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## Contracts Trends In Different Categories Of Projects Under Bharatpur Road Division

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<sup>1</sup> Engineer and Director, Tarapunja Engineering and Research P.Ltd. Morang, Nepal<sup>2</sup> Research Professor, Srinivas University, India and Research Director, Madan Bhandari Memorial Academy Nepal, Uurlabari – 3, mail: anjaymishra2000@gmail.com, Morang, Nepal**ABSTRACT**

Bidding trend in different categories of work in Division Road Office, Bharatpur are different. The main purpose of the research is to analyze the existing bidding trends along with the consequences of procurement at Division Road Office Bharatpur, Chitwan. Contracts were administered in Chitwan and Dhading districts.

Bidding data of Division Road Office Bharatpur of four consecutive years starting from 2073/074 to 2076/077 were analyzed. Also the journal articles, research papers, books, internet searching were done. Low bidding trend was identified using average percentage below engineers' estimate as threshold and analysis was also done using average number of bidders for competitive bids.

The study revealed that, "A" category works ( Road Construction) i.e. 52.94% are suffering from low bid, "B" category works (Bridge and Structure Construction) i.e. 46.15% are suffering from low bid where as "C" category works (Maintenance ) i.e. 25% are suffering from low bid based on percentage below engineers' estimate.

**Keywords:** Road Construction, Bridge and Structure Construction, Maintenance, Low bidding

**1. INTRODUCTION****1.1. Background**

E-Government Procurement (e-GP) system is defined as the use of information technology system by governments in conducting their procurement relationships with suppliers and contractors for the procurement of works, goods, consulting services and other services required by the public sector. For many governments around the world such as Argentina, Australia, Albania, Bangladesh, Brazil, Chili, Finland, Hong Kong, India, Italy, Mexico, Norway, Romania, Singapore, South Korea, Philippines, Indonesia and Nepal. There is a single e-government portal for all the procurement of Nepal government called Public Procurement Monitoring Office (PPMO), e-GP I/II (Bista & Mishra, 2019, Mishra and Singh, 2019 and Mishra, 2019).

In present context, since our Country is going through three levels of government (Federal, Provincial and Local government with limited number of technical manpower), poor, collusive and ineffective public procurement practices in Nepal are challenges, not only for country but for the government of the region as a whole. Public procurement should be able to ensure the value for money and it should be fully transparent, people oriented and effective. Since, Public procurement is an essential part of the public financial management system so it has to be tactically for socio-economic development of the country. There is a lot to do here is a lot to do to achieve a reasonable, transparent, non-corrupt and completely accomplished public procurement system (Bista and Mishra 2019)/(Mishra and Singh, 2019).

Development and maintenance of physical infrastructures is a key to rapid economic growth and poverty reduction (Bahadur, K.C.M, & Mishra, A.K. (2019)). Production costs, employment generation, access to market, investment plan etc. depends mostly upon the quality of existing infrastructures; especially transport facilities. Road transport is the most widely used means of transportation in Nepal, compared to other mode of transportation. Being a landlocked and a mountainous country, the limitations are imposed by the nature itself on the scope and development of other modes of transport systems (Bahadur, K.C.M, Mishra, A.K., & Karki R., 2020). Among the various transport systems (air transport, water transport, land transport etc.), road transport have wide geographical coverage, large influential area, low capital investment, door to door service,



higher flexibility, quick and assured deliveries, high employment potential, personalized travel and service, economy and safety. So, the government of Nepal investing millions of rupees every year in road sector to improve the transportation facilities of the country (DoR, 2012; DoR,2004, DoR,1995).

The construction of physical infrastructures, their rehabilitation and maintenance has become an important aspect of national economy. It has an enormous impact on everyday lives because its ultimate goal is to satisfy public interest by creating physical and socio-economic infrastructure (Mishra and Singh, 2019). For the development and maintenance of infrastructures, an economic, efficient, effective, fair and transparent public procurement system is necessary and there should be a capable, self-sustained, well managed and sustainable construction industry. The construction sector is a gradually growing industry in Nepal (Mishra et al.,2020).

The construction industry and its clients are widely associated with Bid and Procurement issues in the construction industry. These issues are different depending upon nature of construction business activities, processes, environment and organization. Bid and Procurement is a substantial and integral element of construction project management. It has been the issue of attention in the construction world. Due to time and cost overruns associated with construction projects, so many projects fail to accomplish their targets and objectives. Unmanaged or unmitigated bidding and procurement procedures are one of the fundamental causes of these overruns (ADB,2013).

### 1.2. Statement of the Problem

The major factors for making bidding decision by bidders includes internal(specialization, experience, resources, capabilities, etc.), external ( project type, number of bidders, bidding risk, cash flow requirements, bid related factors etc.) and environmental factors(social and economic condition, include availability of other projects, availability of qualified labor, availability of qualified manpower, availability of qualified subcontractor, availability of equipment).These three factors interactively affect the strategic decisions of competitive bidding in construction industry (Carr,P.G.,2005). This study is a part of ongoing research with a view to verify the existing theory and overcome the global problem of bidding for rapid infrastructure development with case of local projects located within Chitwan and Dhading Districts of Nepal.

### 1.3. Research Objectives

To analyze the bidding trend of contracts in different categories of road/bridge projects under Bharatpur Road Division.

## 2. 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. The contractor's bidding price affects contract award cost, which is the difference between the engineer's estimate and the bidding price calculated as the percentage increase/decrease from the engineer's estimate. Some factors affecting the construction cost are contract award cost, project characteristics, project delivery methods, contract types, incomplete drawings, inaccurate estimates, design consultants fares and so on. Contract award cost occurs during the procurement/end of bidding phase (Bista and Mishra 2019).

### 2.1. Trends of Bidding

There is no any uniformity in the definition of low bids and abnormally low bids ((Mishra et al., 2020). 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 Abnormally Low Bid (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 bids 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 normal level of profit; and the bidder cannot explain its price on the basis of the economy of construction method, or technical solution chosen, or the exceptionally favourable condition available to the bidder, or the originality of the work proposed.

In Nepal to achieve the goals from the administrative point of view, roads are classified as Strategic Road Network (SRN) roads consisting of National Highways and Feeder Roads and Local Road Network (LRN) roads consisting of District Roads and Urban Roads . SRN comes within the responsibility of the Department of Roads (DoR) and LRN by Department of Local Infrastructure Development and Agricultural Roads (DoLIDAR) (DoR, 2013). At present, the length of SRN including under construction and planned is 14,488 km. Only 50% SRN is paved (SSRN, 2013/14 as cited in Giree, 2015). The SRN comprises 21 National Highways and 208 Feeder roads which are mentioned in the Lists of SRN updated in May, 2012. Similarly by the end of fiscal year 2012/13 the length of LRN is 50,944 km out of which 16,200 km roads are motorable (NPC, 2013 as cited in Giree, 2015). Considering SRN roads influenced population is 2130.70 No./km and road density is 8.49km/100 square km (DoR,2012, DoR,2013).

Within the Department of Roads(DoR) there are 33 Division Road Offices (DRO) which are established for the major objective to maintain the strategic roads. Majority of the DRO construction and maintenance projects invites the open competitive bids at national level without qualification criteria (work valuing up to NRs. 20 million). Most of these contracts are undergoing time and cost overrun. Also, some construction projects are still incomplete.

The study was descriptive as well as quantitative. Descriptive research study is the basis of describing the characteristics of a particular data by using statistical approach (frequencies, average, mean, correlation coefficients, and trend). On the other hand, quantitative research study determines whether variables under the study are associated or not.

## 2.2. Methods of Public Procurement Practice in Nepal

Procurement of works deals with a systematic approach for tendering and awarding of contracts for construction projects. The clear procedure for bidding and award of contracts assists the employers and engineers to receive sound competitive bid in accordance with the bidding documents so that they can be quickly and efficiently assessed. PPA (2007) and PPR (2007) describe in detail the procurement process of the Government of Nepal.

Table 2.1 Method of Public Procurement in GoN

S.N.	Procurement Method	Contract Size in Nepalese Rupees	Contractor	Recommended Standard Bidding Document (SBD)
1	Sealed Bidding	Above 2 million and up to 20 million.	Local / National	Works of simple nature, no qualification requirement
i)	ICB	Not more than one capable firm to perform the required works No bids received in NCB Donors Conditions Special and Complex works	International, International and Nepali JV, Nepalese JV	Works- Large Contracts
ii)	NCB/LCB	More than 20 Million	All interested and eligible local bidders	Works-Medium or small Contracts, qualification requirement.
iii)	LIB	For highly specialized works only	International Contractor	Works- Large Contracts or specialized Documents.
2	Sealed Quotation	Up to 2 Million	All interested and eligible local bidders	Works- Small Contracts
3	Direct Procurement	Up to 500,000	All interested and eligible local bidders	Letter of Invitation and BoQ
4	Force Account	Up to 100,000	None	None
5	Users' Committee	Up to 6 Million works of simple nature	Contractor cannot be used	Users' Committee agreement
6	Procurement under special circumstances	Emergency	Depend on contract amount	Works- Small contract

Source: PPMO, 2019

## 2.3. Criteria for Low Bid

Competitive bidding is widely applied in many sectors besides construction. The different forms of bidding are; open bidding or sealed bidding or combination of these two. Open bidding employs an iterative negotiation process, whereby each contractor independently negotiates a contract price with the client. Consultation among competing contractors is allowed, and contractors are allowed to revise their bid for as

long as the client has not come to a decision on which bid to accept. The open form of bidding is widely used in the commercial sector. Sealed bids on the other hand, are more typical of the construction and civil engineering sector. In sealed bids, each contractor is allowed to submit only one bid, and negotiation between the client and competing contractors is barred. Equally, discussion pertaining to the project under bid between the competing contractors is not allowed. Each contractor's bid is submitted by a specified date, and once submitted (usually in a sealed envelope) cannot be revised. The process of strategic decision making in bidding incorporates some factors: Internal, external and environmental factors. Internal factors are those related to the company such as the expertise, experience, resources, capabilities, etc. External factors, outside the company, include the number of bidders, bidding risk, type of project, cash flow requirements, bid related factors and etc. Environmental factors, social and economic condition, include availability of other projects, availability of qualified labor, availability of qualified staffs, availability of qualified subcontractor, availability of equipment. These three factors interactively affect the strategic decisions of competitive bidding in construction industry.

One of the most frequently used procedures for selecting contractors is competitive bidding, where the lowest reasonable bidder from a range of bids is awarded the contract. In some places, the root of this method can be traced back to the 19th century. For example, the State of New York has been using this method for the last 150 years. Instead of accepting low bid, some states in the USA are adopting the provision of surety bond from surety companies which are available entities that can share responsibility with contractors in front of owners. They conduct thorough financial analysis of contractor's financial data to be sure that contractor is unlikely to fail so they can, as a third party, guarantee owners the payment of additional funds in case the contractor really fails. Some of public owners in USA resort to surety companies alone, which can pay a maximum liability reaching 100% of the contract amount. However, there are some modifications to this single objective decision-making procedure based on lowest bid price. For instance, in France and Portugal, bid prices that one considered abnormally lower than the engineer's estimate by the project owner are excluded. They define abnormally low as any bid whose price appears very lower than the engineer's estimate and consequently may cause implementation problems (Mishra, 2019). Mishra et al., (2020) state an increase in the number of bidders have two counteracting effects on equilibrium bidding behavior. First, the increased competition leads to more aggressive bidding, as each potential bidder tries to maintain her chances of winning against more rivals: this is the competitive effect. Second, the winner's curse becomes more severe as the number of potential bidders increases, and rational bidders will bid less aggressively in response: this is the winner's curse effect.

Highway road construction projects that were awarded to low bidders that were significantly lower than the median bidder experienced 3.5 to 4 times the cost escalation (from the low bid) than projects where the low bidder was close in price to the median bid price (Bista and Mishra, 2019). An open bidding process unrestricted by prequalification of contractors did not provide a public sector client with increased value. Prequalification is correlated with lower cost escalation and avoiding low bids.

K.C.M, & Mishra (2019)/ Mishra(2019) 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. As per K.C.M, & Mishra (2019), 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 K.C.M, & Mishra (2019), contrary to popular belief, low bidding projects occur less frequently than normal bidding in the public building project as the 81.42% of the project under five division office in Central Development Region of Department of Urban Development and Building Construction (DUDBC) in the fiscal years from 2064/065 to 2066/067 BS are normally bided projects. This shows a tendency of contractor bidding in a normal range in public building project under DUDBC which is contrary to the belief of public client organizations in majority that there are low bided projects in their organizations. It is also seen from the analysis of reviewed projects by K.C.M, & Mishra (2019) that 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 (Chakraborty, P., 2011). 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 (Errikson and Lann, 2009). 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. Criteria for low bid or abnormally low bids adopted in various countries are presented in table 2.2 below.

Table 2.2 Criteria for low bid adopted in various countries

S.N.	Country	Criteria of low bid or abnormally low bid
1	India	Bid that vary from the estimated rates by more than 25%.
2	Taiwan	Total Bid Price less than 80% of the estimate.
3	United Kingdom	one which deviates by 10% - 15% from the average price tendered
4	Luxembourg	low bid in terms of a price which leaves no margin for a normal level of profit
5	Lithuania	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

Source: (Modified from Bista & Mishra, 2019)

### 3. METHODOLOGY

#### 3.1 Research Approach

The study is extension of Wagle and Mishra (2021) Study where qualitative as well as quantitative approach was adopted. Data were collected from office record of Division Road Office Bharatpur and were analyzed. Qualitative data acquired from the clients' and contractors' respondents were also analyzed. Research was based on the database collected from primary as well as secondary sources and infers characteristics or relationships of population. So, this research is more close to quantitative inferential approach.

#### 3.2 Study Area

The study area covered those of the different projects under Division Road Office, Bharatpur, Chitwan. Under DoR, there were altogether thirty three division road offices located in different districts of the country. Each division office has a separate jurisdictional limit and work responsibility in the maintenance of strategic road networks (highways and feeder roads) and construction of small roads which falls under their responsibility in the yearly development program announced by the Government. Various accomplished projects, ongoing projects whose procurement has completed already under Road Division Bharatpur in four fiscal years from F/Y-2073/074.

DoR, Division Road Office, Bharatpur is one of the thirty three division road offices working throughout the country under DoR. It is located in the headquarter of Chitwan district and its working area extends to two districts, Chitwan and Dhading. Planned maintenance of National Highways (within Chitwan and Dhading Districts) is the main responsibility of the Bharatpur Road Division. In addition to those numbers of projects under yearly development program announced by the Government are there to be implemented by the division. They included but limited to the probable strategic road projects, others urban road projects and regional and touristic importance road projects, bridge projects etc.

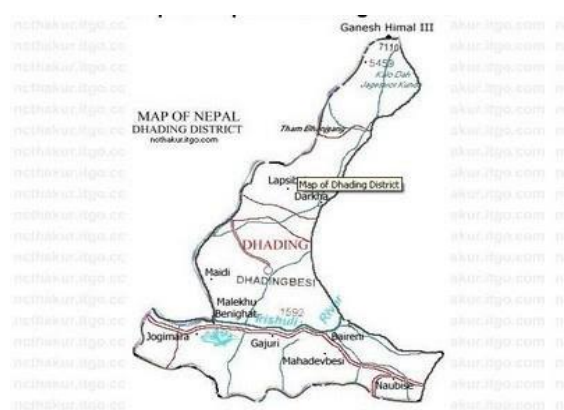


Fig: Dhading district  
Fig 3.2: Study area

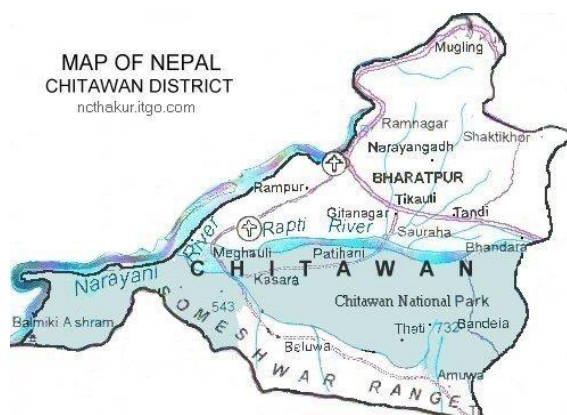


Fig: Chitwan district

### 3.3. Study Population

Representative samples were the base of any findings. Statistical inquiry can either be a census type or a sample type. The main features of a census inquiry is checking every item of the whole population but due to limitation of time, energy, cost and other constants, sometimes it becomes impossible to consider all the population. During this research study all population secondary data of the study area is included for better analysis and better results for getting setout objectives. The targeted population consisted of Engineers and Division Chief who work for Division Road Office and had experience in their jobs to the bid evaluation, awarding committees, and to the supervisions and management of public construction projects. Also, this research targeted, as study population, all bidders for bidding in Division Road Office, Bharatpur.

### 3.4. Categorization of works

There were different categories of road works. We have categorized the datas taken from Division Road Office (DRO) in three types.

1. Category 'A' – Road Construction works
2. Category 'B' – Bridge and Structure Construction works.
3. Category 'C' – Maintenance Works.

### 3.5. Sample Selection

The research used sample selection as secondary data like estimated cost, bid price, number of bidders, scheduled contract duration, actual cost and actual duration incurred for each construction project .These were from several projects (road, bridges constructions including maintenance works) for which the Division Road office, Bharatpur has successfully accomplished the procurement/bidding award phase in fiscal years F/Y 2073/074, F/Y 2074/075, F/Y 2075/076 and F/Y 2076/077(National Planning Commission, C.B.o.S., 2012/2013).

Researcher conducted the primary data collection through Questionnaire and Focused Group Discussion. In this method sample size taken for this primary data collection was at least 20 stakeholders i. e. 20/20 clients, contractors and related field experts.

### 3.6. Methods of Data Collection

#### 3.6.1. Primary Data Collection

##### *Design of Questionnaire*

A structured set of questionnaire were developed with help of referances such as Errikson and Lann, 2009, Hassan, A.A., 2012. Hyari, K.H., 2015, Jha. A.,K 2011. Khan, H.T. & Khan, Q.A.,2015 and Lama, A.D., 2014 in order to assess the perceptions of clients , contractors and related technical persons on the present status of bidding trend and possible reasons of bidders to take part in bidding/contracting works like to stay in market, to utilize available human and non-human resources, to get experience and to make their presence in construction /supply market etc. The researcher approached engineers, division chief, accountants, computer operators working at Division Road Offices and contractors as well as their staffs who were directly involved in bid evaluation and contractor selection process and had experience through the extended career in the implementation of many projects of road/bridge projects under Division Road Office.

The primary data required were collected through both questionnaire survey and formal/informal interviews. Research methods was designed to collect the data analysis that helps to produce a complete set of research which fulfilled the objectives of the study.

#### 3.6.2. Secondary Data Collection

From Division Road Office Bharatpur, estimated cost, bid price contract price at completion and non-price information (number of bidders, scheduled contract duration, actual cost and actual duration incurred for each project) of fiscal year 2073/074, 2074/075 , 2075/076 and 2076/077 were collected. Several related literature were reviewed before the start of research work. Reports and documents relevant to the projects were studied to generate idea about the research problems and issues at the same time to get the ideas of data needed for the research work. Journal articles, publications, text books, online reading materials, websites, social medias were used for the collection of secondary data. Specifically, secondary data required for the research were collected from the following sources.

- ✓ Data taken from Division Road Office, Bharatpur.
- ✓ Relevant text books related to contractor selection methods.
- ✓ Publications of DoR.
- ✓ Related Acts and Regulations.
- ✓ Published and unpublished literature, reports and journals.
- ✓ Office records of Division Road Office, Bharatpur.
- ✓ Online search for various journals by using various websites such as sciencedirect.com, sci-hub.org, sci-hub.io, sci-hub.cc to read journal articles etc.

Composition and experience in road projects of respondents were as follows:

Table 3.1 Composition of Respondents

SN	Description	Respondents
1.	Clients/Engineers	30
2.	Contractors/Contractors' Staffs.	30
3.	Engineers/technical persons of related field.	30
	<b>Total</b>	<b>90</b>

Experience of respondents was also accessed by questionnaire which is found to be suitable for research objectives.

### 3.7. Data Analysis

After the data collection, the data were categorized on the basis of type of projects 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 secondary population data were collected accurately as much as possible required for this study from the Division Road Office (DRO), Bharatpur related to four fiscal years i.e F/Y 2073/074, F/Y 2074/075, 2075/076 and 2076/077 . Adequate efforts have been made so that the data would be complete, consistent, accurate and homogenous as far as possible. After the assurance of data to be fit for analysis the number of bidders and % below Engineer's estimate was carried out for co-relation and regression analysis.

Table 3.2 Summary of Methodology

Objectives	Data Required	Collection Tools	Analysis method
To analyze the bidding trend of contracts in different categories of road/bridge works	Engineers estimate, contract amount, no. of bidders, categorization of works.	official letters of D.R.O and Questionnaire survey.	Trend Analysis, Regression Analysis, and Discriptive Statistics

## 4. RESULTS AND DISCUSSION

### 4.1. Bidding Trend

Bidding trend of different categories of road projects were accessed first based on the contractor's overhead as a threshold. Furthermore, categorical bidding trend were also assessed on the basis of range of percentage below engineers' estimate. Data of four fiscal year 2073/074, 2074/075, 2075/076 and 2076/077 of Bharatpur Division Road Office were used for analysis.

#### 4.1.1. Average Percentage below Engineers' Estimate.

As per methodology set out, calculation of average percentge of bidding amount was done assuming the mid value, A is 15% (percentage below engineer's estimate).

The calculations of average percentage of bidding below engineers' estimate using data of fiscal year 2073/074, 2074/075, 2075/076 and 2076/077 of Bharatpur Division Road Office.

This chapter broadly deals with the bidding trends analysis and status of collusive bidding in Division Road Office, Bharatpur, Chitwan by conducting quantitative data analysis for the previous construction projects that were awarded to the contractors.

Firstly, assessment of bidding trend of overall projects was done based on the award of contract to substantially evaluated lowest responsive bid. Secondly, categorical bidding trend was assessed on the basis of ranges of percentage below engineers' estimate and percentage of number of bidders. Data of fiscal year 2073/74, 2074/75 ,2075/76 & 2076/077 of Division Road Office, Bharatpur, Chitwan were used for analysis.

As per PPA 2007 and PPR 2008 the contractor's overhead and profit is considered as 15%. So it is assumed the value of Assumed Mean (A) as 15 for the purpose of the statistical analysis using the prescribed formula.

#### 4.1.2. Average Percentage below Engineers 'Estimate (Based on all the Bids)

Average percentage below of bidding amount was calculated by step deviation method of continuous series data. All bids for the contract were considered to analyze the general bidding percentage of all contractors. The observed data were arranged based on class group of percentage below Engineers estimate and calculation were done assuming the mid value.

Average percentage below engineers' estimate  $(y) = A + (\Sigma U*f / \Sigma f) * h$  (in %)

Assumed Mean (A) was taken 15% (percentage below engineer's estimate). Table 4.1 shows the calculation of average percentage of bidding amount using data of Division Road Office, Bharatpur, Chitwan.

Table 4.1 Average Percentage below Engineers' Estimate (Based on all the Bids)

Bidding Trend					
Average Bidding % Below Calculation					
SN	% Below Engineer's Estimate	Mid Value (X)	No. of Bidders (f)	$U = (X - A) / 5$	$U*f$
1	0 to 5	2.5	19	-3.1	-58.9
2	5 to 10	7.5	21	-2.1	-44.1
3	10 to 15	12.5	19	-1.1	-20.9
4	15 to 20	17.5	23	-0.1	-2.3
5	20 to 25	22.5	21	0.9	18.9
6	25 to 30	27.5	23	1.9	43.7
7	30 to 35	32.5	10	2.9	29.0
8	35 to 40	37.5	10	3.9	39.0
Total			$\Sigma f = 146$		$\Sigma U*f = 4.4$
*Note: Assumed Mean (A) = 15					
Average Bidding % Below Engineers Estimate			$= A + (\Sigma U*f / \Sigma f) * h$ (in percentage)		
			$= 18.15 \%$		
No. of Normal Bidders			74	50.68 %	
No. of Low Bidders			72	49.32 %	
Total			146	100 %	

From the calculation of table 4.1, average percentage of bidding amount is found to be (100%-18.15%) 81.85%. Among 146 bids on 38 contracts of Division Road Office, Bharatpur, Chitwan, 74 (50.68%) bids were normal bids whereas 72 bids (49.32%) bids were low bids.

#### 4.1.3. Average Percentage below Engineers' Estimate (Based on Award of Contract)

Average percentage below of bidding amount was calculated by step deviation method of continuous series data. The observed data were arranged based on class group of percentage below Engineers estimate and calculation were one assuming the mid value. Assumed Mean (A) was taken 15% (percentage below engineer's estimate). Table 4.1 shows the calculation of average percentage of bidding amount using data of Division Road Office, Bharatpur, Chitwan.

Table 4.2 Average Percentage below Engineers' Estimate (Based on Award of Contract)

Bidding Trend					
Average Award % Below Calculation					
SN	% Below Engineer's Estimate	Mid Value (X)	No. of Contract (f)	$U = (X - A) / 5$	$U*f$
1	0 to 5	2.5	7	-3.1	-21.7
2	5 to 10	7.5	3	-2.1	-6.3
3	10 to 15	12.5	2	-1.1	-2.2
4	15 to 20	17.5	8	-0.1	-0.8
5	20 to 25	22.5	4	0.9	3.6
6	25 to 30	27.5	8	1.9	15.2
7	30 to 35	32.5	3	2.9	8.7
8	35 to 40	37.5	3	3.9	11.7
Total			$\Sigma f = 38$		$\Sigma U*f = 8.2$
*Note: Assumed Mean (A) = 15					
Average Award % Below Engineers Estimate			$= A + (\Sigma U*f / \Sigma f) * h$ (in percentage)		
			$= 19.08 \%$		
No. of Normal Bids			19	50 %	
No. of Low Bids			19	50 %	
Total			38	100 %	



From the calculation of table 4.2, award of contract occurs at an average percentage of bidding amount of (100%-19.08%) 80.92%. Among 38 contracts of Division Road Office, Bharatpur, Chitwan, 19 contracts (50%) bids are low bids.

#### 4.1.4 Average Numbers of bidders per Contract

To calculate whether the contracts are competitive or not, average number of bidders per contract was analyzed by statistical analysis. Number of bidders per contract was grouped in class interval of size 2 and average number of bidders was calculated by step deviation method of continuous data. Table 4.3 shows the calculation of average number of bidders per contract based on contracts of Division Road Office, Bharatpur, Chitwan of fiscal year 2073/74, 2074/75, 2075/76 & 2076/77.

Table 4.3 Average Number of Bidders per Contract

Bidding Trend					
Average Number of Bidders Per Contract					
SN	Range of no.of bidders per contract	Mid Value (X)	No. of Bids (f)	$U = (X - A) / 2$	$U*f$
1	0 to 2	1	11	-1.50	-16.50
2	2 to 4	3	17	-0.50	-8.50
3	4 to 6	5	8	0.50	4.00
4	6 to 8	7	0	1.50	0
5	8 to 10	9	0	2.50	0
6	10 to 12	11	0	3.50	0
7	12 to 14	13	0	4.50	0
8	14 to 16	15	1	5.50	5.50
9**	16 to 18	17	1	6.50	6.50**
Total			$\Sigma f = 38$		$\Sigma U*f = -9.0$
Note: Assumed Mean (A) = 4    ** Outlier					
Average Number of Bidders			$= A + (\Sigma U*f / \Sigma f) * h$ $= 3.53$ (approx. 4)		
No. of Competitive Bids			18	47.37 %	
No. of Non-Competitive Bids			20	52.63 %	
Total			38	100 %	

From the calculation of table 4.3, average number of bidders was found to be 3.53 (approx. 4) per project. Among 38 contracts of Division Road Office, 18 bids (i.e.47.37%) in respective contracts are Competitive bids and 20 bids (i.e. 52.63%) in respective contracts are non-competitive bids.

Frequency of contracts under various Bidding Ranges.

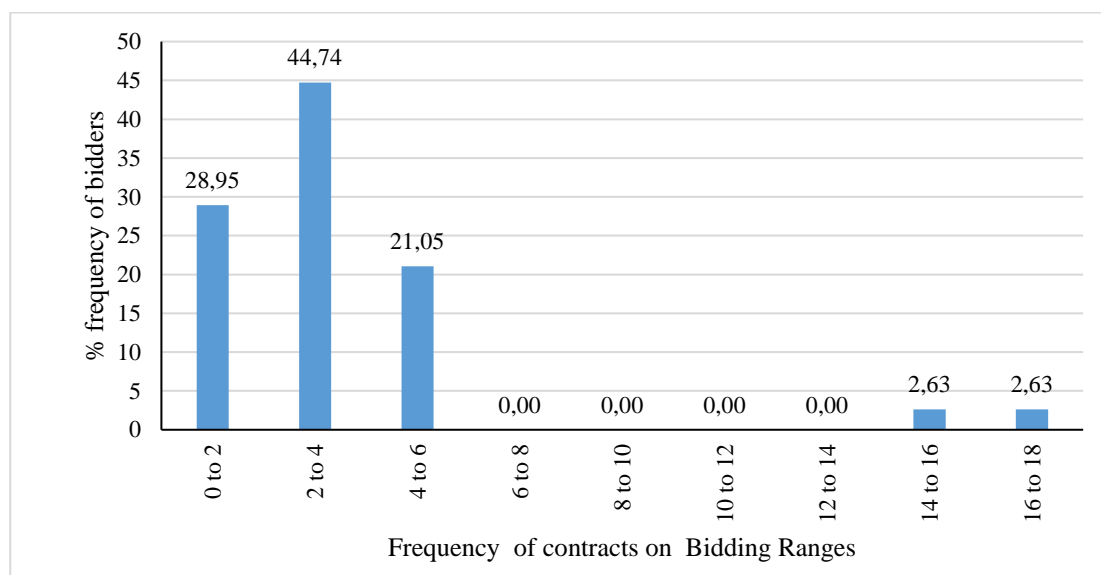


Fig.4.1 Frequency of contracts on various bidding ranges.

By the above figure it is found that there were maximum frequency of bidders (i.e 44.74%) was found on the bidding range 2 to 4. Then frequency of bidders ( 28.95%) was found on the bidding range 0 to 2 and frequency of bidders 21.05% was on bidding range 4 to 6. Which shows the almost no. of bidders participated per contract was found within the range 1 to 6 however maximum no. of participated bidders was within range 2 to 4.

#### 4.5.1 Bidding Status with Type

Based on the category Type of work, average percentage below engineers' estimate are calculated using bidding data of DRO, Bharatpur and is presented in Table 4.7 below.

Table 4.7 Bidding status with type of works.

Division Road Office, Bharatpur, Chitwan			
Work Category	% Below Engineers Estimate	Low Bids	
		Number	Percentage
A	27.44	9	52.94 %
B	17.50	6	46.15 %
C	3.12	2	25.0 %

Where,

Category A denotes General Road Construction Works

Category B denotes Bridge Construction Works

Category C denotes Maintenance Works

Table 4.7, reveals that, "A" category works i.e. 52.94% are suffering from low bid with 27.44 % below engineers' estimate bidding. "B" category works i.e 46.15 % are suffering from low bid with 17.50% below engineers' estimate where as "C" category i.e. 25% are suffering from low bid i.e.3.12 % below engineers' estimate. It can be stated that average percentage below engineers' estimate in C category work is found to be less low bid, where less technical expertise is required.

Table :4.8 Percentage below Engineer's Estimate and No. of bidders based on category

% below Engineer's estimate.	Category A	Category B	Category C
0-5	0	0	7
5-10	1	1	1
10-15	0	2	0
15-20	1	7	0
20-25	1	2	0
25-30	7	1	0
30-35	4	0	0
35-40	3	0	0

Bidding Status on Category of Works.

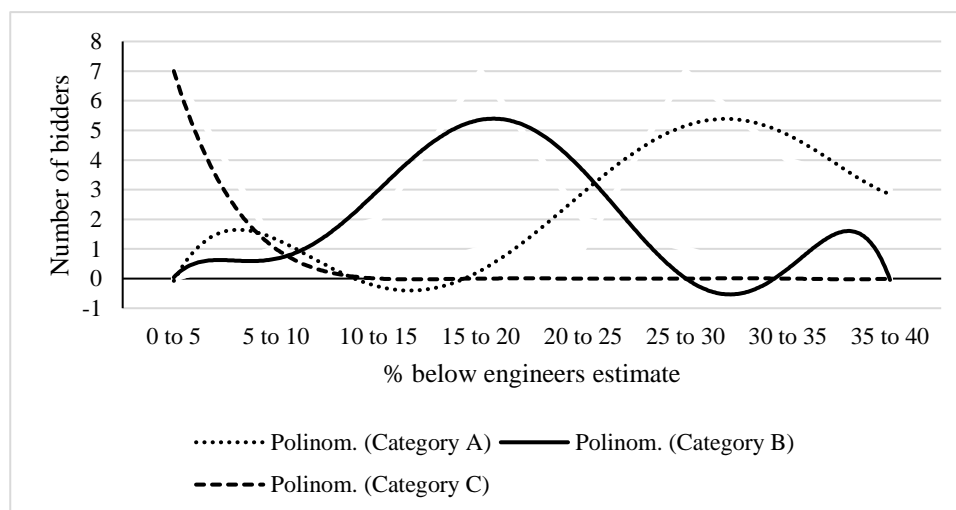


Fig.4.4 Bidding Status on Category of Works.

In 'A' category work maximum number of contracts are occurred in between 25-30% below engineers' estimate (other than collusive ranges). Similarly for 'B' category work maximum number of contracts are occurred in between 15-20% below engineers' estimate, likewise for 'C' category work maximum no. of contracts are occurred in between 0-5 % below engineers' estimate. (i.e within collusive range.)

## B) Bidding Trend with Size

All the contracts are of price above 20 million rupees and fall under same size category.

### 4.5.2. Bidding Trend Comparison on % Below Engineer's Estimate and Frequency of Bidders in Four FY.

Table 4.9 : Percentage below engineer's estimate and frequency of bidders

	0-5	5 to 10	10 to 15	15 to 20	20 to 25	25 to 30	30 to 35	35 to 40	40 to 45
FY 2073/74	7.3	4.9	9.8	12.2	4.9	24.4	12.2	24.4	
FY 2074/75	17.3	17.3	15.4	23.1	15.4	7.7	-	-	
FY 2075/76	7.7	15.4	15.4	15.4	15.4	23.1	7.7	-	
FY 2076/77	13.3	20.0	11.1	11.1	17.8	15.5	8.9		

By the figure 4.5 it is found that there were maximum low bidding cases (i.e 62.5%) in FY 2073/74 and maximum normal bid cases (i.e 53.8%) in FY 2074/75. In every case and based on the average number of bidders per project as the barrier line for determining competitive bid and non-competitive bid, there were almost 60% bids in FY 2075/76 sounds to be competitive bids and 75 % bids that sound to be non-competitive bid in FY 2073/74. About 20.05 % of bids appears to be collusive in FY 2075/76 and 50.00 % of bids appears to be collusive in FY 2076/77.

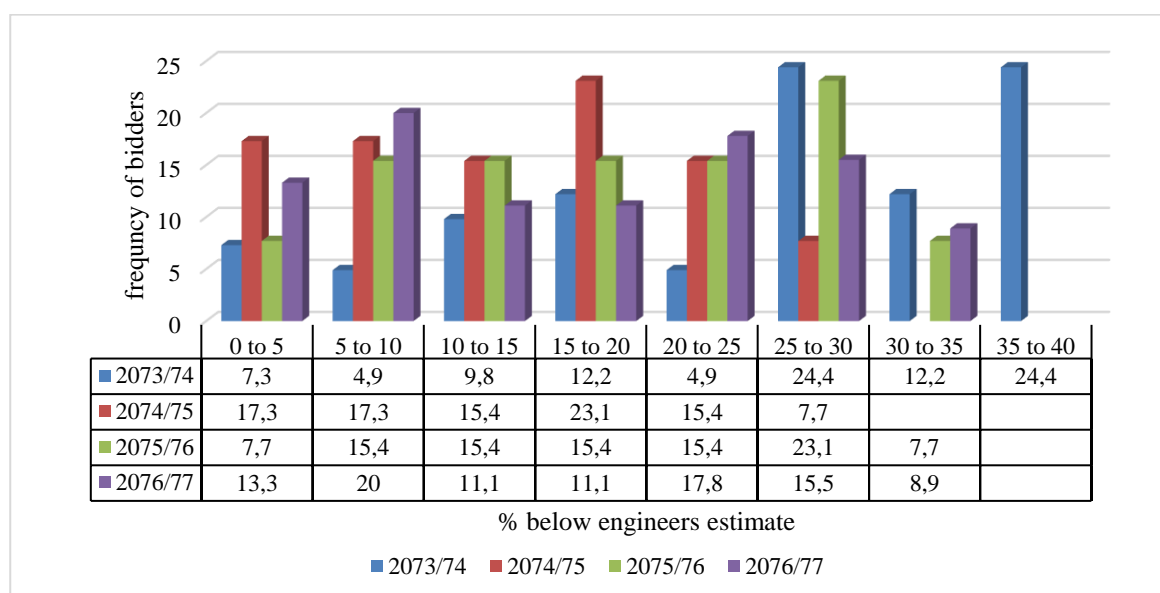


Fig.4.5 Bidding Trend w.r.t. Fiscal Year

## 5. CONCLUSION AND RECOMMENDATION

By analyzing the four years data taken from Division Road Office, Bharatpur in the F/Y 2073/074, 62.5% of total bids were found low bids, during F/Y 2074/075, 46.2% were found low bids, during F/Y 2075/076, 60% of total bids were found low bids and during F/Y 2076/077, 58.3% of total bids were found low bids. But by the analysis of average bidding % below engineers estimate (based on all 146 bids) of four F/Y, 49.32% of total bids are found low bids and based on average award % below calculations (based on 38 contracts), 50% of total bids are found low bids.

By the study of four F/Y, based on average no. of bidders per contract we found that the overall no. of competitive bids were 47.37% and no. of non-competitive bids were 52.63% .

## DEDICATION

Revolutionary red salute to the great martyr Com. Suresh Wagle!

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**REFERENCES**

- Asian Development Bank,2013.ADB Procurement Guidelines for Evaluation and Comparison of Bids. ISBN 978-92-9254-138-5.
- Bahadur, KC.M, & Mishra, A.K. (2019),Bidding Trends of Contracts based on Types and Sizes of Projects under Road Divisions Butwal and Shivapur, *J Adv Res Const Urban Arch*,4(3&4): 7-16.
- Bahadur, KC.M, Mishra, A.K., & Karki R. (2020), Assessment of Bidding Practices and Effectiveness of E-Bidding System in Nepal.July 2020 *Journal of Economics Business and Management* 3 (7):9-18.
- Bhatta, I., 2014. Issues Related to Selection of Contractors in Public Construction Procurement. *Rural Infrastructure*, 5(5), pp.184-89
- Bista, D.B., & Mishra, A.K. (2019). 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*,2(1), 1-9.
- Carr,P.G.,2005. Investigation of Bid Price Competition Measured through Pre bid Project Estimates, Actual Bid Prices, and Number of Bidders.*Construction Engineering and Management*, 131 (11), pp.1165-1172.
- Chakraborty, P., 2011. Competition policy in Public Procurement. *Competition Commission of India*.
- DoR, 1995. *The DOR Strategy*. Departmental Policy Document. Department of Roads.
- DoR, 2004. *Strategic Road Network*. SRN 2004. Kathmandu: Department of Roads.
- DoR, 2012. *Statistics of Strategic Road Network 2011/12*. SSRN 2011/12. Babarmahal, Kathmandu: HMIS Unit, Department of Roads Ministry of Physical Planning, Works and Transport Management, Government of Nepal.
- DoR, 2013. *Nepal Road Standard 2070*, Standard.Babarmahal, Kathmandu: Department of Roads Planning and Design Branch,Road and Traffic Unit.
- Errikson and Lann, 2009. Effects of Procurement on Project Performance. *A Survey of Swedish Construction Clients*,37 (17),pp.27-31.
- GoN, 2007; 2073 B.S. The Public Procurement Act first ammendment,2063.Kathmandu:Law Books Management Board of Nepal.
- GoN, 2019: 2076 B.S. Eighth Amendment of Public Procurement Regulation,2076.Kathmandu
- Government of the People's Republic of Bangladesh,2006.The Public Procurement Act,2006.
- Government of U.K, 1999. Local Government ACT,199.London, U.K. : Government of U.K.
- Hassan, A.A., 2012. *Procurement Practices in Kenya's Public Corporation*. MBP Thesis. School of Business.
- Hyari, K.H., 2015. Handling Unbalanced Bidding in Construction Projects: Prevention Rather Than Detection. *Journal of Construction Engineering and Management*, 141(7), pp.04015060-1- 04015060-10.
- Jha. A.,K 2011. Proposal on revisited E-bidding system and enhancing key features of existing E-bidding system. *DoLIDAR Bulletin*, 7 (1),pp.6-7.
- Khan, H.T. & Khan, Q.A.,2015.Effects of Lowest Bidding Bid Awarding System in Public Sector Construction Projects in Pakistan. *Global Journal Management and Business Resarch*, 15 (1), pp.9-21.
- Lama, A.D., 2014. The Contractor and Low Bidding: An Analysis. *Nepalese Construction Souvenir*, 16(23), pp.25-30.
- Mishra AK , Bhandari S, Jha T. Factors Affecting Performane and Time Extension of Ongoing Construction Projects under Town Development Fund,Nepal. *J Adv Res Const Urban Arch* 2018; 3(4).
- Mishra, A.K., Megh Bahadur K.C. & P.S. Aithal.(2020).Association of Number of Bidders and Minimum Bid Ratio (AER) with Effect of E-bidding of Different Project.International Journal of Management,Technology,and Social Sciences (IJMTS),5(2),201-215.
- Mishra,A.K., (2019) Status of Collusive Bidding in World Bank Funded Road Projects of Nepal, Vol. 62 No. 2, <http://www.solidstatetechnology.us/index.php/JSST/issue/view/10>

Mishra, A.K., and Singh, K.N., (2019). Bidders' Competitiveness in Rural Road Projects in Nepal: A Case Study of World Bank Funded Project, Vol. 62 No. 1 <http://www.solidstatetechnology.us/index.php/JSST/issue/view/9>

National Planning Commission, C.B.o.S., 2012/2013. *National Accounts of Nepal 2012/2013*. Kathamandu: Saugat Printing and Publication

Mishra, A. K., Sah., Ram Chandra, & Aithal, P. S. (2020). Operational Assessment of Public Transport: A Case of Kathmandu, Nepal. *International Journal of Case Studies in Business, IT, and Education (IJCSBE)*, 4(2), 132-152. DOI: <http://doi.org/10.5281/zenodo.4033197>

Wagle B, Mishra AK. Analysis of Number of Bidders Relation with Engineer's Estimate within Different Categories of Projects under Bharatpur Road Division. *J Adv Res Const Urban Arch* 2021; 6(4): 17-30