IDENTIFYING RISK FACTORS AFFECTING MANAGEMENT AND MAINTENANCE OF URBAN TRANSPORTATION

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Abstract - *Urban transportation systems in most developing countries face major challenges. The existing road transport infrastructure capacity in most cities in the developing economies has reached critical level and is unable to meet the huge demand from the increasing number of vehicles. The challenges have been attributed to continuous growth in urban population, private vehicle ownership, ineffective traffic management system and the ineffectiveness of public transport services which are the causes of traffic congestion with dire consequences on social and economic activities.*
This project aims to identify the risk factors that influence the performance and operating of the urban transportation during its life cycle. The risk factors influence the longevity, fitness, and adaptability of the facility dictating the necessity and timing of renewal or rehabilitation. To identifies risk factors that influence the cost-effective management, operation, and maintenance of bridges, roads and highways, and terminal/stations as well as how and when in the project life cycle the identified risk factors impact the associated facility By knowing the risk factors gives better understanding in allocation of fund to management parties/stakeholders involved.

***Key Words*: Infrastructure, Urban Transportation, Risk Identification, Risk Classification**

1. INTRODUCTION

Infrastructure is the basic physical and organizational structure needed for the operation of a society or enterprise or the services and facilities necessary for an economy to function. It can be generally defined as the set of interconnected structural elements that provide framework supporting an entire structure of development. It is an important term for judging a country or region's development.

The infrastructure sector covers a wide range of services such as transportation (including roadways, railways, airways and water transportation), power generation, transmission and distribution, telecommunication, port handling facilities, water supply, sewage disposal, irrigation, medical, educational, and other primary services.

1.1 Overview of Urban Infrastructures

The growth and development of the society depends on the physical infrastructures for distributing resources and essential services to the public. As per census data of 2011, a very large proportion of India's population still lives in Indian villages. Only nearly 31 % of the total population lives in urban areas about 5,161 towns and cities. Which generate 60 % of the nation's GDP. . Over the past four years, the Indian Economy consistently recorded growth rates in excess of 8.5% per annum resulting in rapidly increasing infrastructure spending. Total infrastructure spending is expected to increase from US$ 24 billion in 2005 to US$ 47 billion in 2009. In the World Economic Forum's Global Competitiveness Report for 2016- 2017, India's infrastructure ranked 39th according WEF index.

JnNURM funds specific projects for urban infrastructure and basic urban services in 65 cities of India through two schemes, i.e. the Scheme for Urban Infrastructure and Governance (UIG) and the Scheme for Basic Services to the Urban Poor (BSUP). Under the JnNURM, the Government of India enters into partnership with state governments and ULBs. As a first step, the ULB has to prepare a perspective plan or a City Development Plan (CDP), which is followed by a Detailed Project Report (DPR) in line with the priorities laid out in the CDP. . The state government and the ULB of a Mission city are required to sign a memorandum of agreement (MoA) with the Government of India, where both the state government and the ULB commit to a set of reforms and they all agree to share in the funding of the project.

India's municipal corporations, municipalities and Nagar Panchayat (NP) - commonly known as urban local bodies (ULBs)- need to be strengthened as local self-governments with clear functions, independent financial resources, and autonomy to take decisions on investment and service delivery. India has 4,143 Urban Local Bodies (ULBs), of which 162 are Municipal Corporations (MCs), 1,482 are municipalities and 2,349 are Nagar Panchayat (NPs) (i.e. Notified Area Councils that are in transition from rural to urban areas) [11].

2. URBAN TRANSPORTATION

Urban transportation refers to the system of transportation that provides access and mobility for people and goods within cities. Elements of urban transportation include public transit (collective transport); non-motorised transport (pedestrians, cyclists) and freight. Effective urban transport systems are essential to economic activity and quality of life.

Urban transportation opens up opportunities to access essential services as well as social activities. Business activities depend on urban transportation systems to ensure the mobility of its customers, employees and suppliers.

Urban travel in Indian cities predominantly happens through walking, cycling and public transport, including intermediate public transport (IPT). Despite high growth rates of motorised two wheelers and cars in the last two decades (15 per cent and 10 per cent per annum respectively), car ownership remains at 3–13 per cent of the households and two wheelers at 40–50 per cent [10].
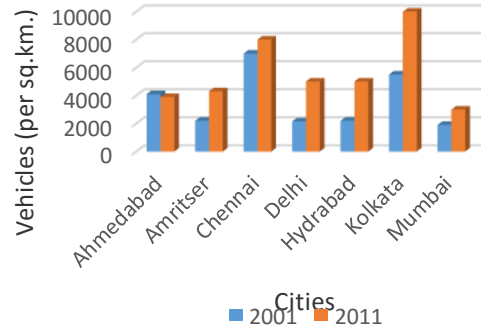
Transportation infrastructure mainly includes roads, parking lots, vehicles and transportation terminals. Urban traffic management system is also an important component which can properly control and guide the distribution of traffic flows on roads.

Table -1: Urban Road Length in Kilometer (1981-2011)

	1981	1991	2001	2011
Urban road length (km)	123120	180799	252001	411840
Urban population (Million)	159	217	285	377
Urban roads in km per million population	774	833	884	1092
Registered motor vehicles (Million)	5.7	21.4	55	141.9
Total population (Million)	683	846	1027	1210
Registered motor vehicles/milli on population	8346	25.296	53554	117273
Ratio of urban population and registered vehicles/milli on population	0.1	0.03	0.02	0.01

Source: Basic Road Statistics, 2011

Sources: Road Transport Year Book, 2012(MoRTH, GoI.2013)

Chart -1: Trends in Urban vehicular Density Trend (vehicles/sq.km)

The total number of registered motor vehicles in India increased from about 0.3 million in 1951 to nearly 142 million in 2011 (MoRTH, GoI, 2013) an increase of 7.7% per annum. As against a population increase of 3.8% per annum during the same period. Like the population growth, motorization has also not been uniform across cities, with some having grown faster than others. The older cities like Mumbai and Kolkata seem to have had a slower growth in motorization compared to the smaller and faster growing cities.

Registered vehicles per million population has increased by 219% while urban roads per million increased by only 124%, in the last decade. The road space for vehicles has decreased (from 0.18 km per vehicle to 0.01 per vehicle) in the last few decades, resulting in high levels of congestion in all cities.

3. PAPER REVIEWED

Jennifer S. Shang, Youxu Tjader, and Yizhong Ding [1] have performed the potential of applying the analytic network process (ANP) to evaluate transportation projects in Ningbo, China. ANP differs from traditional hierarchical analysis tools in that it allows feedback and interdependence among various decision levels and criteria. Compared with the conventional transportation evaluation methods, our model has incorporated a much wider range of long-term and short-term factors, which are classified into benefits, opportunities, costs, and risks. Tactical and operational issues are taken into consideration.

Jie Li and Patrick X.W. Zou [2]have performed develop a risk identification framework from the perspectives of project life cycle, and an assessment framework for risks associated with PPP project using fuzzy analytical hierarchy

process (AHP). Furthermore, the paper provides a framework for assessment of risks in PPP projects followed by an illustrative example where the data was obtained from survey questionnaires.

Roger Allport, Richard Brown [3] have performed examined the success of individual projects from three viewpoints – financial success, policy success and durability success – and have undertaken an assessment of the factors that led to success or failure, focusing on six factors that, based upon our experience we hypothesise are particularly important. Some of these case studies have considerable depth, and all are based on our understanding of the local situation.

John Lark and Mr. Lark [4] have performed Risk has consequences in terms of economic performance and professional reputation, but there are also environmental, safety and social considerations. These risks may be internal or external, direct or indirect. ISO 31000:2009 — Risk management — Principles and guidelines, provides a set of principles, a framework and a process for managing risk. Using ISO 31000:2009 can help organizations of all sizes increase the likelihood of achieving their objectives, improve the identification of opportunities and threats, and effectively allocate and use resources for risk treatment.

Sanjay Kumar Singh [5] performed Cities and towns play a vital role in promoting economic growth and prosperity. Although less than one-third of India's people live in cities and towns, these areas generate over two-third of the country's income and account for 90% of government revenues. Poor transport systems stifle economic growth and development, and the net effect may be a loss of competitiveness in both domestic as well as international markets. Although Indian cities have lower vehicle ownership rate, number of vehicles per capita, than their counterparts in developed countries, they suffer from worse congestion, delay, pollution, and accidents than cities in the industrialized world.

Roshan Shetty [6] performed and defined a huge gap between the demand and supply of the essential public amenities. The paper gives an overview of importance of infrastructure sector and also the need for the Private Public Partnership in the infrastructure development. The paper also discusses on Environment Impact Assessment (EIA) as tool to predict the consequences of any proposed or development project on the environment along with the economic and social aspects when planning infrastructure development.

Kamal Pande Kathmandu [7] have performed Some of the institutional risks that persist in this sector are lack of (i) budget planning, (ii) proper selection of road projects (projects are often selected based on political pressure), (iii) efficiency in management practices, (iv) timely mitigation of implementation issues and (v) clarity on procurement issues. There is an urgent need for clarity on contractual provisions and proper documentation of these arrangements for an effective project delivery.

Dr. O.P. Agarwal, Ms. Sujaya Rathi, Ms. Kanika Kalra [8] have performed and defined The total number of motor vehicles in many cities has more than doubled in the last 10 years alone, causing severe congestion, air pollution, increasing incidence of road accidents and a very rapid increase in the consumption of petroleum fuels. It is well recognized that poor transportation has the potential to adversely impact the economic efficiency of our cities as well as the health and well-being of urban Indians. Although the country adopted a National Urban Transport Policy in April, 2006 emphasizing on the prioritization of public transport and non-motorised modes over personal motor vehicles, the pace of motorizations has continued. Clearly there is a need to step back and review what has happened so far so that future directions can be better aligned to deal with the emerging problems.

K. Rajkumar, Dr. S. AnandaKumar [9] have performed A key motivation for governments considering PPP is the possibility of bringing in new sources of financing for funding public infrastructure and service needs. An introduction to PPP and a comprehensive review of literatures regarding Public Private Partnership projects are included. The observations from case studies and the literature studies were used to identify the critical factors influencing the infrastructure development projects under public private partnership. The data for this study will be gathered through a detailed questionnaire survey.

3. NEED OF STUDY

With a population of about 1.2 billion people, transportation in India is imperative to the nation's economy. Since the economic liberalization of the 1990s, development of infrastructure within the country has progressed at a rapid pace, resulting in many modes of transport by land, water and air. Though the number of motor vehicles is low when compared to global standards, the automobile industry in India is rapidly growing, with a production of over 4.6 million vehicles.

Under existing approaches, urban infrastructure project financing is structured in a way which creates flaws inefficiencies and added costs, greater political (policy) risk, and a lack of diverse ownership needed for transparent incentives. A number of key risks need to be taken into consideration as well. These risks will need to be allocated and managed to ensure the successful financing of the project. The party that is best placed to manage these risks in an effective way.

4. AIM AND OBJECTIVES OF THE STUDY

[1] To review the key trends in urban India that translate into negative externalities or problems in urban transportation.

[2]   To identify gaps in the existing policies and programs   as well as propose a set of recommendations to address the main challenges.

[3]   To identify the various critical risk factors in Urban transportation development.

[4]   To conduct a survey among urban transportation environment and predicting probability and expect impact of occurrence of the most critical risks.

5. SCOPE OF THE PROJECT

The project is concentrated on Urban Transportation projects which come under the Indian scenario only. The scope of the research was the urban transport, which covered City of Gujarat and its suburbs. The perspectives of the key actors were framed into issues and recommendation with a view to identify the risk factors and quality of urban transport.

6. METHODOLOGY

[1]   Objectives

[2]   Review of literature & collection of case studies

[3]   Data collection in terms of management and maintenance of urban transportation

[4]   Identification of Risk Factors

7. IDENTIFICATION OF RISK FACTORS

The purpose of this research was to identify the various risk factors that have a potential to adversely influence in managing and operation of urban transportation. As the primary source of data for this research was available literature and personnel interviews, a subjective approach for identifying and analysing risk factors was preferred over an objective mode of analysis. The literature selected for this research dealt with potential failure modes that have been defined as discrete failures, deficiencies, or problems commonly encountered. Additionally, the selected material also identified the immediate physical causes of failure modes, and in many cases, proposed means of repair, correction, or prevention, all in great detail.

Risk factor have to be determined before the risk being allocated, they have to anticipate the risk so it will be more organize and prepared. In order to achieved at this stage, a study based on same research objective being used to develop idea for this study. The risk factor were generated based on extensive literature review.

8. DATA COLLECTION

Field based surveys include observational surveys and passenger interviews. Observational surveys are conducted to understand the behaviour of subjects without any specific

response from the subjects. They are merely observed as they perform the normal activities. Examples of observational surveys include traffic counts (boarding and alighting counts, vehicle counts etc), transport inventory surveys etc. While observational surveys measure the system as it currently exists; many times it is necessary to understand the changes in travel behaviour due to changes in the operating systems. In such cases it is necessary to conduct passenger surveys. Methods used for the collection of Management and maintenance data include manual method.

Study area: Ankleshwar station road

Features of Study area: This area is major source of trip production and attraction. Connecting major two road which is produce maximum trips for Ankleshwar city as an entrance gates for this city.

Weather Condition: It was initially a foggy day but afterwards it became clear.

Method: Direct Manual Method

Number of Enumerators: Six

9. SURVEY ANALYSIS

Table -2: Types of survey carried out and its result

Types of survey	Finding
Roadway Network Survey	Very poor roadway condition and drainage line No improvement in design since last decade
Classified traffic volume count	Current traffic volume limit nearly exceed design limit Movement of restricted vehicles
Pedestrian count survey	Major flow around carriageway Food stall/cart stall restricted pedestrian movement
Speed and delay survey	Variances in travel time and delay occurs due to unpredictable sources
Parking duration survey	Major problem for city produce several problem Absentees of management
Bus-Occupancy Survey	Level of service poor Management need new techniques and equipment

10. RISK FACTORS COMMON TO ALL URBAN TRANSPORTATION FACILITIES

A	**Management Risks**
1	Forecast and calculation
2	Design concept
3	Design details
4	Deterioration
B	**Operational Risks**
1	Road congestion
2	Parking problems
3	Deteriorating road safety
4	Infrastructure Risk
5	Risk of theft
6	Risk of overloading
7	Risk of Drivers
8	Weather condition
9	Relationship risk
C	**Environmental Risks**
1	Air pollution
2	Water pollution
3	Noise pollution
D	**Political and government risks**
1	Transportation Policy
2	Multiplicity of Laws*
3	Government duties and taxes
4	Unstable government
5	Attitude of government towards foreign investors/investors
6	Inconsistences in government policies
7	Change in law
8	Judicial risk
9	Corruption risk/Market-distortion risk
E	**Technological Risks**
1	Vehicular technologies
2	Traffic equipment
F	**Construction Risks**
1	Capital materialized problem
2	Completion delay
3	Too many late design variation
4	Construction cost overrun
5	Poor quality workmanship
6	Safety risk
7	Inflation rate volatility
8	Construction force majeure events
9	Accidents during construction
G	**Project finance Risks**
1	Financial Legislation change
2	Poor financial market
3	Inflation rate volatility
4	Little financial attraction of project to investors
5	Ill capital structure
H	**Other Risks**
1	Risk of man-made events*
2	Competitor Risks
3	Risk of natural disasters*

11. CONCLUSIONS

In this paper, we identify various Risk Factors in management and maintenance of Urban Transportation. The identification of risk factor one of the most important stages in order to allocate the risk for any project. The findings from this reviewed study is that the risk factors are clustered into 44. Meanwhile the most frequent factors are Risk of Drivers, Parking problems, Air pollution and forecast and calculation.

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