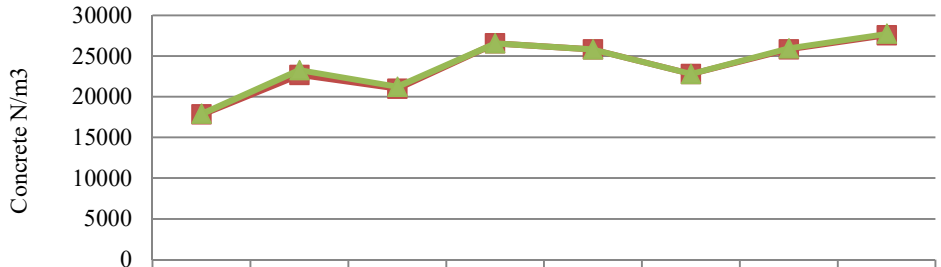
Table 8. Published net unit rates of selected common items of works for the year 2008 to 2015

No	Year	Con.Sub. (N/m3)	Con.Sup. (N/m3)	Blk. Sub. (N/m2)	Blk. Sup. (N/m2)	RC Sub. (N/kg)	RC Sup. (N/Kg)	Tiles (N/m2)	Mortar (N/m2)
1	2013- 2015	27,370.00	27,370.00	3,776.00	3,262.00	201.00	201.00	5,821.33	1,150,00
2	2011- 2012	27,168.00	27,168.00	3,776.00	3,262.00	201.00	201.00	5,821.33	1,150,00
3	2010	26,181.40	26,181.40	3,559.00	3,075.00	168.00	168.00	5,821.33	835.50
4	2009 (early)	26,181.40	26,181.40	3,559.00	3,075.00	206.50	206.50	5,821.33	835.50
5	2009 (late) – 2008	26,181.40	26,181.40	3,559.00	3,075.00	278.00	278.00	5,821.33	785.30

Source: Consol (2008, 2009, 2010, 2011 and 2013)
Note: firms' overheads and profit are not included in the rates

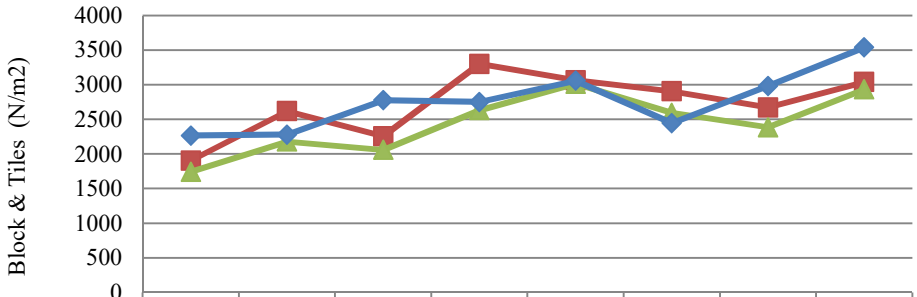
Cement and iron for reinforcement are key expensive ingredients for the production of concrete and reinforced concrete respectively. This is due to the high production and distribution cost of these key ingredients (Mac-Barango, 2012; Aiswarya et al., 2017). A great deal of industrial energy consumption is usually required to process them couple with the need to import more of these materials to compliment local demands thereby leading to increased cost. Fiakpa (2008) observed that local demand for cement can be sometimes so high that 60% of the study surveyed the country's construction demands are imported to meet the need.

This study inferred that only one of every four LOCOFs' unit rates are higher than the published rates; firms' bid unit rates are very low when compared to the published rates whose estimates are only based on material and labour, plant and equipment requirement of each item of work. This finding was affirmed by the decreasing bid unit rates of items of work over three to four years contrary to the steady increase observed in the CPI in the same period. It is expected that LOCOFs' bid unit rates should also increase as prices of goods and services increase as this is expected to influence the cost of construction material, labour, plant and equipment. This implies that most LOCOFs execute building construction project at a cost that barely caters to firms' overhead, profit and other essentials. This low bid unit rate is most likely due to the LOCOFs' low construction turnover, estimating incompetence, lowest bidders' selection criteria, harsh construction markets and unethical issues among others. Low bid price rates characteristic of construction firms' is sometimes due to opportunistic bidding behaviour as confirmed by numerous studies (Rooke et al., 2004; Tan et al., 2010; Ahmed et al., 2017; Gransberg, 2020).



	2007/08	2009	2010	2011	2012	2013	2014	2015
Conc. Sub(N)	17838	22700	21000	26584	25822	22813	25844	27583
Conc. Sup(N)	17928	23300	21250	26584	25822	22813	25969	27750

Fig. 1. LOCOFs' annual mean bid unit rates trend for concrete work (1:2:4) in substructure and superstructure

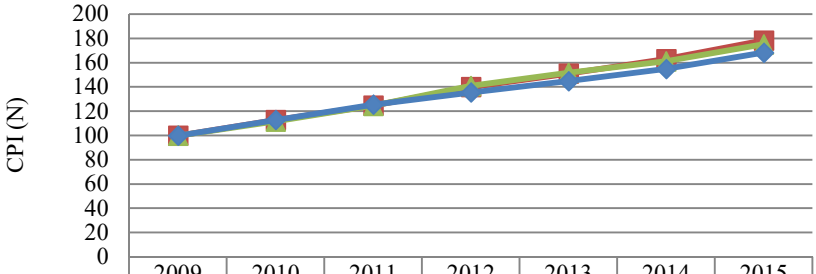


	2007/08	2009	2010	2011	2012	2013	2014	2015
Block Sub.(N)	1905	2620	2257	3300	3065	2907	2672	3040
Block Super(N)	1744	2180	2060	2634	3015	2593	2386	2933
Tiles Rate(N)	2265	2280	2776	2750	3058	2447	2982	3540

Fig. 2. LOCOFs' annual mean bid unit rates trend for 225 mm sandcrete block in substructure and superstructure and tiles

	2007/08	2009	2010	2011	2012	2013	2014	2015
RC. Sub.(N)	189	263	204	225	238	233	226	221
RC. Super.(N)	174	253	204	255	238	233	223	221
Mortar(N)	348	612	403	659	533	434	536	708

Fig. 3. LCFs' annual mean bid unit rates trend for iron reinforcement and mortar (1:4) for rendering



	2009	2010	2011	2012	2013	2014	2015
All items	100	112.8	124.7	140	151.1	163.1	178.4
All items less farm product	100	111.7	124.6	140.9	151.8	161.3	175.3
Miscellaneous goods & services	100	112.8	125.5	135.6	144.9	154.9	168.4

Fig. 4. Nigeria annual average consumer price index (CPI) trend for year 2009 to 2015

Tan et al. (2008) in a study of factors affecting contractor's competition strategy in Hong Kong observed that contractors may offer lower bid price than the other competitors and forgo their profit margin anticipating recovering the profit reduction with subsequent change orders or claims thereby cushioning the effect of the bid low price. A negative bids profit scenario was highlighted in a study by Tan et al. (2010) who observed that many bids submitted are often noted for astoundingly low-profit margin and may even not amount to the direct costs of projects. Unit rates of common items obtained from such construction competitive bidding will readily be lower than realistic professional estimates and may not necessarily reflect the effect of the prevailing CPI in the construction environment in such countries has observed in this study.

Low bid unit rates can adversely influence the desired cost, quality and time expectation of construction projects. Claims during the execution of construction contracts are most often used by firms to cushion the effect of loss of profit and losses arising from low bid prices. Ho and Liu (2004) concluded that contractors will lower their bids if they expect profits through claims. This conclusion was reached after applying the game theory in analysing the relationship between claims and bidding behaviour of contractors. This was supported by Rooke et al. (2004) who submitted that various proactive and reactive claims have been important sources of contractors' profit. Claims have significantly increased bided project contracts sums leading to significant cost and time overrun to clients sometimes with a grave consequence of project abandonment. 0.05% to 16 % increase in project contract sum was observed by El Nemr and Afifi (2018) in a study on missing BOQ items of work phenomenon in unit price contracts. Quality of construction work can also be adversely compromised due to low unit rates as LOCOFs might engage inferior technical specifications, personnel and work method resulting in shoddy construction works (Tan et al., 2010). This may also affirm reasons for the characteristic poor or low-quality building project construction work finishes delivery and high rates of construction operation failure of LOCOFs (Olatunji et al; 2000; Oladapo, 2007; Bala et al., 2009; Alabi, 2010; Ekanem et al.,2010; Tsado et al., 2019).

5. Conclusion and Recommendation

The study assessed LOCOFs construction financial performance in relation to firms' BOQ of building projects' contracts sums and common building construction items of work unit rates. LOCOFs BOQ contracts sums and common items of work were analysed and evaluated so as to obtain the level of a significant relationship between building projects 'contracts sums and bid rates of concrete (1:2:4), sandcrete block and iron reinforcements in building substructure and superstructure, mortar for rendering and tiling work. The result showed that 40.8% variance in building project contract sums can be significantly predicted from the common items of work bid unit rates used in this study; and most LOCOFs' unit rates are less than the published unit rates. In addition, LOCOFs' mean bid unit rates trend decreased over three to four consecutive years as against a steady increase observed in the CPI for all the years included in this study. The study concludes that LOCOFs construction financial performance is at a low ebb as they carry out their construction business operations with little or no appreciable margin for overhead and profit and thus are unlikely to have good quality construction output. A limitation of this study is the difficulty in getting larger items of work bid unit rates data due to ineffective information storage and retrieval system in developing countries, institutional administrative bottlenecks and the unwillingness of LOCOFs in releasing such sensitive financial information. This notwithstanding, results from this study readily gives an insight assessment of the building construction contracts bidding practices of the LOCOFs.

The study recommends a more effective tendering system that will encourage winning of contracts based solely on responsive and feasible bid unit rates of work items. This will go a long way in boosting the construction business financial performance of LOCOFs and hence better position them in meeting the rising challenge of infrastructural development in developing countries.

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