



A STUDY ON INDIA'S INFRASTRUCTURE DELIVERY MODEL AND VALIDATION OF FINDINGS USING SPSS SOFTWARE

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ABSTRACT

Through a detailed study on the infrastructure delivery services by the public and private sector, its efficiency and failures, the reasons for the failures and inefficiencies are put forward. Then solutions as how to improve them are arrived at. The findings along with the suggested solutions are summarized in a questionnaire template. The questionnaires are sent out to both the public and private sector officials and also to academicians of NITs and IITs. The validation of the study was done by using the data collected from the survey and analyzing on SPSS software.

KEYWORDS: Public Sector, Private Sector, SPSS Software

INTRODUCTION

The questionnaire templates were sent to different stakeholders through mail and post. Both the government and private sector employees will take part in the focus interview. All the questions were given a five point Likert scale format for their answers. This ensured uniformity in the assessor's level of judgment for all the questions.

USE OF SPSS TO ANALYZE THE DATA

SPSS is a widely used program for statistical analysis in social science. It is also used by market researchers, health researchers, survey companies, government, education researchers, marketing organizations, data miners, and others.

USE OF FACTOR ANALYSIS

The thesis has three primary segments i.e.

- 1) Infrastructure Problem Identification section.
- 2) Private Sector involvement analysis section
- 3) Section where solutions are put forward to solve existing problems.

However we find that many suggestions and views have been put forward in these three sections. These suggestions or views can be considered as variables. Thus with the presence of a large number of variables, focus upon major variables gets distorted. For this we use factor analysis.

FACTOR RETENTION

1. Since principal components analysis and factor analysis are data reduction methods, there is a need to retain an appropriate number of factors based on the trade-off between simplicity (retaining as few as possible factors) and completeness (explaining most of the variation in the data).
2. The Kaiser's rule recommends retaining only factors with eigen values exceeding unity. Intuitively, this rule means that any retained factor z should account

for at least as much variation as any of the original variables x .

3. In practice, the scree plot of the eigen values is examined to determine whether there is a "break" in the plot with the remaining factors explaining considerably less variation.

FACTORS FOR THE SECTION "INFRASTRUCTURE PROBLEM IDENTIFICATION"

Descriptive Statistics

	Mean	Std. Deviation	Analysis N
Problem Identification	3.29	1.440	45
Government capability	4.00	1.148	45
Government incapable of proper documentation	3.98	1.097	45
Government project allocation	3.42	.988	45
Private sector make improper DPR	2.78	.927	45
Land Acquisition major issue	4.36	.645	45
Shortage of skilled labor	3.71	.944	45
Timely fund disbursal	3.76	.933	45
Timely statutory clearance	4.11	.682	45
Efficient project tracking	3.69	.925	45

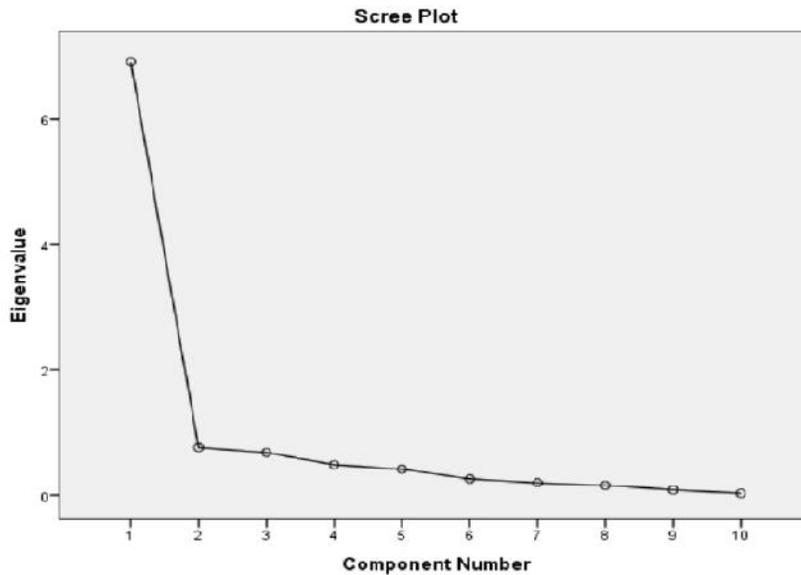
KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.888
Approx. Chi-Square	418.128
Bartlett's Test of Sphericity	df
	45
Sig.	.000

of Sampling Adequacy test shows a value of .888 which is greater than 0.5 which shows that the samples are sufficient enough to give a correct representation of the case. The Bartlett's Test of Sphericity also shows a significance level of .000 which is lesser than 0.05 which shows that factor analysis is appropriate for our data. The correlation matrix shows the level of correlation between the different variables. Correlation level of values greater than ± 0.3 is generally considered good and in the below table we find a lot of variables with correlation coefficients greater than 0.3.

45 samples here were considered and the individual means and standard deviations of these factors were calculated using these 45 samples. The Kaiser-Meyer-Olkin Measure

Scree Plot



Here component 1 is the sole factor with Eigen value greater than 1.

Component Matrix

	Raw	Rescaled
	Component	Component
	1	1
Problem Identification	1.389	.965
Government capability	1.103	.960
Government incapable of proper documentation	1.044	.951
Government project allocation	.769	.779
Private sector make improper DPR	.822	.887
Land Acquisition major issue	.450	.697
Shortage of skilled labor	.607	.642
Timely fund disbursal	.502	.538
Timely statutory clearance	.474	.696
Efficient project tracking	.601	.650

Extraction Method: Principal Component Analysis.

a. 1 components extracted. It shows that the first three components have high probability of explaining the 45 samples.

ANALYSIS OF THE SOLUTION

From the above analysis it was found that “problem identification” by the government agencies was the genesis of all problems faced by the infrastructure sector.

The government agencies need to do proper ground studies so as to mitigate the problems faced by the industry.

FACTORS FOR THE SECTION “PRIVATE SECTOR INVOLVEMENT”

Descriptive Statistics

	Mean	Std. Deviation	Analysis N
Private sector money laundering	4.13	.786	45
Private sector project efficiency	2.22	.850	45
Private sector acquires more land	2.91	.949	45
Private sector bribes	3.78	1.064	45
Private sector develops mafias	2.78	1.106	45
Private sector degrades environment	2.96	1.224	45
Public sector project greater social impact	3.98	.965	45

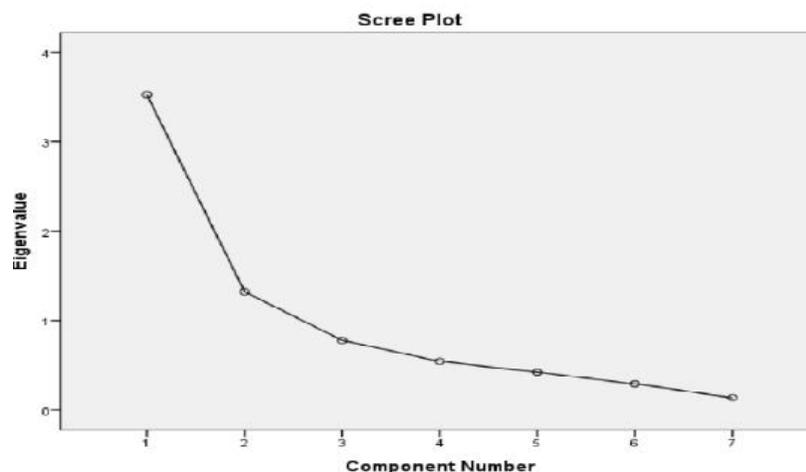
KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.614
Approx. Chi-Square		128.327
Bartlett's Test of Sphericity	df	21
	Sig.	.000

45 samples here were considered and the individual means and standard deviations of these factors were calculated using these 45 samples. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy test shows a value of .614 which is greater than 0.5 which shows that the samples are sufficient enough to give a correct representation of the case. The Bartlett's Test of Sphericity also shows a

significance level of .000 which is greater than 0.05 which shows that factor analysis is appropriate for our data. The correlation matrix shows the level of correlation between the different variables. Correlation level of values greater than ±0.3 is generally considered good and in the below table we find a lot of variables with correlation coefficients greater than 0.3.

Scree Plot



The above figure shows that component 1 and 2, show an eigen value greater than 1 and cumulatively they explain 69.030% of the variance in the set of data.

ANALYSIS OF THE SOLUTION

From the above analysis it was found that private sector misappropriates money intended for infrastructure projects and the efficiency of private sector project implementation is less as was thought otherwise.

FACTORS FOR THE SECTION “SOLUTIONS TO ADDRESS INFRASTRUCTURE BOTTLENECKS”

Descriptive Statistics

	Mean	Std. Deviation	Analysis N
Land should be acquired by government	4.22	1.085	45
Single window clearance	4.11	.775	45
Dispute redressal mechanism	3.87	.757	45
Quality of projects more important than L1	3.18	.684	45
SIa mandatory	3.13	1.140	45
Contractor ranking mechanism	3.78	.735	45
Profit limitation	2.89	.775	45
Citizen's voice	4.24	.679	45

45 samples here were considered and the individual means and standard deviations of these factors were calculated using these 45 samples. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy test shows a value of .671 which is

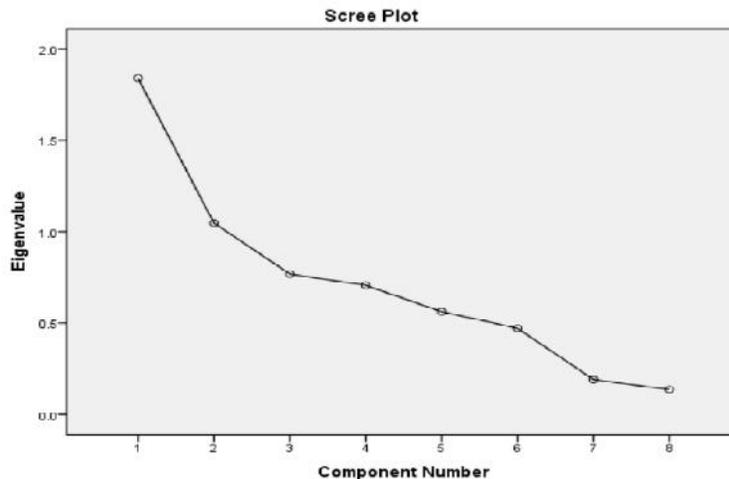
greater than 0.5 which shows that the samples are sufficient enough to give a correct representation of the case. The Bartlett's Test of Sphericity.

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.671
Approx. Chi-Square	66.362
Bartlett's Test of Sphericity	df
	28
	Sig.
	.000

also shows a significance level of .000 which is greater than 0.05 which shows that factor analysis is appropriate for our data. The correlation matrix shows the level of correlation between the different variables. Correlation

level of values greater than ±0.3 is generally considered good and in the below table we find a lot of variables with correlation coefficients greater than 0.3.



ANALYSIS OF THE SOLUTION

From the above analysis it was decided that the solutions which are the most important to solve the problems faced by the infrastructure sector:-

1. Land for infrastructure projects should be first acquired by the government and then it should bidding for the project to hasten the project execution.
2. Representatives from different departments should form a monitoring committee which will act as a single window clearance body for all issues related to the project.
3. Dispute redressal mechanism and arbitration laws must be improved for faster dispute settlement during and post project execution.

HYPOTHESIS TESTING USING ONE SAMPLE T TEST

An assumption made about a population’s parameter is referred to as statistical hypothesis. The assumption however, made may either be true or false. There can be

two possible outcomes. Either to accept the statistical hypothesis or to reject the hypothesis.

HYPOTHESIS TESTING FOR THE SECTION “PRIVATE SECTOR INVOLVEMENT”

We considered 7 null hypothesis and we considered the mean of the null hypothesis to be 3 and we ran one sample T tests to understand whether the null hypothesis was true or not.

If the mean of the 45 samples was greater than 3 and the significance level of the two tailed comparison less than 0.05 then the null hypothesis would be untrue and the proposed hypothesis would be right.

HYPOTHESIS TEST 1

Private sector companies mis-manage money from loans availed from the banks for infrastructure projects.

Mean of null hypothesis = 3

Mean of Alternate hypothesis > 3

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Private sector money laundering	45	4.13	.786	.117

One-Sample Test

	Test Value = 3					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Private sector money laundering	9.670	44	.000	1.133	.90	1.37

Here the sample mean is 4.13, the degree of freedom is 44 and the significance level is less than 0.5.

Thus we can conclude that the null hypothesis is untrue and that we can say with 95% confidence level from the questionnaire samples that private sector companies mis-manage money from loans availed from the banks for infrastructure projects.

HYPOTHESIS TEST 2

Efficiency of private sector investment is far less as compared to public sector investments.

Mean of null hypothesis = 3

Mean of Alternate hypothesis > 3

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Private sector project efficiency	45	2.22	.850	.127

One-Sample Test

	Test Value = 3					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Private sector project efficiency	-6.139	44	.000	-.770	-1.03	-.52

Here the sample mean is 2.22, the degree of freedom is 44 and the significance level is less than 0.5. Thus we can conclude that the null hypothesis is true and that we can say with 95% confidence level from the questionnaire samples that efficiency of private sector investment is more as compared to public sector investments.

HYPOTHESIS TEST 3

Private sector in the garb of development acquires more agricultural land than is necessarily required for construction projects, to create land banks resulting in shortage of agricultural land.
 Mean of null hypothesis = 3
 Mean of Alternate hypothesis > 3

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Private sector acquires more land	45	2.91	.949	.142

One-Sample Test

	Test Value = 3					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Private sector acquires more land	-.628	44	.533	-.089	-.37	.20

Here the sample mean is 2.91, the degrees of freedom are 44 and the significance level is .533. Since the significance level is greater than 0.05, thus we cannot say correctly whether the null hypothesis is correct or wrong.

HYPOTHESIS TEST 4

Private sector ignores the environment and other socio economic parameters while executing a project, since maximization of profit is its only aim.
 Mean of null hypothesis = 3
 Mean of Alternate hypothesis > 3

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Private sector degrades environment	45	2.96	1.224	.182

Table 7.30 One-Sample Test

	Test Value = 3					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Private sector degrades environment	-.244	44	.809	-.044	-.41	.32

Here the sample mean is 2.96, the degrees of freedom are 44 and the significance level is .809. Since the significance level is greater than 0.05, thus we cannot say correctly whether the null hypothesis is correct or wrong.

HYPOTHESIS TEST 5

Public sector investments have greater social impact and benefit as compared to private sector investments
 Mean of null hypothesis = 3
 Mean of Alternate hypothesis > 3

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Public sector project greater social impact	45	3.98	.965	.144

One-Sample Test

	Test Value = 3					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Public sector project greater social impact	6.797	44	.000	.978	.69	1.27

Here the sample mean is 3.98, the degrees of freedom is 44 and the significance level is .000.

Thus we can conclude that the null hypothesis is untrue and that we can say with 95% confidence level from the questionnaire samples that Public sector investments have greater social impact and benefit as compared to private sector investments.

CONCLUSION

From the various tests conducted on the samples such as Factor analysis test & Hypothesis test, it was found that the people would have taken the survey find that:-

1. Though loans are taken from banks for infrastructure projects, much justice is not done with the availed money.
2. Public sector considers social impact better than private sector.
3. However, in terms of efficient delivery, private sectors does a better job.

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