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GENESIS OF METRO RAIL SERVICE IN DELHI

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ABSTRACT

Urban transport is a key element of urban infrastructure. An effective urban transport network not only ensures high growth of economy, but also empowers the poor by increasing employment opportunities. The transport demands if left unmet may result in a chaotic situation, totally disrupting the growth of the economy. Delhi, a city of high economic value faces the problem of lack of efficient and environment friendly traffic mode which could reduce the travel time, the level of fatigue, delays in reporting to respective jobs, problems of over exhaustion etc. Due to continuous increase in population, employment opportunities and number of vehicles, there is a constant increase in demand over the years and infrastructure has not grown in adequate proportions making the existing network system function beyond its capacity. This has led to serious traffic problems of congestion, delays, safety, pollution and system management. Immediate steps were needed to improve both the quality and availability of mass transport service. This resulted in the launching of Delhi Mass Rapid Transport System (DMRTS), a joint venture between Government of India and Government of Delhi which was implemented by Delhi Metro Rail Corporation. This paper attempts to study the concept of Metro system and the major factors responsible for the development of Metro Rail Service in Delhi.

KEY WORDS: *DMRTS, DPR, RITES, Demographic factors*

I.INTRODUCTION

The birth of Metro (an electrically powered train operating on reserved tracks) dates back to 1863. The first 6 km underground railway was constructed in London between Paddington and Farringdon. Since then, over 130 cities in Europe, Asia and America have built their own metro system.

A Metro can perhaps be best described as a high frequency; urban rail based mass rapid transit system which operates independently of other modes of transport systems. It can be underground, at grade, elevated or a combination of any of the above. However , classifying Metro as heavy rails along with subway, rapid transit and rapid rail, the *American public transportation association* described Metro as an electric railway with the capacity of a heavy volume of traffic characterized by high speed and rapid acceleration passengers rail cars operating singly or in multi car trains on fixed rails, separate rights of ways from which other vehicular and foot traffic are excluded and are having sophisticated signaling and high platform loading.

The above analysis of Metro highlights certain characteristic features of Metro Rail. They are as follows:

- High acceleration and deceleration
- Close inter station distances
- Close doors

- High level of ticket-less movement/ travel
- No scope of luggage and storage
- Air conditioned
- Fast access and dispersal
- Information friendly
- Primarily intra city travel
- Large carrying capacity

To achieve these objectives, the Government of India and the State Government of Delhi jointly started working in the di4rection of developing the Metro network in National Capital Territory of Delhi.

II.OBJECTIVE OF THE STUDY

The objective of the present paper is to study the factors responsible for the development of Metro Rail in Delhi.

III.RESEARCH METHODOLOGY

The study is done using data collected through reports of GOI, books, published articles, journals and websites.

IV.BACKDROP FACTORS

Delhi has experienced massive population growth, national and International significance as the capital city of the second largest country in the world. Delhi has more motor vehicles than Mumbai, Calcutta, Chennai put together. In spite of the roads occupying 21 per cent of the total city area, this large number of motor vehicles causes extreme congestion on roads, ever slowing speed, fuel wastage, environmental pollution and an unacceptable level of road accidents. Despite measures by way of increasing the length of the road network and road surface space through widening, construction of a number of flyovers/grade separators, the traffic congestion has continued to increase unabated. This situation is likely to worsen due to increasing population and economic growth.

The mass transport system will need to be augmented substantially and the road infrastructure, traffic management and associated amenities improved substantively. There is a preponderance of low capacity vehicles such as two wheelers and cars. This is induced by increasing inadequacy of mass transport to cater to travel demand both in quantity and quality. Because of this situation, there is a growing need to construct an environmentally friendly, efficient mass transit system that will reduce traffic congestion and offer rapid and reliable scheduled services.

The urban transport situation in large cities in India is deteriorating. The deterioration is more prevalent in metropolitan cities where there is an excessive concentration of vehicles. Commuters in these cities are faced with acute road congestion, rising air pollution, and a high level of accident risk. These problems cannot be solved without a concise and cogent urban transport strategy. The main objective of such a strategy should be to provide and promote sustainable high-quality links for people by improving the efficiency and effectiveness of the city's transport systems. Policy should be designed in such a way as to reduce the need to travel by personalized modes and boost the public transport system.

Delhi being the capital city is the center of socio economic, cultural and political activities of the country. The city also acts as a major center of trade and commerce and is the nodal point for five national highways and intercity rail corridors, carrying large volumes of heterogeneous passenger and goods traffic. The national highways and other major road network carry intra city and intercity traffic traversing to and from the different parts of the country. The majority share of travel needs of Delhi commuters is met by road based transport systems. Due to continuous increase in population, employment opportunities and number of vehicles, there is a constant increase in demand over the years and infrastructure has not grown in adequate proportions making the existing network system function beyond its capacity. This has led to serious traffic problems of congestion, delays, safety, pollution and system management.

The pressure of traffic movement and its wide variety became the cause of concern for the administrators. They started finding out ways and solutions. The expansion of public transport system by permitting private buses to operate along with DTC was mooted. This could also not solve the problem. There were frequent jams, increase in commutation time, road rage, pollution, health problems, fatigue etc. The government at this juncture started working to find a solution and they thought of developing a metro rail network.

The idea of having a mass rapid transit system for Delhi was mooted decades ago. The *Central Road Research Institute* (CRRI) in 1969-70 conducted an exhaustive study on traffic and travel characteristics of Delhi and projected the transport demand for 1981. It is at this juncture, the CRRI projected the need for a mass rapid transit system.

In 1975, *metropolitan transport project of Delhi* recommended a Mass Rapid Transit System network

comprising of 36 km of underground corridors and 97 km of surface/elevated corridors.

The Town and Country planning organization reassessed the transport demand projection for 2001 and proposed an underground network of 58 km besides a surface corridor of 195 km.

In 1984, the *Delhi Development Authority* prepares a perspective plan for the city keeping in view traffic projections for 2001 and recommends a multi modal transport system comprising 200 km of light rail transit system, 10 km of tramway, an extension to surface rail system and extensive road network.

In 1990, *RITES limited* submits a feasibility report on Integrated Multi Modal Mass Rapid Transport System comprising rail corridors, Metro corridors and dedicated Bus way with a total length of 184.5 km, subsequently increased to 198.5 km.

In 1991, RITES was retained by Government of The National Capital Territory of Delhi (GNCTD) to prepare a Detailed Project Report (DPR) and the Tender Documents for the first phase of the project. The DPR was strengthened with a thorough updating of facts and figures and the conducting of highly detailed techno-economic studies and social and environmental impact assessment surveys in the year 1993-94.

The Delhi Metro Rail Corporation Limited was registered on May 3, 1995 under the companies Act, 1956. The Union Cabinet approved the first phase of the Delhi Metro Project.

The feasibility report recommended for the development of mass transit system to cater to the requirements of the people of Delhi and NCT. The major factors responsible for taking this decision were:

- Demographic factors
- Inadequacy of public transport system
- Traffic Jams
- Increased Commutation Time
- Fall in Productivity Due to Loss of Working Hours
- Reduction in Traffic Speed
- Accidents
- Pollution
- Health Hazards

4.1 Demographic factors:

The National Capital Territory of Delhi (NCTD) is a giant metropolis, which has witnessed phenomenal growth and challenges both in terms of population and urban activities during the last five decades. The migration in 1947, industries, search for livelihood are the factors for continuous urbanization and population growth. Like all major cities in the country, the capital city of Delhi faces a huge amount of migration every year. Migration plays a major role in the growth of population of NCT Delhi. Delhi has been receiving population through international and internal migration. Amongst the migrants, majority of the population belongs to the states of NCR. Most of the Population is migrating for employment purposes. Besides these there are a large number of daily migrants (floating population). This causes pressure on Delhi's infrastructure and services.

As per 2001 Census, NCT of Delhi had a total population of 138.5 lakh. With 138.5 lakh population in 2001, Delhi ranked third among the most populous metropolitan Indian Cities after Mumbai and Kolkata. Population growth has been extraordinary and has increased from 9.4 million in 1990-1991 to 16.75 million in 2011. With the continuation of the present population trend, the total population of NCTD by the year 2021 would be around 244 lakh respectively. (Directorate of Census operations, 2001 population census)

Density of population is defined as number of persons living in per sq. Km. According to Census 2001, the density of population is worked out at 9340 persons per sq. km. as against 6352 persons in 1991.The rapid urbanization of Delhi has resulted in sharp increase in the density of population. The density of population in Delhi is the highest among all states/UTs in the country.

4.2 Inadequacy of public transport system:

The basic modes of traffic in Delhi are buses, private vehicles, taxis, auto rickshaws, cycle rickshaws and cycles. Delhi transport needs are basically met by road-based systems. The Mass Transport needs of Delhi are met mainly by buses which are overcrowded and unreliable with long waiting periods at bus stops. Consequently the use of personalized vehicles is growing, leading to increased road congestion, fuel wastage and environmental pollution

Till 2003, buses constituted about 1% of the total number of vehicles, but catered to 60% of the total traffic load, while personalized vehicles accounted for 93.73% of the total vehicles but catered to only 30% of the total traffic load. The share of buses in total number of vehicle is going down steadily since 2003. Among personalized vehicles, motorcycles and scooters comprise about 63.58% of the total number of vehicles in Delhi, while cars and jeeps account for 30.74% of the total vehicles.

Delhi is letting its bus transport decay as car policies are taking over. The total vehicle population of Delhi exceeds the combined vehicle population of Mumbai, Chennai and Kolkata. There is a preponderance of low capacity vehicles such as two wheelers and cars. This is induced by increasing inadequacy of mass transport to cater to travel demand both in quantity and quality.

4.3 Traffic jams:

Explosive increase in vehicles especially personal vehicles is responsible for congestion. Delhi is one of the most privileged cities to have maximum land area under roads – about 21 per cent. Even then the city is actually grinding to a stop due to congestion. The road network has increased from 8380 km in 1971-72 to 30985 km in 2007-08 (3.7 times), while the number of vehicles has increased from 2.14 lakh in 1971-72 to 56.27 lakh in 2007-08 (26.29 times). The imbalance between growth of vehicles and road network in Delhi emerged in heavy traffic congestion and reduced vehicle speed. Roads are designed to carry an estimated volume of traffic. But traffic has overwhelmed the designed capacity of many roads leading to congestion and delays especially during the peak hours. Of the 170 traffic locations surveyed by RITES in 2008 shows that in 44 per cent of locations, traffic volume is already exceeding the designed capacity. There is barely any space left to create more roads.

4.4 Increase in commutation time and cost:

Congestion in roads is due to tremendous growth of vehicles mainly private/personal vehicles. This tremendous growth has largely affected the rate of traffic flow in different part of the city. Large number of parking vehicles on roads have created the safety problems and also reduced the traffic capacity and flow. Overcrowding, traffic jams and congestion lead to increase in commutation time, cost, pollution, tension, fatigue and fall in productivity.

4.5 Fall in productivity due to loss of working hours:

Congestion leads to loss of one very significant aspect of human resource –productive time. Recently the Associated Chambers of Commerce and Industry (ASSOCHAM) of India, an apex body of the chambers of commerce conducted a survey in national capital region to assess the commuting time for working population and delays. The study found that as a result of traffic congestion and increasing jams during peak morning and evening's hours, commuters in Delhi and NCR towns are losing as much as 2 to 2.5 hours every day to reach their destinations, i.e. from home to office and office to home. This translates into a total loss of nearly 420 million man hours every month by about 70,00,000 working population of Delhi and NCR that are taking to public transport for commuting between home and their office destinations and vice-versa, according to the study. Congestion leads to loss of productivity due to lost time, among others. This eats away the GDP silently. Therefore Congestion entails enormous costs on the economy.

4.6 Reduction in traffic speed:

Peak hour traffic has slowed considerably in Delhi. On an average, it is estimated that to provide a congestion free drive, traffic speed should be maintained around 40 km per hour. But studies carried out by different agencies in Delhi show that peak hour speed has dwindled quite drastically. Central Road Research Institute (CRRI) study of 2006 shows that during the morning and evening peak hours, 55-60 per cent of the major arterial roads have travel speeds less than 30 km per hour. Even during off-peak hours 40-45 per cent of major arterials have travel speeds less than 30 km per hour. Any disturbance in traffic flows creates long queues and delays. The traffic signals also accounts for 63 per cent of delays and traffic congestion.

4.7 Accidents:

Safety is a major component of traffic management. The tremendous increase in number of motor vehicles in the city coupled with limited road space, inadequate facilities for pedestrians and cyclists, irresponsible driving and violation of traffic rules has resulted in a significant number of road accidents. The total number of accidents in 1998 and 1999 was 10217 and 9909 respectively. 9282 accidents cases were reported in Delhi in 2001. Details of accidents reveals that pedestrians, cyclists and two wheeler riders are the major victims accounting for 55%, 10% and 24% of total casualties in 1999. The fatality mostly occurred among pedestrians (1025) followed by two wheeler riders (431). One of the most vulnerable groups to accidents is school children.

4.8 Pollution:

Congestion aggravates pollution. Low average speeds due to traffic congestion increases the emissions due to the stop-and-go pattern of traffic flow in congested condition. The emissions of hydrocarbon and carbon monoxide emissions per vehicle-kilometer tend to increase at low average speeds in congested city driving. Idling and frequently accelerating and

decelerating vehicles waste a lot of energy, consume more fuel and cause increased emissions of toxic pollutants which lead to high personal exposure to pollutants.

4.9 Health Hazards:

Delhi is in danger of losing the gains of its CNG programme as pollution level is rising day by day. The exponential growth of private vehicle and in particular diesel vehicles leads to rise in pollution levels. Levels of nitrogen oxides have been rising in the city to dangerous levels which are a clear sign of pollution from vehicles. Rise in pollution level may lead to asthma, lung diseases and other respiratory diseases. Long term exposure may lead to lung cancer.

Some of the other factors which necessitated the growth of Metro Rail are:

*Affordability: Private vehicles like cars and motorbikes have become more affordable due to increase in income (revised pay scales according to 6th pay commission). This has resulted in increase in private vehicle ownership. With the sharp increase in income of middle class, has created a society where ownership of private vehicle is considered as a symbol of economic status and personal freedom.

*Cheap vehicles: Daily registration of vehicles in Delhi is increasing at an alarming rate. On an average 1000 new vehicles are added in Delhi every day. Availability of cheap vehicles like Maruti 800/alto, Nano by Tata Motors have aggravated the problem of congestion and traffic jams.

Expansion and growth of roads is not possible as there is no space left on Delhi roads. Almost 75% of the road space is used by cars and two wheelers.

*Nuclear families: Joint family system is not a preferred option for young population of Delhi as they want to be more independent. This results in decrease in FAR (floor area ratio) and thus leads to more vehicles on road.

*Primary producer i.e. the farmer has become mobile, aware and alert of the marketing strategies which has resulted in creating vehicular traffic in Metro's like Delhi which has got no produce of its own.

*Land use patterns: Delhi has developed as a borderless city with the formation of a large number of rapidly growing towns in Haryana and Uttar Pradesh. These towns have emerged as places of residence and work place for the middle and upper middle classes. This has added to the flow and movement of traffic within Delhi. BPO/Call Centre/ MNCs in Noida and Gurgaon also added to heavy traffic movement within Delhi. Another factor responsible for traffic problems is increase in number of schools, factories and hospitals in Delhi and NCR.

CONCLUSION

The Metro Rail in Delhi was mooted with the concept of providing mass rapid transit system for the people of Delhi and National Capital Territory and that too at an affordable price. The idea to develop it was to solve all traffic and transport related problems which have been encountered for years together. It was developed with very high aspiration and optimistic approach

The development of metro rail network under the aegis of DMRC was done with the following underlined objectives:

- Provide mass transit system
- Reduce commutation time
- Affordable prices
- Provide comfortable and safe journey
- Reduction in accidents
- Respite from traffic jams and accidents

Indirect objectives of metro rail service are:

- Improve health condition
- Improve level of fatigue
- Improve labour productivity
- Increase in social interaction
- Increase in quality of life

The planner, the decision makers etc. visualized that it would ease the traffic flow and improve the mobility pattern of people of Delhi. The Project is expected to help reduce traffic congestion and pollution caused by motor vehicles and to play a large role in improving Delhi's transit system and Delhi's urban environment. Delhi metro covering all major markets and office complexes of the city has become a lifeline for the daily commuters to these routes besides promising a safe, secure and comfortable drive to commuter's destination. DMRC planned to cover the whole of Delhi with a Metro network by the year 2021. It will certainly change the mobility pattern of people in and around Delhi. Delhi Metro railway is becoming the preferred transport system for anyone and everyone. There is no doubt that it is the best mode of transport available in Delhi and NCR.

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