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Pragmatic Study of Government Policies for Metro Rail Project in India

Abhishek Kumar*, Rahul Shinde

Department of Civil Engineering, RMD Sinhgad Institute of Technology, Savitribai Phule University, Pune , Maharashtra, India

ABSTRACT

Urban planners believe that there is a need of Mass Rapid Transit System (MRTS) in a city once the population crosses one million. Advanced countries generally plan for a metro system when the population of a city exceeds one million and by the time the population reaches the two million mark, a metro is generally in position. In India there are about 54 cities having a million plus population, however only 23 cities have seen various levels of development of MRTS. Metros are now under construction in ten more cities of India after Kolkata and Delhi. By year 2016 India will rank as a developed country and by that reckoning 15 more cities should start planning for their metro systems. Rail-based "Mass Rapid Transit System" has been widely accepted as a solution for most of the traffic and environmental pollution related problems which major cities throughout the world are facing now. Metro rail construction activities are being undertaken in a big way in India, existing metro rail network of the city of Kolkata and Delhi are being expanded, while it is under various stages of construction in cities like Bengaluru, Chennai, Jaipur, Gurgaon, Mumbai, kochi, lucknow, Nagpur, ahmedabad and Hyderabad.

Keyword : Government Policies & Provisions, MRTS, Infrastructure Project

I. INTRODUCTION

Infrastructure development has a crucial role to play if India is to sustain its high growth, which must become more inclusive as the country matures. Successive Five Year Plans of Government of India have emphasized the need to develop infrastructure, thus we receive ample amount of funds for infrastructure projects.

In recent times the Metro Rail has come up as an alternative of mass transport in urban spaces faced with growing population, heightened vehicular traffic and increased pollution. Metro rail is a form of mass transit public transport system employing trains. The metro rail system, unlike conventional rail-based systems is grade separated from the other traffic or provided with separate right of way (ROW) to avoid conflict with other urban transportation networks. In most of the cases, at least a portion of the rails are placed underground (in tunnels), while a major portion remains above ground (elevated). The system is provided in an urban area and is mostly operated by electricity with high capacity and frequency.

Government policies and provisions are not explicitly stated and have not been standardized. These policies and provisions vary from project to project. Absence of various incentives and tax exemptions for some projects result in higher costs.

II. METHODS AND MATERIAL

1. Literature Review

Niraj Sharma, etc. all in 2013 carried out a research on The higher cost of metro corridors in Mumbai (as against the other Indian cities) is due to higher land acquisition costs and absence of various incentives/tax exemptions which the government has provided to other metro rail projects but not extended the same to Mumbai metro.

With the growth in Indian economy, major infrastructure development initiatives have been undertaken by the

Governments at the central, state and local body levels. Transportation infrastructure projects recently undertaken in India have experienced large cost and time overruns. The development, construction and operation of the infrastructure facilities need a number of permits and approvals. These projects are more vulnerable to approval delays because they require various statutory and non-statutory approvals and clearances during the development phase and project specific approvals during the implementation phase. The approvals process is often neither streamlined nor expeditious.

The Union urban development ministry's report on 'Innovative Financing of Metro Rail Projects' suggests that PPP has not been very successful in Metro projects. The report states that a study of global experiences in Urban Rail Transit provisioning showed that PPP in Metro projects had failed. "In 113 cities across the world having Metro rails, 88% have been developed and are being operated in public sector mode whereas in only 12% cities some form of PPP exists," says the report. Outside India, no city (expect the failed experiment of STAR and PUTRA Metro rail in Kuala Lumpur) has attempted provisioning of Metro rail in full city on PPP in the past few decades.

Rohitkatyal stated that infrastructure investment is risky during the construction period and the initial years of a project before a clear income stream emerges. The government should therefore consciously use its available scarce resources to take significant equity position in infrastructure project, which otherwise would not receive adequate funding.

2. Research Methodology

The methodology for the work consists three step model. The first step is questionnaires have been prepared by authors considering government policies of metro rail projects. The second step is to perform non-parametric test on data and third step is to perform parametric test on data. The interviews based on questionnaire with the professional associated with metro rail development. In the analysis of data response of all the questions have been studied and the findings have mentioned in the subsequently contained.

3. Data Collection and Analysis

The data has been collected in qualitative form and based on the government policies in metro rail projects.
No. of questionnaire sent:-05
No. of responses received:-18
No. of professionals interviewed: -18

1. Whether the Government policies help the project to run smoothly through all barriers and Promote the project?
2. Whether the Government supported and promoted adoption of new technologies?
3. Whether the Government regulatory bodies cooperative in regard to approvals and obtaining Clearances?
4. Whether you find too much interference from Government officers during project work?
5. Whether the Government policies beneficial for business along the corridor?

Data Analysis Tool

Data was analysed by two performed test, parametric test and non-parametric test. The data was collected using fine point Likert Scale (Table 1). Firstly non-parametric Kolmogorov-Smirnov Test was performed. It is used to determine normality of collected data, the result showed that the collected data was normally distributed and it is variable to make parametric tests. Progressing further, to check the reliability of the data Cronbach's alpha was computed.

Table 1. Five point Likert scale

OPTION	SCORE
Almost Always	5
Usually	4
Occasionally	3
Usually not	2
Almost never	1

4. Non-Parametric Test

Kolmogorov-Smirnov Test

The one sample Kolmogorov-Smirnov test is used to test whether a sample comes from a specific distribution. We can use this procedure to determine whether a sample comes from a population which is normally distributed.

Hypothesis Testing

Let $x_1, \ldots, x_n$ be an ordered sample with $x_1 \leq \ldots \leq x_n$ and define $S_n(x)$ as follows:

$$S_n(x) = \begin{cases} 0, & x < x_1 \\ k/n, & x_k \leq x < x_{k+1} \\ 1, & x \geq x_n \end{cases}$$

Now suppose that the sample comes from a population with cumulative distribution function $F(x)$ and define D_n as follows:

$D_n = \max_x(F(x) – S_n(x))$

Observation: It can be shown that D_n doesn't depend on F. Since $S_n(x)$ depends on the sample chosen, D_n is a random variable. Our objective is to use D_n as a way of estimating $F(x)$.

The distribution of D_n can be calculated, but for our purposes now the important aspect of this distribution are the critical values. These can be found in the Kolmogorov-Smirnov Table.

If $D_{n,\alpha}$ is the critical value from the table, then $P(D_n \leq D_{n,\alpha}) = 1 – \alpha$. *Dn* can be used to test the hypothesis that a random sample came from a population with a specific distribution function $F(x)$. If $\max_x (F(x) – S_n(x)) \leq D_{n,a}$ then the sample data is a good fit with $F(x)$.

Also from the definition of *Dn* given above, it follows that $(1 - \alpha) = P(Dn \leq D_{n,a}) = P(\max_x (F(x) – S_n(x)) \leq D_{n,a}) = P(S_n(x) - D_{n,a} \leq F(x) \leq S_n(x) + D_{n,a}$ for all x) = $P((F(x) – S_n(x)) \leq D_{n,a}$ for all x)

Thus $Sn(x) \pm Dn,\alpha$ provides a confidence interval for F(x)

$$F(x) = \sqrt{\frac{2}{x}} \sum_{k=1}^{\infty} \frac{e^{-(2k-1)^2\pi^2}}{(8x^2)}$$

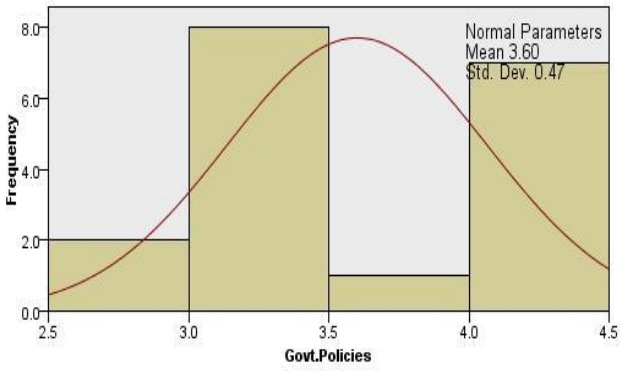
III. RESULTS AND DISCUSSION

Kolmogorov-Smirnov Test

The result of the Kolmogorov-Smirnov test showed that the factor is normally distributed, thus quality to be tested with statistical parametric tests. Based on the result, we decided to retain the null hypothesis, thus the factor (Government Policies) impact the metro rail projects.

Table 2 - Kolmogorov-Smirnov Test for Government Policies

S.No.	Null Hypothesis	Test	Significance	Decision
1	The distribution of Govt. Policies is normal with mean 3.60 and standard deviation 0.47.	One-Sample Kolmogorov-Smirnov Test	.338	Retain the null hypothesis.



Total N		18
Most Extreme Differences	Absolute	.222
	Positive	.222
	Negative	-.194
Test Statistic		.941
Asymptotic Sig. (2-sided test)		.338

Figure 1 - Kolmogorov-Smirnov Test for Government Policies

Parametric Test

In statistics **Cronbach's α (alpha)** is used as a (lower bound) estimate of the reliability of data. Cronbach's alpha is a measure of internal consistency, that is, how

closely related a set of items are as a group. It is considered to be a measure of scale reliability.

Suppose that we measure a quantity which is a sum of *K* components (K-items or test lets):
X = Y1 + Y2 + ------ +YK
Cronbach's α is defined as:

$$\alpha = \frac{K}{K-1}(1 - \frac{\sum_{i=1}^{k} \sigma^2 y_i}{\sigma_x^2}$$

Where,

$\sigma_x^2$is the variance of the observed total test scores,
$\sigma_{yi}^2$the variance of component i for the current sample of persons
K is the total number of questions in the particular section

Alternatively, Cronbach's α can be defined as:

$$\alpha = \frac{\mathrm{k}\,\bar{c}}{(\bar{v} + (K-1)\bar{c}}$$

Where,
K *is* as above
$\bar{v}$The average variance of each component (item)
$\bar{c}$The average of all covariance between the components across the current sample of persons (that is,
without including the variances of each component).

Table 3 – Criteria for Cronbach's Alpha

Cronbach's alpha	**Internal consistency**
α ≥ 0.9	Excellent (High-Stakes testing)
0.7 ≤ α <0.9	Good (Low-Stakes testing)
0.6 ≤ α <0.7	Acceptable
0.5 ≤ α < 0.6	Poor
α < 0.5	Unacceptable

Cronbach's Alpha Test

The reliability values (alpha values) for all the factors were computed and found to be in good and acceptable range of values. Cronbach"s alpha was calculated using Ms-Excel.

Table 4 – Cronbach's Alpha for Government Policies

S.No.	Q1	Q2		Q3		Q4	Q5		
			Government Policies					Sum	Average
1	3	5		3		4	4	19	3.8
2	3	3		2		3	3	14	2.8
3	3	4		3		3	4	17	3.4
4	3	4		3		4	3	17	3.4
5	3	4		3		4	3	17	3.4
6	2	4		2		3	3	14	2.8
7	3	4		3		4	3	17	3.4
8	2	4		3		2	4	15	3
9	3	4		3		4	3	17	3.4
10	3	4		4		3	3	17	3.4
11	3	4		3		3	4	17	3.4

S.No.	Q1	Q2	Q3	Q4	Q5		
	Government Policies					sum	Average
12	3	4	4	5	4	20	4
13	4	5	5	3	4	21	4.2
14	3	4	4	5	4	20	4
15	3	4	4	5	4	20	4
16	4	5	5	3	4	21	4.2
17	4	5	4	4	4	21	4.2
18	3	4	4	5	4	20	4
Sum	55	75	62	67	65	324	
Variance	0.275	0.250	0.691	0.756	0.238		
	k	5					
	Variance Vertical	5.11111111					
	Sum of Horizontal Variance	2.20987654					
	Cronbach's Alpha	0.70954106					

IV. CONCLUSION

The major reason for this resistance is the "जोचलरहाहैचलनेदो" attitude of government officials. Thus some newer and progressive policies must be formed promoting the use of New Technologies. Government at every level should have friendly policies and provisions for MRTS Development.

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