

Socio-economic analysis of Vivekananda Setu, Kolkata, West Bengal – An insight

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Abstract

Developing economies, urgently need new infrastructures such as sanitation, potable water and drivable roads. Previously, many governments – by far the biggest source of financing for infrastructure projects – supported the infrastructures and project finance markets with cash and/or guarantees. Furthermore, infrastructure stimulus packages will understandably reverse as governments look to bring their finances under control. The study has been done on Vivekananda Setu & it has been sub-divided into various sub-sections based on a structured questionnaire. The present research will try to evaluate the socio-economic improvements by looking at opportunities for economic productivity, socio-economic capability to enhance a sustainable and healthy life and equal economic distribution. The tools used here mainly are Exploratory Factor Analysis using Principal Component Analysis with Varimax Method of rotation.

Key words :- Vivekananda Setu, Economic productivity, Structured questionnaire, Exploratory Factor Analysis, Principal Component Analysis etc.

JEL Classification:-H51, H52, H53, H54

Date of Submission: 29-05-2021

Date of Acceptance: 12-06-2021

I. Introduction

The economists have the opinion that infrastructure is the backbone of the economy. Various empirical data clearly shows that if given a choice, investors always prefer to invest their money in countries whose infrastructure is more developed. Vivekananda Setu is one of those infrastructures. Therefore, it can be said that rapid infrastructure development is one of the most popular ways through which a country can take advantage of various economic opportunities. Therefore, it is of no surprise that countries around the world focus heavily on building infrastructure.

This amazing looking bridge made up of steel provides a great place or position affording a good view on the Hooghly River, and that body of water that flows along the western edge of Kolkata. Walking, driving, going for a morning exercise or taking the train across the impressive Bally Bridge that is standing with one leg on either side of the Hooghly River. This important Setu crossing links Dakshineswar in Kolkata with Bally in the Howrah district. The colossal steel structure is 2,887 feet (880 meters) long and took six years to build, being completed in 1932.

II. Brief Review of Literatures

Klingebiel (2001) stated that as part of an overall strategy to induce private funding and provision of infrastructure services, governments have offered support to investors in the form of grants, loans and guarantees. These supports have often been provided through an institutional approach of specialized financing facilities.

Winters et al. (2002) examined the issue of regional cooperation among neighbouring countries in the area of regional public goods. This public goods include water basins (e.g., lakes, rivers, underground water), infrastructure (e.g., roads, railways, dams), energy and the environment.

Bhattacharyay (2010) stated that infrastructure plays a key role in promoting and sustaining rapid economic growth. Properly designed infrastructure can also make growth more inclusive by sharing its benefits with poorer groups and communities, especially by connecting remote areas and small and landlocked countries to major business centres.

Inderst, G. (2013) discussed explicitly the structure and development of private infrastructure finance in Europe in a global context. It examined that the contribution of private capital to the financing of infrastructure investment needs. A broad picture is created by putting the various financing instruments and investment vehicles into a simple frame, i.e. percentages of GDP.

Broadhurst et al. (2017) reviewed cyber-terrorism and outlines the main trends and challenges presented by the convergence of the exceptional reach, speed and scale of the Internet and the political ambitions of violent extremists. There are various chapters on cyber weapons, critical infrastructure, attribution, Internet of Things, recruitment and propaganda, financing, legislation and counter measures, and cyberwar. Each of them provides a brief summary of a key aspect of the cyber terror phenomenon, an analysis of emerging trends or perspectives, and other relevant information or examples identified during the research.

Objectives of the study

- To provide a brief overview of Vivekananda Setu, Kolkata, West Bengal
- To highlight on the social impact of the selected infrastructure
- To focus on the economic impact of the selected infrastructure

III. Research Methodology

- The data collected for the study is primary in nature. The data has been collected with the help of a structured questionnaire. Random Sampling method has been used to select the respondents before interviewing.
- At first a pilot survey has been conducted here within 30 respondents to gather a basic knowledge about the customers' perception regarding the selected bridges.
- Then on the basis of the factors identified a structured questionnaire in 5-point Likert scale has been prepared to conduct the market survey **amongst 130 respondents**
- The Bride is chosen on Judgemental Sampling Basis amongst the prominent bridges in Kolkata and its surroundings.
- Appropriate statistical tools and techniques including descriptive statistics, Exploratory Factor Analysis and multivariate analytical techniques will be used depending on the nature of data.

IV. Results & Discussions

Gender of the Respondents: Out of the total respondents of 130, for this particular bridge, 26.52% are males and 73.8% are females.

Educational qualification of the Respondents: Majority of the respondents were below 10th standard.

Monthly Incomes of the Respondents: Majority of the respondents have monthly income of more than ₹ 30000.

Residential Areas of the Respondents: Out of those 130 respondents, 31.5% belongs to the City areas, 27.7% belongs to the Town areas and only 40.8% belongs to the Village areas.

Climatic conditions of the study area: Due to the formation & usage of the Vivekananda Setu, no major changes came out in the climatic conditions of the nearby areas of the bridge.

Land Use of the study area: Due to the formation & usage of the Setu, Land usage became unstructured for maximum of the respondents.

Air Quality of the study area: After the formation & usage of the Vivekananda Setu, the maximum respondents were bifurcated between that the Air Quality remain normal and it became suffocating due to bridge.

Soil Quality of the study area: As 62.3% of the respondents responded that the Soil Quality in the nearby areas of the bridge became highly unhygienic, so it can be concluded that, after the formation & usage of the Setu, Soil quality in the nearby areas of the bridge became highly unhygienic.

Noise Levels in the study area: After the formation & usage of the Vivekananda Setu, the Noise Levels remained gone beyond tolerance limit according to the responses of the maximum respondents.

Vibration in the study area: After the formation & usage of the Setu, majority of the respondents said that Vibration Levels gone beyond tolerance limits.

Past Emanation of the study area: After the formation & usage of the Setu, majority of the respondents said that Past Emanation gone beyond tolerance limits.

Traffic Jam in the study area: After the formation & usage of the Setu, majority of the respondents said that the traffic jam gone beyond tolerance limits.

Solid Waste Disposal in the study area: After the formation & usage of the Setu, majority of the respondents said that the solid waste disposal is normal.

Drainage in the study area: After the formation & usage of the Vivekananda Setu, majority of the respondents said that the drainage system gone beyond tolerance limits.

Conveyance in the study area: After the formation & usage of the Setu, majority of the respondents are not at all happy with the conveyance facilities they are receiving from the bridge.

Findings of Exploratory Factor Analysis

The responses of the questionnaire are measured on a Likert scale; hence they are continuous in nature. In the exploratory phase to find out the constructs from the dataset, Exploratory Factor Analysis has been conducted. The following sections represents the results: -

Table 1: KMO & Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.640
Bartlett's Test of Sphericity	Approx. Chi-Square	822.568
	Df	210
	Sig.	.000

(Source: Primary Data compiled through SPSS)

The value of KMO is **0.640** which is much higher than 0.5 that indicates the sample is adequate for carrying out factor analysis. On the other hand, the control of Sphericity (Bartlett's sig < 0.001) proves that EFA can be carried out.

Principal Component Analysis for Exploratory Factor Analysis

In order to carry out Principal component analysis (PCA), and to identify the factors which have socio-economic impact on the respondents, there are twenty-one (21) variables which are extracted into seven (7) factors which explain **65.316 of the total variances**. The rotated component matrix has been developed with Principal component analysis as extraction method and Varimax with Kaiser normalisation which is shown in the tables below:-

Table 2: Total Explained Variance

Total Explained Variance									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.782	18.010	18.010	3.782	18.010	18.010	2.987	14.226	14.226
2	2.444	11.638	29.648	2.444	11.638	29.648	2.335	11.121	25.347
3	2.193	10.443	40.091	2.193	10.443	40.091	2.236	10.648	35.995
4	1.751	8.338	48.429	1.751	8.338	48.429	1.820	8.669	44.663
5	1.343	6.394	54.822	1.343	6.394	54.822	1.778	8.468	53.131
6	1.142	5.438	60.261	1.142	5.438	60.261	1.394	6.638	59.769
7	1.062	5.055	65.316	1.062	5.055	65.316	1.165	5.546	65.316
8	.982	4.678	69.993						
9	.880	4.190	74.184						
10	.785	3.736	77.920						
11	.710	3.380	81.299						
12	.682	3.248	84.547						
13	.537	2.557	87.104						
14	.493	2.346	89.451						
15	.453	2.159	91.610						
16	.435	2.070	93.680						

17	.355	1.692	95.372						
18	.307	1.464	96.836						
19	.271	1.292	98.128						
20	.211	1.006	99.134						
21	.182	.866	100.000						
Extraction Method: Principal Component Analysis.									

(Source: Primary Data compiled through SPSS)

Table 3: Rotated Component Matrix

Rotated Component Matrix							
	Component						
	1	2	3	4	5	6	7
X1	.784						
X2	.757						
X3	.707						
X4	.591			.525			
X5	.570						
X6		.869					
X7		.850					
X8		.744					
X9			.776				
X10			.718				
X11			.656				
X12	.522		.587				
X13				.691			
X14				.587			
X15				.557			
X16				.504			
X17					.903		
X18					.869		
X19						.707	
X20						.688	
							.552
Extraction Method: Principal Component Analysis.							
Rotation Method: Varimax with Kaiser Normalization.							
a. Rotation converged in 9 iterations.							

(Source: Primary Data compiled through SPSS)

The component matrix denotes the correlation between the variable and the factor. But, in some cases there may be a situation where a single variable has very similar kind of correlation for more than one factor, to avoid this factor loading it is determined through Rotated Component Matrix.

Again, from the above rotated component matrix, it can be said that decision making in relation to the socio-economic impact of the **Vivekananda Setu** on the respondents (D_{SEIV}) depends on **seven** factors namely, “**Fear & Complexity**”, “**Climatic Changes & Natural Disasters**”, “**Availability of Consumables & Necessities**”, “**Transport & Socio-economic aspects**”, “**Health & Medical Facilities**”, “**Livelihood**” and “**Higher Education**” i.e.

$$D_{SEIV} = \beta_1 + \beta_2 + \beta_3 + \beta_4 + \beta_5 + \beta_6 + \beta_7$$

$$= (0.784X_9 + 0.757X_8 + 0.707X_6 + 0.591X_{12} + 0.570X_{10} + 0.522X_7) + (0.869X_{21} + 0.850X_{20} + 0.744X_{18}) + (0.776X_{14} + 0.718X_5 + 0.656X_{13} + 0.587X_7) + (0.691X_4 + 0.587X_{16} + 0.557X_{15} + 0.504X_{11}) + 0.903X_2 + 0.869X_1 + (0.707X_{17} + 0.688X_{19}) + (0.522X_3)$$

V. Conclusion

According to the EFA, it can be concluded that there are seven factors namely “**Fear & Complexity**”, “**Climatic Changes & Natural Disasters**”, “**Availability of Consumables & Necessities**”, “**Transport & Socio-economic aspects**”, “**Health & Medical Facilities**”, “**Livelihood**” and “**Higher Education**” which have proper impact on the socio-economic condition of the users of Vivekananda Setu.

Rather than the above figures, anybody who used the bridge and had a look over the views of the bridge had to admire the impressive engineering feat up close, stroll along the walkway and have to pause for some time to study the network of girders. The Bridge was built with eight spans laid at distance of 300 ft each. The length of bridge is almost half mile with 10 km approach roads on both sides which increases the flexibility of the bridge. This bridge is very much adjoined with railways, because the Railway for the first time crossed

over River Hooghly and reached Calcutta at Sealdah Terminus. But Vivekananda Setu had become weak as a result of ageing, its increasing utilities and the traffics are day by day increasing, even repairs were becoming difficult. There was very much in need for a second bridge. Therefore Nivedita Setu was constructed parallel to it and around 50 metres (165 ft) downstream which is also another part of my research work. It was opened to traffic in 2007. Vivekananda Setu allows traffic movement upstream (Bally to Kolkata) while Nivedita Setu helps downstream transport (from Kolkata to Bally).

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