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Research Article

Bidding Trends of Contracts based on Types and Sizes of Projects under Road Divisions Butwal and Shivapur

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A B S T R A C T

The Purpose of the research is to analyze the existing bidding trends & relation between number of bidders, estimated amount with three types and three sizes of projects at Road Division Butwal and Shivapur.

Bidding data of four consecutive fiscal years starting from 072/73 of two Road Divisions were analyzed. Low bidding trend was identified in overall using average percentage below as threshold and analysis was also done using average number of bidders for competitive bids.

Research revealed that 34.58, 19.81 & 29.53 % below engineer's estimate in Butwal and 25.71, 26.67 & 23.50 % below were found in Shivapur Division respectively for general road works, structural works & maintenance works and also the threshold for low bids. Similarly, average number of bidders only 40%, 36% bids was found as competitive bids, whereas 60% & 53.44% bids were low bids respectively in Butwal and Shivapur Divisions.Likewise 24.17, 34.77 & 31 % below and 25.15, 24.72, 27.5% below were found for Size 1, Size 2, Size 3 of Butwal & Shivapur respectively. Maximum number of contracts was found at 20-35% below for both divisions. Significant effect of number of bidder is seen in low bidding.

Improvement in existing bid awarding system with extra qualification criteria should be focused by assigning weight in monitory term, asking method of statement and assurancefor project performances of project before implementation.

This research would be useful for those who are involving in policy making and governing agencies like Public Procurement Monitoring Office and for making necessary amendment in existing rules.

Keywords: Bidding Trend, Low Bidding, Competitive Bidding, Average Bidding, Best Value Method

Introduction

Infrastructure development, operation and maintenance of physical infrastructure is the basic criteria for the development of nation and national economy to prosper. Among the various infrastructures, main backbone for development is transportation infrastructure & electricity. Legal provisions are there in order to make procedures, processes and decisions relating to public procurement much more open, transparent, objective and reliable, obtain the maximum returns of public expenditures in an economical and rational manner by promoting competition, fairness, honesty accountability and reliability in public procurement processes and ensure good governance in an economical and rational manner *(Public Procurement Act, 2007). PPR (2007)* states that the bid estimated up to 20 milliondoes not require any qualification criteria bid estimated to be 20 million to 1 billion requires only National competitive bidding within National Bidders only and in single stage double envelope procedure whereas above 1 billion estimated cost should be in international competitive bidding.

Trend of low bid exists in all categories of works varying from gravel road works, maintenance project works to bituminous road works including structural components works but ranges to get bid in hand varies with respect to technicalities required and projects in hand of contractors *(Bista & Mishra, 2019).* Construction industry is trying to apply value management in Nepal for cost effectiveness as it has found adequate number of human resource with A class contractors *(Mishra, 2018)* though time extension is not an exception but norms of the industry *(Mishra et al., 2018)* which shows the poor performance of the industry based on Town Development funded projects of Nepal*(Mishra and Bhandari, 2018)* whereas Contractors are not gaining profit as per expectations though their business is profitable *(Mishra and Regmi, 2017).*

With promulgation of new constitution, country is going through three levels of government (Federal, Provincial and Local) with limited number of technical manpower in provincial and local level and more and more public infrastructure is to be constructed there in rapid manner especially in transport sector. Low bidding, Collusive and poor & ineffective public procurement practices are challenges. Public procurement it has to be used tactical for socio-economic development of the country. There is a lot to do to achieve a reasonable, transparent, non-corrupt and completely accomplished public procurement system *(ibid).*

Statement of Problem

Massive financial investments (30-50 % of National development budget annually) are made in road, bridges and transport projects and that contract price is inversely proportional to the financial risks involved. Public work of the project is generally awarded to lowest responsive bid. Low bidding creates financial problems to the contractor and its impact ison time, cost, quality and overall performance of the project, therefore it needs study on bidding trendsin practical way with project categorizations & modification on current public procurement system of the country to select the appropriate contractors for the execution of the development projects like road, bridges and maintenance related projects.

The category of the project should be separated with respect of type (category of works like general road works, structural works like bridges and culverts and maintenance of roads and bridges to make them serviceable and prolong their life) and basis of sizes of Project *(ibid)*. In Road Divisions, bidders bid differently in various categories of contracts according to the nature of works.Numerous researches have been conducted in this area without separating the bidding trends based on its type and size of works. Hence, it is necessary to study and analyze the bidding trend of such works along with its relations and possible conclusions for the betterment of result in future.

Research Objectives

The objective of this research is to find bidding trends of contract works in terms of Types (General Road Construction Works, Structural works like bridges and culvert construction works and maintenance works for road and bridges) and sizes (in terms of initial engineer's cost estimates) of works in roads/ bridges projects under road divisions and analyze the relation between numbers of bidder, lowest responsive bids, estimated amount with type and size of projects.

Literature Review

Bidding is a dynamic process. Several factors (i.e. nature of work contrasting the technicality and span coverage of project, bidding requirement, socio-economic conditions, rivalry, need for work, probability of winning, number of bidders, accuracy of estimate, amount of data & information available, etc.) influence a contractor's bid price. Contractor winning the contract through traditional bidding procedure generally raises dispute and trends to compensate the loss through claims, existing bidding procedure guarantees the lowest cost project but not necessarily the best and higher the number of bidders, higher will be the chance of low bidding & civil works having cost estimate up to two million can be awarded to the bidder having lowest bidding price*(Bista & Mishra, 2019).*

Public procurement is guided by Legal Act and Regulation. Public Procurement Act (PPA), 2007 and Public Procurement Regulation (PPR), 2007 are the governing act and regulation for the execution of contract administration by public sector

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in our country. On the basis of PPA (2007) and PPR (2007), Public Procurement Monitoring Office (PPMO) has prepared the standard bidding documents which are followed by public sector for the executing of the construction project in public sector. Similarly, the guidelines for the execution of different donor funded projects are also prepared on the basis of the procurement system of PPMO which is based the provisions of *PPA (2007)* and *PPR (2007).* According to the provisions of PPA (2007) and its regulation, the successful bidder in National Competitive Bidding (NCB) is the one which is substantially evaluated with lowest bid price *(PPA 2063, PPA 2064 8th Revision).*

Nepalese Construction Industry contributed around 10 to 11 percentages to GDP and it uses around 35 percent of government budget *(FCAN, 2018)*. It is estimated that this sector is creating employment opportunities to about one million people so it generate employment next to agricultural sector in the country. Similarly about 60 percentages of the nation's development budget is spent through the use of contractors *(FCAN, 2018).* Low bidding forces contractors to continuously lower the costs by adopting cost saving technological and managerial innovations. These savings are then passed to the owner through the competitive process *(ibid).*

Ioannou & Awwad, (2010), states that competitive low bid method is favored for saving a considerable amount of money and minimizing the level of favoritism and corruption and by the application of such method, found negative impact on contractor's profit, disputes/ claims, coordination, quality control, project cost and duration. Other alternative bidding procedures such as the weighted multi-criteria selection methods of contractor, competitive bidding method awarding contracts to the lowest bidder which is within some predefined range of engineer's estimate and competitive average-price based bidding included in the study are the suggestions of *Bista et al. (2018),* to avoid low bidding.

Lack of healthy competition i.e. low bidding in contracting is affecting contractors negatively in their financial capacity along with poor performance of contractors and projects. Contractors can suffer severely under price fluctuation and high interest rates if payments are delayed. Owners should be committed to effect payments timely (*Regmi & Mishra, 2017).*

The professional who are aware of Value Management understand that the practice of economic analysis done in the feasibility study of a project as Value Management. The reasons for not implementing VM in the construction field are ranked series with the common Relative Hindrance Factor (RHI) from client and consultants, Lack of trained professionals in VM, lack of knowledge & practice in VM. The clients have given more focus on lack of guidelines while the consultants have focus on lack of trained professional on VM *(Mishra, 2018).*

Bista et al., (2018), states that tendency of contractors to bid lowering the bid price is high in road construction projects and found that such tendency is even higher in the case of new construction type road projects in comparison to other types like rehabilitation, maintenance etc. Most of the contractors bid with the bidding price 25 % - 40 % low with respect to engineer's estimate and try to manage their overhead and profit with price escalation, variation and claims. They have also tendency to extend contract period with some justification in order to achieve more price adjustments. According to *Kadariya (2011)*, contractors generally feel that 5%-15% lower amount than the original engineer's estimate is normal range for bidding to obtain nominal profit in building projects and below that range bid is considered as a low bid.

According to *Bhatta (2014),* there is no any uniformity in the definition of low bids and Abnormally Low Bids (ALBs). In India, the bid is considered low bid that vary from the estimated rates by more than 25 %, even after updating the scheduled rates to match the prevailing cost index. In Taiwan, the total Bid Price less than 80% of the estimate is considered an ALB. According to National legislation of United Kingdom low tender abnormally is the one which deviates by 10% - 15% from the average price tendered. Luxembourg law defines a low bid in terms of a price which leaves no margin for a normal level of profit. A law adopted in Lithuania in 2009 provides that a tender is abnormally low either if it is 15% or more lower than the average of the other tendered prices, or if it is 30% or more lower than the authority's original estimate. According to European Commission's Europa report, a tender is assumed to be abnormally low if: it is not providing a margin for a normal level of profit; and the bidder cannot explain its price on the basis of the economy of the construction method, or the technical solution chosen, or the exceptionally favorable conditions available to the bidder, or the originality of the work proposed. According to a research conducted by *Disti (2011)*, a tender having bid price lower than 60% to the engineer's estimate is considered as an ALB or ALT and *Bhattarai (2015)* concluded regarding low bidding as result showed that trend of low bidding was higher. The frequency of bid ranging 30 % to 50 % low with respect to engineer's estimate was the higher.

Methodology

This wasan Analytical (quantitative inferential approach) research to look up and to be decided on trends nowadays on the bidding process for public procurement. The methodological framework adopted in the course of the study was review of secondary information sources/ data of respective road division offices (road division Butwal &

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Shivapur) for consecutive four fiscal years (072-73 to 075-76 contracting record books) and were analyzed through statistical analysis tools and results were presented through various tables and figures in order to get information about bidding trends.

Study Area & Population

Various accomplished projects, ongoing projects whose procurement has completed already under Road Division Butwal, Rupandehi and Road Division Shivapur, Kapilvastuon consecutive four fiscal years like F/Y 072/73, F/Y 073/74, F/Y 074/75and F/Y 075/76 wereconsidered for this research study.

Sampling and Data Collection

Statistical inquiry can either be a census type or a sample type. This research study included all population secondary data of the study area for better analysis and better results for setout objectives. In overall 769 completed contract data (526 contract data from road division Butwal & 243 contract data from road division Shivapur) which has been completed procurement/ bidding award phase successfully. The major inputs extracted were the Engineers' Estimate, Bid prices, number of bids submitted with categorization of hard copy bidding and e-bidding and was analyzed and conclusions are made.

To analyze bidding trend, researcher first categorize the project contract works in various categories, the first category is according to types of projects and second categorization is according to sizes as listed below:

(a) Categorization with TYPES

- Type A (General Road works): This includes all General road works varying from earthen road works, Drain construction, base, Sub-base works and all bituminous works.
- Type B (Structural Works): This includes all structural construction works of bridge construction works, culvert construction works which is geographically concentrated works but needs highly technical expertise.
- Type C (Maintenance Works): This include all types of road/ bridge maintenance works like recurrent maintenance to periodic maintenance works.

(b) Categorization with SIZES

- Size 1: Projects having engineers' estimated cost less than 2 million with VAT & contingencies.
- Size 2: Projects having estimated cost equal or more than 2 million and less than 20 million with VAT & contingencies.
- Size 3: Projects having estimated cost equal or more than 20 million and less than 1 billion with VAT & contingencies.

Data Analysis and Presentation of Data

After the data collection, the data was categorized on the basis of the type or categorization of procurement/ contracting works to general road construction works, structural works like bridges and culvert construction works and road and bridges maintenance works. The projects were also categorized in terms of project size/ estimated amount. Then, Minimum Bid Ratios (AEr): AEr = were calculated. Using statistical method for calculating the average percentage below estimate and average number of bidders per project, there was distinction between normal and low bid and also competitive and non-competitive bid taking as the average value a distinction value. Like more than average percentage below was taken as low bid and bidders less than average number per project was said to be non-competitive bid.For the Co-relation between number of bidders and lowest responsive cost/ final bidding cost (% below Engineer's Estimate, researcher carried out the Karl Pearson's correlation between the number of bidder and % below Engineer's Estimate. This correlation was carried out according to type of the project and size of projects according to public entity. As DOR carry out mainly Road and bridges project, the combination of RD Butwal and Shivapurwere presented in atables and graphs.

Result and Discussions

Data were analyzed to explore bidding trends and its consequences in low bidding-Norman bidding, Competitive-Noncompetitive bidding and co-relation between numbers of bidders to percentage below engineers' estimate.

Bidding Trends

Categorical bidding trend areassessed on the basis of ranges of percentage below engineers' estimate and % of number of bidders. Data of fiscal year 2072/73, 2073/74, 2074/75 & 2075/76 of both divisions Butwal and Shivapur were used for analysis.

Average Percentage below Engineers' Estimate

According to the methodology set-out, calculation of average percentage of bidding amount was done assuming the mid value, A is 15% (percentage below engineer's estimate) and for the calculation of average percentage of bidding amount using data of fiscal year 2073/74 of RDButwal are taken for the analysis. All eight (8) fiscal years individual data were analyzed and presented in graphical & tabular form.

Up on analysis of contracts of fiscal year 2073/74 of Butwal division, average percentage of bidding amount is found to be (100%-18.20%) 81.80%. Among 315 contracts, 147 bids (i.e.46.67%) in respective contracts are normal bids and 168 bids (i.e. 53.33%) in respective contracts are low bids. Similarly, average number of bidder is found to be 3.31 per

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project. Among 315 contracts of fiscal year 2073/74, 133 bids (i.e.42.22%) in respective contracts are Competitive bids and 182 bids (i.e. 57.88 %) in respective contracts are non-competitive bids.

It is seen that there is low bidding more rather than normal bidding and based on the average number of bidders per project is the barrier line for determining competitive bid and non-competitive bid, there is more projects sound to be non-competitive bid which supports the fact that there is more collusive bidding as well.

Comparison of Bidding Trend of Butwal Division

Comparison of bidding trends of Butwaldivison from FY 072/73-075/76 on the basis of normal, low, competitive bids & non-competitive bids was discussed and results are presented below.

From the calculation of table and figure 1, average percentage of bidding amount is found to be high lowest in fiscal year 075/76 i.e. (100%-60%) 40%. In FY 074/75 there is more percentage of Normal bids 51.72% than that of Low bids are in range 48.72% of Butwal division which is same as desirable by the researcher. And competition is found to be highest in fiscal year 075/76 which helps to conclude us that where there is more competition there is chance of low bidding. Collusive bids are found to be highest in fiscal year 073/74 where maximum number of contracts are awarded and all bidders would have sufficient works to take and they might agree to make bids collusive and it is also found that in fiscal year 072/73 and 074/75 there were no collusive bids and at that period only less number of bids were awarded and hence competition among bidders are increased.

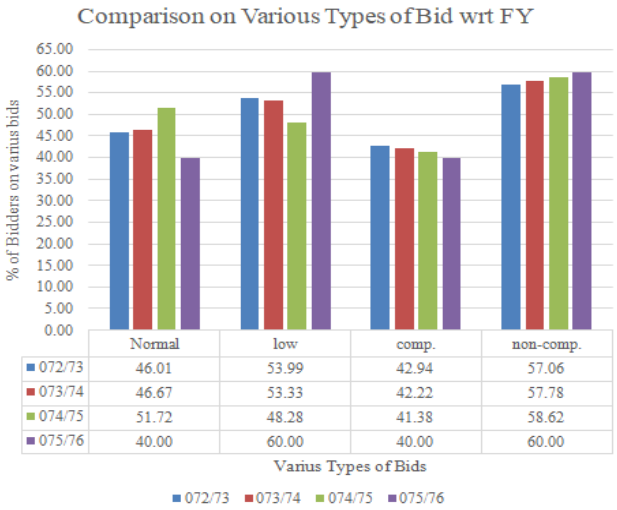

Figure 1.Comparison of Bidding Trend with respect to 4 FY ofButwal Division

So it can be stated on comparison low bids occurred more there than in Butwal division whose causes might be less number of contracts there and hence competition among contractors for obtaining work results more low bidding.

Comparison of Bidding Trends of Both Divisions

Considering overall contracts in Butwal division up to 67% below than engineers estimate is found and in Shivapur division up to 63 % below than engineers estimate is found and in Butwal division FY 074/75 in an average 28.53 % below than engineers estimate and in Shivapur division FY 073/74 has in an average 23.72 % below than engineers estimate is found.

From the calculation of table 1, average percentage of bidding amount is found to be high lowest in fiscal year 075/76 i.e. (100%-60%) 40%. And competition are found to be highest in at that fiscal year too which help to conclude us that where there is more competition there is chance of low bidding. Similarly in Shivapur division average percentage of bidding amount is found to be high lowest in fiscal year 073/74 i.e. (100%-53.44%) 46.56%.

According to Bista & Mishra, 2019, for Nepalgunj and Mahendranagar road divisions, in three fiscal year of DRO, Nepalgunj the percentage of normal bid and low bid can be stated as follows. In an average of three fiscal year 38 % bids were normal and other 62% bids were low bids.

Table 1, reveals that in Butwal division 60% low bids were found in FY 075/76 where only few contracts were awarded that year and hence more number of bidders compete to get works in hand, similarly in Shivapur division normal and low bids are found almost equal but number of bidders per project in this division found to be high. Likewise non-competitive bids are also increasing which suggests contractor's wants to make bids collusive as much as possible and introduction of e-bidding system would help to reduce the bid rigging/ cartellings.

Table 1.Various types of bids comparison

Various types of bids comparison				
	Butwal division			
FY	Normal (%)	Low (%)	Comp. (%)	Non-comp. (%)
072/73	46.01	53.99	42.94	57.06
073/74	46.67	53.33	42.22	57.78
074/75	51.72	48.28	41.38	58.62
075/76	40.00	60.00	40.00	60.00
	Shivapur division			
072/73	52.00	48.00	36.00	64.00
073/74	46.56	53.44	46.56	53.44
074/75	52.94	47.06	44.12	55.88
075/76	57.14	42.86	46.43	53.57

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Comparison between % no. of Bidders and % age Below Engineer's Estimate

Table 2.Relation between % no. of Bidders and % age Below Estimate of both division

Various types of Bid Comparison													
Butwal division													
	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70
FY 072/73	33.8	3.1	2.5	7.4	11.7	11.7	11.1	12.9	3.1	1.3	0.7	0	2	0
FY 073/74	31.5	2.9	6.4	8.6	14.3	15.6	14.3	3.9	2.3	0	0	0.4	0	0.4
FY 074/75	0	0	0	24.2	10.4	31.1	6.9	17.3	3.5	6.9	0	0	0	0
FY 075/76	16.4	5.5	3.7	11	9.1	11	18.2	20	5.5	0	0	0	0	0
Shivapur division														
	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70
FY 072/73	38	2	4	10	14	8	8	8	6	0	0	2	0	0
FY 073/74	23.7	4.6	1.6	11.5	9.2	9.2	13.8	8.4	10.7	3.9	3.1	0.8	0	0
FY 074/75	14.8	0	14.8	23.6	11.8	17.7	5.9	3	0	3	5.9	0	0	0
FY 075/76	17.9	0	14.3	25	7.2	14.3	7.2	3.6	0	3.6	7.2	0	0	0

It is found from above table 2, that the maximum (31.1%) contractors bid at 25-30 % below in fiscal year 074/75 and in fiscal year 073/74 the bid with 65-70% below was also awarded. In overall it can be concluded that maximum bidders wants to take their bids at about 15-30% below than the engineer's estimate in Butwal Division and maximum (25.00%) contractors bid at 15-20 % below in fiscal year 075/76 and in overall we can conclude that maximum bidders wants to take their bids at about 15-30% below than the engineer's estimate in Shivapur Division. Which is the average percentage below of all contracts seen in division which helped to say that contractor themselves try to get works at low percentage but with competition they were forced to make bids low.

From table 2, it is found that average % below that of Butwal division is higher and in terms of bidder number average number is higher in Shivapur division. The reason in this case might be in Butwal division project award number is highest more number of project leads to lesser average number of bidder per project but competition to get contract seems same in both divisions. In an average above 20% below tender only gets the contract in hand.

Table 3.Type of work, average percentage below engineers' estimate

Work Type	DRO, Butwal				
	y	Normal bid		Low bid	
	%	No.	%	No.	%
A	17.56	116	45.85	137	54.15
B	13.21	17	48.57	18	51.43
C	29.23	11	42.31	16	61.54
	Avg. No. of bid	Comp. Bid		Non comp. Bid	
A	3.15	102	40.32	151	59.68
B	3.40	15	42.86	20	57.14
C	4.70	14	42.86	13	57.14

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Bidding Trends with Categorizations (Type & Size)

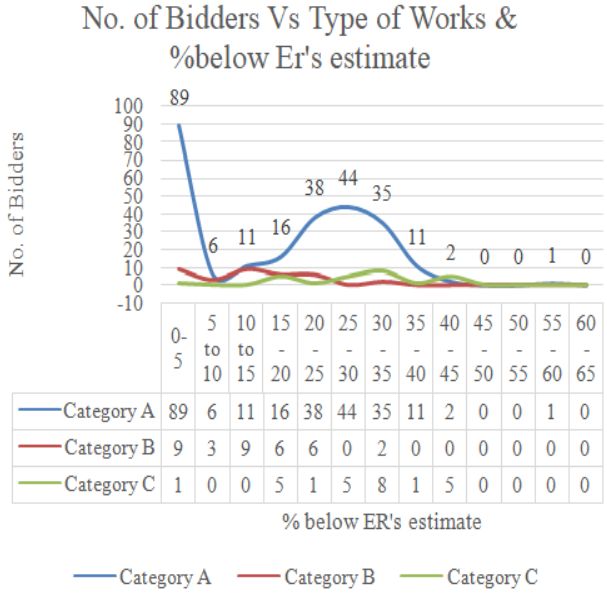
- **Bidding Trend with Type**

Based on the category Type of work, average percentage below engineers' estimate are calculated using bidding data of fiscal year 2073/74 for Butwal division is presented in table 2 below.

Table 3, reveals that, C category works i.e. 61.54% are suffering from low bid while competition is also seen more at C type category of works i.e. Road and bridge maintenance works. It can be stated that average percentage below engineers' estimate in B category work is found to be less low bid, where more technical expertise is required.Based on the category Type of work, percentage below engineers' estimate and no. of bidders are worked out using bidding data of fiscal year 2073/74.

No. of Bidders vs Type of Works & % below Er's Estimate

In FY 073/74 of Butwal division apart from bids collusive range among 315 completed contract that year maximum number of contracts i.e. 44 falls under bidding range 25-30% below engineer's estimate which is much higher than the average bidding range i.e.18.20% below as stated above and the contracts 37.20% falls under the bidding range 20%-35% of type A which almost suggests that if bidder wants to get contracts in hand he should bid in the range 20-35% which is ultimately low bid.



	0-5	5 to 10	10 to 15	15 - 20	20 - 25	25 - 30	30 - 35	35 - 40	40 - 45	45 - 50	50 - 55	55 - 60	60 - 65
Category A	89	6	11	16	38	44	35	11	2	0	0	1	0
Category B	9	3	9	6	6	0	2	0	0	0	0	0	0
Category C	1	0	0	5	1	5	8	1	5	0	0	0	0

Figure 2.Categorical Distribution of Contracts (DRO, Butwal FY 073/74)

In A category work maximum number of contracts occurred in 25-30% below engineers' estimate (other than collusive ranges). Similarly for B category work maximum numbers of contracts are occurred in between 10-20% below Er's estimate, likewise for C category work maximum numbers of contracts are occurred in between 25-35% below engineers' estimate.

Comparison of Relation between No. of Bidders and % age Below Engineer's Estimate with Types of Projects

From the above comparison table it can be stated that in Butwal division there is consistent relation between no. of bidders and % age below the engineers estimate than that of Shivapur division and in general also we can see the positive and directly proportional relation between the no. of bidders and % below that of engineers estimate. It can also be seen that in type A projects there are more concentration of bidders than that of Type B & type C projects in both divisions. The number of bidders are seen (in category A of FY 075/76 of Shivapur division up to 11.57 bidders per project and 25.71 % below in that case) more in Shivapur division than in Butwal division likely due to less number of contracts awarded there and contractors are forced to bid more competitively to get work in hand.

In Nepalese context Danish method couldn't be applied as DM needs minimum eight numbers of bidders. However best value procurement method could be used to overcome the issues of low bidding and other project performances. To make the effect of collusive bidding less, e-bidding can be promoted and bid awarding method as well towards either average bid method or best value procurement method.

- **Bidding Trend with Size**

Based on the category Size of work, average percentage below engineers' estimate are calculated using bidding data of fiscal year 2073/74 for Butwal division is presented in Table 2,F below.

Analysis of bidding data under Three (3) work Size category are done. Data taken from fiscal year 2073/74 of Road Division Butwal. Among 315 bidding data (contracts), 148 under size 1 category, 116 under size 2 category and 51 under size 3categories.

Table 5, reveals that, second size 2 category works are suffering from low bid while competition is also seen more at second size 2 category of works i.e. Engineer's estimated cost with VAT is equal or more than 20 lakhs to less than 2 crore. It can be stated that average percentage below engineers' estimate in third size 3 category work is found to be less low bid, where more analysis, capital and technical expertise is required.

Based on the category Size of work, percentage below engineers' estimate and no. of bidders were worked out using bidding data of fiscal year 2073/74 for Butwal division is presented in Table 3, below.

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Table 4.Comparison of relation between number of bidders and %age below engineer's estimate with types of projects

Div.	Fiscal years	Type of projects	% below	Avg. Bidders	Div.	Fiscal years	Type of projects	% below	Avg. Bidders
Butwal	072/73	A	18.19	4.25	Shivapur	072/73	A	17.81	5.56
		B	19.81	6.23			B	11.25	4.5
		C	27.69	5.3			C	20.36	5.29
	073/74	A	17.56	3.15		073/74	A	23.61	4.79
		B	13.21	3.4			B	26.67	8.14
		C	29.23	4.7			C	23.5	6.4
	074/75	A	34.58	8.45		074/75	A	24.69	4.6
		B	-	-			B	25	7
		C	24.26	5.24			C	17.5	3.88
	075/76	A	29.17	6.41		075/76	A	25.71	11.57
		B	-	-			B	-	-
		C	18.93	4.5			C	16.69	9.14

Table 5.Size of work, average percentage below engineers' estimate

Work Size	DRO, Shivapur				
	y	Normal bid		Low bid	
	%	No.	%	No.	%
1	14.54	76	51.35	72	48.65
2	23.92	44	37.93	72	62.07
3	14.75	27	52.94	24	47.06
	Avg. No. of bid	**Comp. Bid**		**Not comp. Bid**	
1	2.99	101	68.24	47	31.76
2	3.67	62.00	53.45	54.00	46.55
3	3.43	25.00	49.02	26.00	50.98

In Size 1 category work maximum number of contracts are occurred in between 15-25% (beyond collusive bidding limit i.e. 0%-5%) below engineers' estimate. Similarly for Size 2 category work maximum numbers of contracts are occurred in between 25-35% below engineers' estimate, likewise for Size 3 category work maximum numbers of contracts are occurred in between 10-20% below engineers' estimate.

Hence it is found that according to type of works maximum below is found in maintenance works which includes simple equipment and simple type of works like patch works, pot hole repairs, drain repairs etc.

And also it is found that according to Size of works maximum below is found in Size category 2 works which includes more than or equal to 20 lakhs to less than 2 crore of engineer's estimate where more number of contracts occurred and also there are more number of contractors who are eligible to bid.

Comparison of Relation between No. of Bidders and %age Below Engineer's Estimate with Sizes of Projects

From the comparison Table 4, it can be said that in both divisions there are consistent relation between no. of bidders and % age below the engineers estimate and in general also we can see the positive and directly proportional relation between the no. of bidders and % below that of engineers estimate. It can also be seen that in Size 1 projects are very less amount projects and the intention of bidders were on higher. So that less number of bidders bid in such projects but size 2 projects were awarded in high numbers in divisions and these projects are middle size projects with similar nature and less expertise requires and hence more bidders were concentrated in such projects and again it can be seen that Size 3 projects were more technical expertise demanded projects and for this technical as well as financial resources required the most . So that size 3 projects were bid by only few bidders. But in FY 075/76 of both divisions

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there are very few projects like size 3 and more bidders were seen to compete and result of that reason % age below for this year was also found high.

Table 6.Categorical Distribution Size of Contracts (RD, Butwal FY 073/74)

No of contracts (frequency)			
% below estimate	**Size 1**	**Size 2**	**Size 3**
0-5	68	18	13
5- 10	4	1	4
10- 15	4	5	11
15-20	14	6	7
20-25	17	19	9
25-30	21	27	1
30-35	11	29	5
35-40	3	8	1
40-45	5	2	0
45-50	0	0	0
50-55	0	0	0
55-60	0	1	0
60-65	0	0	0

to reduce effect of low bidding and better contract performances of project.

Conclusion

Bidding trends analysis of road divisions show that there were up to 67% below bidding cost projects and after calculating average no. of bidders and average percentage below engineer's estimate majority of bids are found to be lob bids whereas competitive versus non-competitive bids are found almost equal which shows that there are collusive bidding practices. On study most percentage of bidders are concentrated to bid about 20-35% below engineers estimate for getting work in hand. The previous study of Nepalgunj and Mahendranagar road division were also found same as that of bidding trend found in this study. This study suggested that variation of low bidding with the types of project, category C projects are found to be low bidding and during informationcollection the respondents said lower bid to be in category A projects. Possible reason for that is during actual data the maintenance projects were small sized and in such projects local contractors competes for their resources consumption and easy supervision leads maximum low bids. Project category with estimated costs were found to be low bid in size 2 projects, these are the

Table 7.Comparison of relation between no. of bidders and %age below engineer's estimate with Sizes of projects

Division	Fiscal years	Type of projects	% below	Avg. Bidders	Divisions	Fiscal years	Type of projects	% below	Avg. Bidders
Butwal	072/73	1	10.19	3.05	Shivpur	072/73	1	17.25	5.4
		2	32.41	6.75			2	21	5.4
		3	24.4	6.24			3	-	-
	073/74	1	14.54	2.99		073/74	1	24.13	5.16
		2	23.92	3.67			2	24.22	5.48
		3	14.75	3.43			3	14.5	4.6
	074/75	1	24.17	5.13		074/75	1	16.5	3.2
		2	34.77	8.64			2	25.15	5.75
		3	27.5	8.33			3	18.93	3
	075/76	1	12.5	3.8		075/76	1	16.67	8
		2	27.33	4.33			2	22	10.7
		3	31	11.2			3	27.5	14

Low bidding might save some economy of public entity initially but its negative effects on Time, Quality, Cost and performances of contract & also severely effects on development and service to pubic. Hence by introducing appropriate bid awarding system like average bid method, best value method or by introducing effective implementation method on current system like requesting method of statement of works, rate analysis would helped projects with maximum number of awarding National Competitive Bidding projects with no technical qualification needed, hence contractors compete in these types of projects more and more and resulting more low bids.

Recommendation

It should be asked the contractors who take project with low bidding for the method of statement, work schedule and

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clarification for low bidding; this might help for the effective implementation of contract project. Method of statement from contractor can also help the rate negotiation/ variation conflict to be resolved. Extra qualification criteria should be provisioned by assigning weight in monitory term along with extra performance bond with respect to the ranges of percentage below engineers' estimate through amendment of PPA (2007) and PPR (2007).

Recommendations for Further Studies

- Study on effects of low bidding on quality in comparison to normal bid.
- Study on factors contributing to low bidding trend other than number of bidders, types of projects and Sizes of projects.
- Study on suitability of Best Value Method, Average Bid Method.
- Enhanced revision study of Norms and rate analysis of Department of Roads.

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References

1. Asian Development Bank. ADB Procurement Guidelines for Evaluation and Comparison of Bids. 2013. ISBN 978-92-9254-138-5.
2. Bhatta I. Issues Related to Selection of Contractors in Public Construction Procurement. *Rural Infrastructure* 2014; 5(5): 184-189.
3. Bista DB, Mishra AK. Bidding Trend and its Effects in Implementation on Road Projects of Division Road Offices of Department of Roads, Nepal. *Int J Adv Res Civil Stru Engr* 2019; 2(1): 1-9.
4. Disti RK. Review of Bidding Trend in Construction Tenders for the purpose of amendment in Public Procurement Legislation of Nepal. 2011. Available at www.ppmo.gov.np. Accessed date Junuary 10, 2014.
5. FCAN. Federation of Contractor's Associations of Nepal (FCAN). 2012. [Online] available athttp://nepalconstructions.com/challenges-and-prospects-of-nepalese-construction-industry/
6. GoN, The Public Procurement Act first ammendment, 2063. Kathmandu: Law Books Management Board of Nepal. 2007; 2073 B.S.
7. GoN, Eighth Amendment of Public Procurement Regulation, 2076. Kathmandu. 2019; 2076B.S.
8. Huan M. Factors Affecting the Bid/ No Bid Decision Making Process of Small To Medium Size Contractors in Auckland. Unitech, New Zealand. 2011.
9. Ioannou PG, Awwad RE. Below-Average Bidding Method. *Construction Engineering and Management* 2010; 136(9): 143-148.
10. Mishra AK, Bhandari S, Jha T. Factors Affecting Performance and Time Extension of ongoing Construction Projects under Town Development Fund, Nepal. *J Adv Res Const Urban Arch* 2018; 3(4).
11. Mishra AK, Bhandari S. Performance Assessment of Ongoing Construction Projects under Town Development Fund, Nepal. *Int J Adv Res Civil Stru Engr* 2018; 1(1&2).
12. Mishra AK, Regmi U. Effects of Price Fluctuation on the Financial Capacity of "Class A" Contractors. *International Journal of Creative Research Thoughts* 2017; 5 (4): 1920-1937.
13. Mishra AK. Assessment of Human Resource Capacity of Construction Companies in Nepal. *J Adv Res Jour Mass Comm* 2018; 5(4).
14. Mishra AK. Implementation Status of Value Management in Project Management Practice in Nepal. *International Journal of Management Studies* 2019; 6(1).
15. Singha Bahadur Bista and Khet Raj Dahal. "Assessment of Low Bidding In Bridge Construction With Special Reference To Nepal. *International Journal of Research-Granthaalayah* 2018; 6(10): 71-80. https://doi.org/10.5281/zenodo.1475391.

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