

Assessment on the Fixation of District Rate of Kathmandu District

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Abstract

The aim of this research is to assess and analyze the compliance of district rate and market rate of skilled manpower, unskilled manpower and some construction materials in Kathmandu District and search the possible correction in the prevailing process of district rate fixation if any. Many public entities were visited and the district rate of Kathmandu district since fiscal year 2071/072 was collected and initially the district rate of some construction material and manpower were compared with Input price index of construction sector. It shows the clear difference between the rate change pattern in district rate and price index. Then the real market rate of those construction material since fiscal year 2071/072 were collected from contractors, vendors and public entities and again compared with the district rate of same item for same fiscal year. Also the rate Assessment of various material with both district rate and actual market rate for various fiscal year was done and again comparison between them were made which also show the clear gap between the market rate and district rate. Then interview to the expert were conducted for the possible solution to reduce the gap between the district rate and actual market rate of construction materials and manpower. The study can be useful for the District rate fixation committee for the possible correction in the district rate fixation process.

Keywords

District rate, Actual Average Market Rate, Input price index of construction material, District Rate Fixation Committee

1. Introduction

The demand of physical infrastructure in country is very high. It has been determined that the construction sector makes up about 35 percent of government projects, and as a result, it contributes around 11 percent of Nepal's GDP. [1]. To accomplish all of this, the price estimate for this infrastructure must be more accurate, and the procurement procedure must be open and effective. A cost estimate may only be regarded as reliable and reasonable if the amount estimated and the rate of item used are both accurate. The cost of the materials, labor, and standards used for rate Assessment make up the construction item's rate component. The market rate of materials used for cost estimation of construction work should be precise. In our country public entity uses district rate of material which is published every year by district rate fixation committee. It necessary to check whether the district rate has correctly address the actual market rate so that no difficulties is seen in the construction process of such projects.

2. Literature Review

2.1 Result From Previous Studies

Materials needed for erecting and completing construction works could amount to about 35-45 percent of the total project cost [2]. The top five critical factors affecting the construction price index in Vietnam are consumer price index, gross domestic product, basic interest rate, foreign exchange rate, total export and import.[3] The top three causes of cost overrun in Vietnam as material cost increase due to inflation, in accurate quantity takes – off labour cost increase due to environment restriction [4]. Increment of materials price, delay in construction, fluctuations in the cost of construction materials, un-settlement of the local currency in relation to Dollar value are the major causes for I, II, III IV rank for reasons of cost overrun in construction on Gaza strip.[5] The general model of inflation in Nepal therefore combines demand factors (interest rates, money supply, velocity of money); supply factors (real gross domestic product, industrial worker wages); and external factor (Indian inflation) [6].

2.2 District Rate and Rate Analysis

In general, a rate analysis of a building item necessitates the rate of materials, labor, and civil standards. The civil norm supplied by the Department of Road or the Department of Urban Development and Building Construction is adopted by public offices. According to Rule 148(1) of Public Procurement Rules, 2064. A rate fixation committee composed of the following members shall be established in each district to fix the rates of building materials and conveyance, rent of machine and equipment, and labor wage applicable to the entire district or any part. The committee includes Chief District Officer (chairperson), Local Development officer, Chief Treasury and controller's officer, Representative of Nepal Federation of Construction Entrepreneurs, Representative of Chamber of Industry and Commerce, Chief District Technical Officer (Member-secretary) prepares district rate. Other representatives from various institution are also invited as convened member.

2.3 Practices Around The World

Different techniques are followed for the fixation of rate of construction material and construction item around the world. In Arunachal Pradesh of India, the rates of major construction materials like Cement, Steel and Bitumen are updated based on the rates in nearest authorized dealers located in foothill in Assam and in Arunachal Pradesh.[7] In Bangladesh, Public Work Directives Schedule of Rates for Civil Works is based on the study of current market rates of materials.[8] In Bhutan the revision of labour rate is done as per the approval of the 80th session of the Third LHengye Zhungtshog, the basic material rates are based on market price collected four base towns of Gelephu, Phuentsholing, Samdrup Jongkhar and Thimphu. These rates have been applied in conjunction with the co-efficients from labour and materials coefficients-2021 to develop Built-up item rates.[9] In Srilanka, the quantities of material required for the items are computed from known data and experience. Their total value is calculated on the basis of current prices at source of supply. Unless otherwise stated wastage is allowed in the norms[10]. In United State of America, past cost from item quoted by the contractors in similar locality and similar nature are used as the rate of that item for cost estimation. Most of the neighbouring countries have similar culture of material rate fixation.

3. Research Methodology

3.1 Research Framework

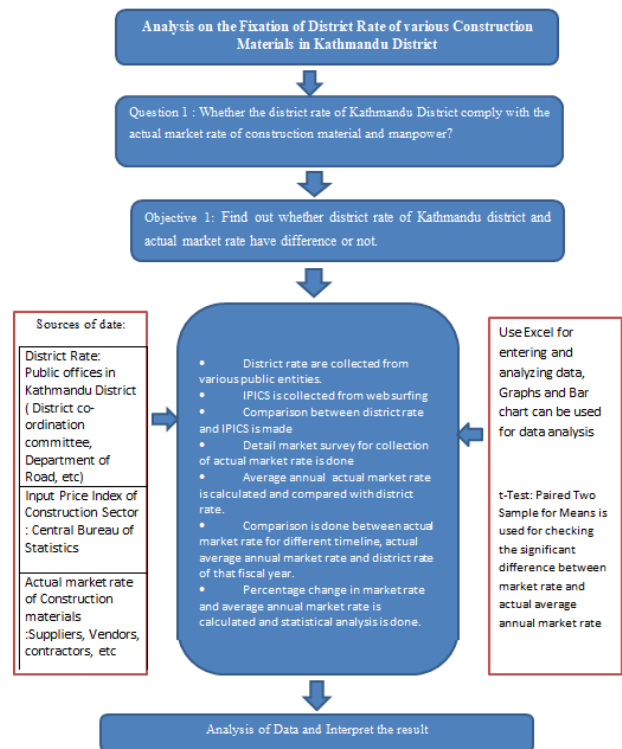


Figure 1: Research Framework Step-1

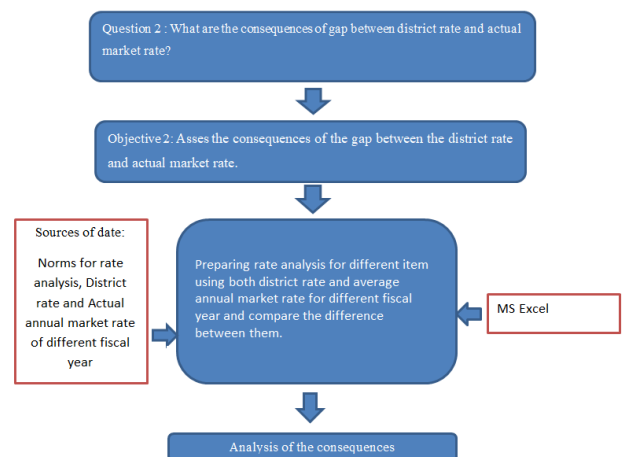


Figure 2: Research Framework Step-2

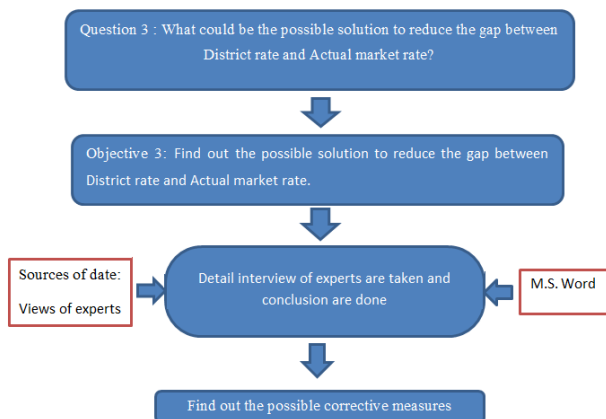


Figure 3: Research Framework Step-3

4. Results and Discussion

To collect the actual market rate of various construction materials such as Cement, Re-bar, Sand, Stone, Aggregate, Aluminium, Skilled and Unskilled manpower, many public entity, contractors, vendors, user committee and manpower were visited. Vat bills, pan bills, daily records sheet were collected in order to collect the actual market rate. Since the rate collected were from different time line within a year, average rate of each item were calculated for the comparison purpose. To determine the numbers of bills to be collected for each item, cochran’s formula is used.

$$n_0 = (z^2 pq) / e^2$$

where,

n_0 = total sample size

z = value from z-table

p = population proportion

$q = (1 - p)$

e = margin of error

For $90n_0 = (1.6452 * 0.5 * 0.5) / 0.12 = 67.5 \approx 68$

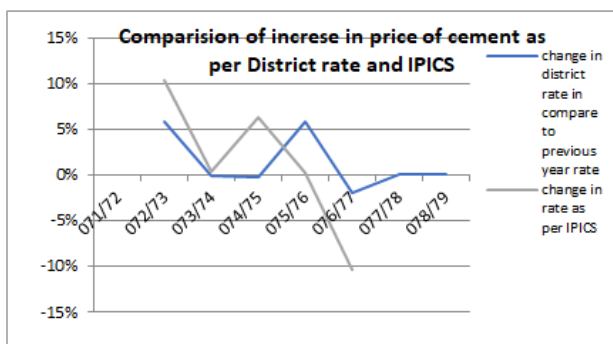


Figure 4: Graphical Representation if change in District rate of cement in Kathmandu District with change in IPICS

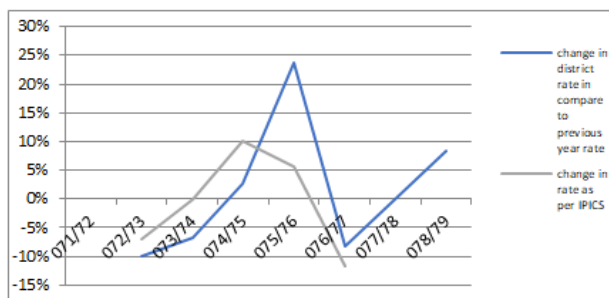


Figure 5: Graphical Representation if change in District rate of Re-bar in Kathmandu District with change in IPICS

We have 8 number of item which provides around 9 sample for each item. Therefore more than 9 bills for each item will be sufficient for study.

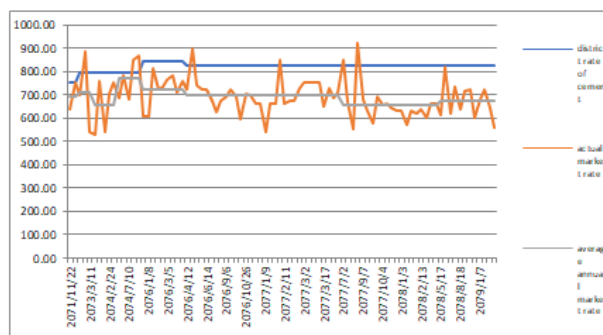


Figure 6: Comparison of District rate, Average Annual market rate and market rate of cement of in Kathmandu District

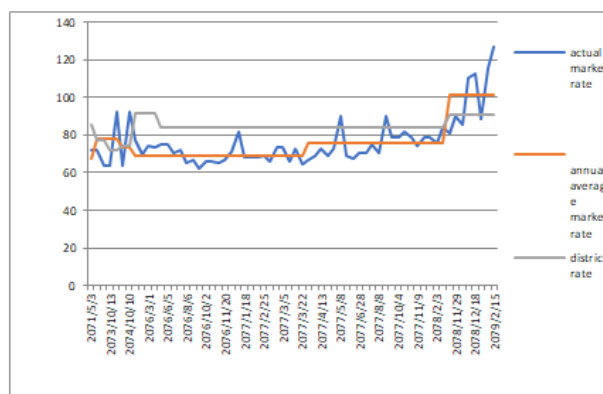


Figure 7: Comparison of District rate, Average Annual market rate and market rate of Re-bar in Kathmandu District

Table 1: Collection of District Rate of Kathmandu District

Fiscal Year	Cement in NRs	Re-bar in NRs	Sand in NRs	Aggregate in NRs	Stone in NRs	Aluminium in NRs	Skilled Manpower in NRs	Unskilled Manpower in NRs
070/71	716	80.45	1730.19	2012.67	1765.5	4734.40	600	415
071/72	754.00	85.70	2083.29	2401.08	2118.6	4734.40	650	475
072/73	797.50	77.15	2789.49	3177.9	2789.49	5369.24	865	635
073/74	797.00	72.00	2787.71	3175.77	2787.71	5831.05	865	635
074/75	795.00	74.00	2643.36	3153.42	2126.87	5691.19	910	670
075/76	841.00	91.50	3031.52	3313.82	2409.17	5691.19	960	700
076/77	825.00	84.00	3031.52	3313.82	2409.17	5691.19	1030	750
077/78	825.00	84.00	3031.52	3313.82	2409.17	5691.19	1030	750
078/79	825.00	91.00	3031.52	3313.82	2409.17	5691.19	1080	790

4.1 Comparison and Statistical test between Actual Average Market Rate and District Rate of Kathmandu District

Actual Annual Average market rate of each item were calculated and compared with the district rate of same materials. Also the t-Test: Paired Two Sample for Means tool was used to check whether the value of Actual Annual Average market rate and district rate of same materials has significant difference or not.

Change in district rate of cement fiscal year 2072/073, 2073/074, 2074/75, 2075/076, 2076/077, 2077/078, 2078/079 with respect to consecutive previous fiscal year is 6%, 0%, 0%, 6%, -2%, 0% and 0% respectively. While the change in market rate of fiscal year 2072/073, 2073/074, 2074/75, 2075/076, 2076/077, 2077/078, 2078/079 is 1.9%, -7.22%, 20.83%, -4.9%, -6.73%, -5.79% and 3.01% respectively.

The district rate of cement of Kathmandu district from fiscal year 2071/072 to fiscal year 2078/079 was compared to the average rate of cement collected from market. The t-test for paired two sample for means for district rate and market rate of cement shows that there is significant difference between district rate and market rate of cement with mean market rate of cement 108.93 rupees per bag lower than the district rate.

The district rate of Re-bar of Kathmandu district from fiscal year 2071/072 to fiscal year 2078/079 was compared to the average rate of Re-bar collected from market. The t-test for paired two sample for means for district rate and market rate of re-bar shows that there is no significant difference between market rate and district rate with mean market rate only 5.76 rupees per kg lower than the district rate.

4.2 Comparison between various item used in construction using both average annual market rate and district rate of various fiscal year 071/72

The comparison of rate analysis of various construction item for various fiscal year as shown in Table 12, shows that the impact of gap in district rate and average annual market rate is high. It also suggest us that correction in the district rate is necessary.

Further check of this objective was done by comparing the average annual market rate and district rate in a project of box culvert. For this purpose, a project of box culvert was taken having 16 item. Among these 16 item, 11 item are taken constant and changes are done for 5 item and following observation is made. Fiscal year 2075/76, 2076/77, 2077/78, 2078/79 were taken for this study purpose.

Table 2: Comparison of change in District rate of cement in Kathmandu District with change in Input Price Index of Construction Sector(IPICS)

Cement/ Fiscal year	District rate of cement in Nrs	IPICS for cement	change in district rate in comparison to previous year rate	change in rate as per IPICS
071/72	754.00	100.00		
072/73	797.50	110.40	6%	10.40%
073/74	797.00	110.80	0%	0.36%
074/75	795.00	117.70	0%	6.23%
075/76	841.00	118.00	6%	0.25%
076/77	825.00	105.75	-2%	-10.38%

4.3 Interview to the expert

Two different interview were conducted. First one to collect information in the district rate fixation method and second to collect the ideas about the corrective measures in district rate fixation. **Interview -1** Initial interview was taken to the expert who were directly involved in the fixation of district rate. This interviews help to verify the process of district rate fixation.

Table 3: Comparison of change in District rate of Re-bar in Kathmandu District with change in IPICS

Rebar	District rate in NRs	IPICS	change in district rate in comparison to previous year rate	change in rate as per IPICS
071/72	85.70	100		
072/73	77.15	93	-10%	-7.00%
073/74	72.00	93	-7%	0.00%
074/75	74.00	102.4	3%	10.11%
075/76	91.50	108.3	24%	5.76%
076/77	84.00	95.6	-8%	-11.73%

Table 4: Comparison and statistical test Between Actual Average Market Rate and District rate of Cement

Cement	District rate	Market rate	Change in district rate compared to previous year's rate	Change in market rate compared to previous year's rate
071/72	754.00	695.00		
072/73	797.50	708.21	6%	1.90%
073/74	797.00	657.10	0%	-7.22%
074/75	795.00	772.22	0%	17.52%
075/76	841.00	722.73	6%	-6.41%
076/77	825.00	700.89	-2%	-3.02%
077/78	825.00	658.79	0%	-6.01%
078/79	825.00	673.17	0%	2.18%

Table 5: T-test: Paired two samples for means

Rate of cement	
Mean District rate in NRs	807.44
Mean Market rate in NRs	698.51
T-stat	6.31
P-value	0.00
Remarks	Significant

Table 6: Comparison and statistical test Between Actual Average Market Rate and District rate of Rebar

Re-bar/ Fiscal year	District rate	Market rate	Change in district rate compared to previous year's rate	Change in market rate compared to previous year's rate
071/72	85.70	67.86		
072/73	77.15	78.00	-10%	14.95%
073/74	72.00	78.00	-7%	0.00%
074/75	74.00	73.65	3%	-5.58%
075/76	91.50	69.33	24%	-5.87%
076/77	84.00	69.33	-8%	0.00%
077/78	84.00	75.72	0%	9.22%
078/79	91.00	101.39	8%	33.89%

Table 7: T-test: Paired two sample for means of Re-bar

Re-bar	
Mean District rate in NRs	82.41
mean Market rate	76.65
t -stat	1.38
p-value	0.21
Remarks	Not significant

Table 8: List of Expert Directly involved in District Rate Fixation

S.no	Name of Expert	Designation/ organization
1	Er. Surendra Kumar Singh	Acting Project Chief, Chainpur Taklakot Road Section, Bajhang, Department of Roads
2	Er. Ujjwal Aryal	Engineer, Namobuddha Minicipality, Kavrepalanchowk

Table 9: List of Expert to collect their view on Fixation of District rate of Kathmandu District

S.no	Name of Expert	Designation/ organization	Experience
1	Er. Dilip Bhandari	Gazetted first-class Officer of Nepal Government, Department of Urban Development and Building Construction	26 years
2	Er. Narayan Prasad Bhandari	Gazetted first class Officer of Nepal Government, Deputy Development Commissioner at Kathmandu District Development Office	26 years
3	Er. Chandra Kumar Pan Shrestha	Deputy Project Director, Kathmandu Upatyaka Khanepani Limited, Project Implementation Directorate	20 years
4	Er. Dinesh Kumar Pote	Retired Gazetted Second Class Officer of Nepal Government	
5	Er. Shakil Manandhar	Team leader at Local Roads Bridge Support Unit	29 Years
6	Er. Bishal KC	8th level officer, Soil and Watershed Management Office	12 years
7	Mr. Niroj Thapaliya	Managing Director, Samanantar Nirman Sewa	18 years
8	Mr. Pancharam Maharjan	Proprietor, PR Nirman Sewa	17 years
9	Mr. Raj Shahi	Project Manger, Mangaldeep Nirman Sewa	14 years
10	Er. Sujan Blon	Proprietor, Bramhayini Engineering and Suppliers	14 years
11	Er. Bishal Karki	CEO, Jateshwor Nirman Sewa	12 years

Table 10: Results and conclusion from the t-test for various construction materials and manpower

S.No	Item	Difference between annual average market rate and district rate
1	Cement	the significant difference with mean market rate 108.93 rupees per bag lower than the district rate.
2	Re-bar	no significant difference with mean market rate only 5.76 rupees per kg lower than the district rate.
3	Sand	significant difference with mean market rate 965.01 rupees per cubic metre higher than the district rate.
4	Stone	significant difference with mean market rate 302.69 rupees per cubic metre higher than the district rate.
5	Aggregate	no significant difference with mean market rate only 26.17 rupees per cubic meter lower than the district rate
6	Aluminium	no significant difference with mean market rate only 169.06 rupees per square metre lower than the district rate
7	Skilled manpower	significant difference with mean market rate only 312.22 rupees per man-days higher than the district rate
8	Unskilled manpower	the significant difference with the mean market rate only 231.11 rupees per man-days higher than the district rate.

Table 11: Comparison of difference in rate of various construction items by using district rate and actual market rate for various fiscal year

Item	f/y 071/72		f/y 077/78		f/y 078/79	
	Difference in NRs	Percentage difference	Difference in NRs	Percentage difference	Difference in NRs	Percentage difference
Stone soling	856.78	22.89	1041.69	22.56	1041.69	22.56
Stone masonry wall	2228.18	24.01	1995.04	16.41	1995.04	16.41
Plum concrete	1859.83	17.77	2112.52	17.65	2112.52	17.65
PCC	-285.27	-2.39	-504.25	-3.63	-504.25	-3.63
PCC for RCC	-214.18	-1.70	-1024.45	-6.96	-1024.45	-6.96
Rebar all complete	-23873.43	-19.49	-6824.10	-5.67	-6824.10	-5.67
Plastering	-13.94	-3.74	50.91	12.74	50.91	12.74

5. Conclusion

5.1 Conclusion of Research Objective-1

The first objective of this research is to find out the gap between the market rate and district rate. The result and conclusion of objective-1 is provided in Table 12.

Table 12: Comparison of total cost of box culvert project using district rate and actual market rate for various fiscal year

F/Y	Project cost as per district in NRs	Project cost as per market rate in NRs	Difference
2075/76	155712998	152447359	(3265639)
2076/77	134040313	132796237	(1244075)
2077/78	134040313	137463675	3423361
2078/79	139441231	146722222	7280990

From table-12, the annual average market rate and district rate of cement, sand, stone, skilled manpower and unskilled manpower is seen to have significant difference. The major number of item has significant difference between district rate and average annual market rate. This shows that the district rate needs correction.

5.2 Conclusion of Research Objective-2

From the comparison of table 13, it is concluded that there is clear difference between the cost estimate of box culvert prepared by using district rate and actual market rate.

This observation shows that for fiscal year 2075/76 the project cost as per district rate was 3,265,639.46 rupees higher than project cost as per market rate for

the box culvert. For fiscal year 2076/77 the project cost as per district rate was 1,244,075.56 rupees higher than project cost as per market rate for the box culvert. For fiscal year 2077/78 the project cost as per district rate was 3,423,361.75 rupees lower than project cost as per market rate for the box culvert. For fiscal year 2078/79 the project cost as per district rate was 7,280,990.30 rupees lower than project cost as per market rate for the box culvert.

5.3 Conclusion of Research Objective-3

From interview -1, it is concluded that no guideline is followed during the district rate fixation process. A proper guideline is necessary. The conclusion is drawn from interview 2 conducted to number of high class government officers and contractors to find the possible solution to decrease the gap between market rate and district rate. Common solutions from most of experts are kept on top order.

- 1) Detail market survey should be conducted frequently.
- 2) District rate should be published more than once in a year.
- 3) District rate fixation committee should be revised as per new structure of government.
- 4) The role of District rate rate coordination committee should be more active.
- 5) A central level secretariat should be formed, which should co-ordinate and help to all the district rate fixation committee in rate fixation work. This secretariat should also continuously study, investigate the new and old construction materials, their availability, scope and price in the country. It should also investigate and study the specification detail of required new material internationally which is not available in the country.

- 6) District rate fixation is a critical issue. Therefore, a dedicated team should be assigned which should continuously update the market situation. It should convey market survey time to time.
- 7) While collecting market rate actual discounted market should be collected in spite of market retail price.
- 8) Market survey and district rate update should tie up with technology.

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