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INCORPORATING LOCAL TRANSPORTATION IN EXISTING RAILWAY STATIONS IN LUCKNOW

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Abstract - *Transport has a significant part to play in accelerating civic mobility. Civic mobility has different confines i.e. mobility for work, education, recreation and other requirements; mobility by the public, private and individualized modes; and mobility through facilitation of colorful transport structure and services handed by the authorities concerned. In this environment, the part of colorful modes of public transport in a megacity is of consummate significance for achieving effective movement pattern but the same cannot be achieved without modal integration of public transport in confluence with non-motorized modes similar as climbers, bikes and cycle cabs. Hence, there's a felt need to evolve underutilized road stations particularly for Lucknow megacity through proper integration of being modes and design of physical architectures. The study suggests colorful measures to reduce vulnerability of non-motorized druggies. Due to perpetration of metro, commuters shifted from road-grounded modes to metro due to lower traffic, accident free script, lower pollution, as well as savings in trip time and cost. Transport is a State Government subject and hence creation of public transport and improvement of its modal share depends on policy opinions taken by original authorities and concerned transport department. Hence, expression of road as original transportation capitals is vital step to promote such a conception in medium sized metropolises also. The study also deals with policy matters related to climbers, bikes, cycle cabs, substantiated modes, original terrain, setting up of devoted civic transport fund at megacity position and state position, institutional frame, public position data bank public civic transport information system, planning morals, strategies for enhancement of sustainable transport, art and aesthetics in conveyance, control of auto business, transport as a multi-sectorial policy, etc. The operations of this study workshop are numerous. The results may be used to enhance the character and image of public transport as well as planning and design of similar original transportation capitals in medium- sized metropolises.*

Key Words: Commuters, Transit.

1. INTRODUCTION

In recent decades, 'Urban India' has grown manifold both in spatial and Demographic terms. Globalization, liberalization, privatization, the inflow of foreign capital, etc. have provided the impetus for urbanization which not only leads to the growth of towns and cities but increase the number of urban centers and urban agglomerations. As per2011 Census, the urban population of the country was 377 million, which constitutes 31.16% of the total population concentrated in 7935 towns and cities. The 53 metropolitan cities (2011) accounted for more than a third of the total urban population (42.6%).

The development of old railway station infrastructure to meet trip demand needs a coordinated and integrated approach amongst several agencies involved with urban services and development at the city level, in the case of Lucknow. In this context, better urban transport infrastructure and services lead to city efficiency in which people and goods are transported at minimal investment and operating cost.

Traffic congestion is when vehicles travel more slowly, the excursion takes a more drawn-out time, and expanded the lining of the vehicles. They are otherwise called gridlocks. With reasonableness and higher procuring power, it has become simple for a typical individual to possess a vehicle. The number of vehicles that have sold last year in India was a lot higher than vehicles sold 20 years back. However this has prompted an agreeable way of life, numerous workers are impacted by gridlock consistently which has prompted the deficiency of important time and time is cash. At the point when the quantity of vehicles surpasses the limit of the street, gridlock happens. In most Indian urban communities gridlock is a significant issue. Individual episodes, for example, mishaps out and about or street being shut down or awful street designs or abrupt slowing down of a vehicle in a smooth progression of weighty traffic might cause traffic congestion.

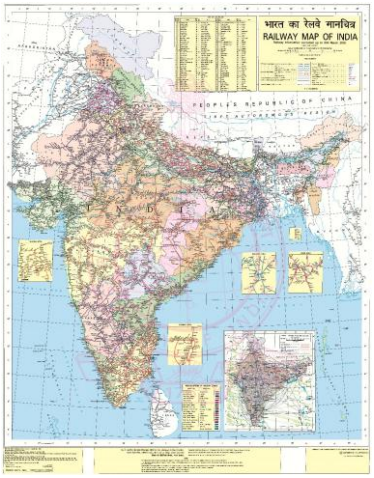

Fig -1: Indian Rail Network

Source: Survey of India (28th Edition 2020)

2. SUB-URBAN RAILWAY SYSTEM IN INDIA

Sub-urban rail framework assumes a significant part in the public vehicle arrangement of a large number of India's significant urban areas. It is characterized as a rail administration between Central Business District and rural areas, a city or different areas that draw enormous quantities of individuals consistently.

Mumbai and Kolkata have rural train administration and have separate tracks laid for the activities of rural rail route organization. Chennai, Delhi, Hyderabad, Pune, and so on don't have committed rural tracks however share follows significant distance trains. Rural trains that handle suburbanite traffic are for the most part electric various units (EMUs).

In 1950-51, the quantity of travellers benefiting of rural rail activities was 412 million, which developed in excess of eleven overlap to 4,552 million by 2013-14. As far as traveller km, be that as it may, it developed from 6,511 million of every 1950-51 to 1,68,589 million by 2013-14, which is multiple times increment over a time of sixty years. Throughout a similar time, normal lead length multiplied from 15.8 km to 37.0 km, because of the development of the urban communities. Interest for rural traveller travel in India has been developing at a yearly pace of 3.6% somewhere in the range of 2001 and 2014. Somewhere in the range of 2011 and 2012 the development rate increased by to 7.8% and further diminished to 1.7% in 2013-14. As far as traveller km, the interest has shown a development pace of 5.0% somewhere in the range of 2001 and 2014.

With this interest circumstance the Suburban frameworks must assume a significant and coordinated part in satisfying the metropolitan travel need of individuals. The more moderate metropolitan locales across the world have thought that it is totally important to arrange the preparation, conveyance and subsidizing of all methods of public transportation including rail based frameworks, transports and standard travel. The institutional plans should be set up to give consistent metropolitan travel that the voyaging metropolitan tenants both need are currently requesting. This will make it conceivable to have a productive Urban India, with fast open vehicle frameworks set up.

2.1 Sub-urban Growth Rail Passengers in India

Sub-urban traveler development in India has been high and reliable.

Table-1: Suburban Rail Passenger Growth in India Source: IR Year Books, IR Annual Report and Accounts, IR Facts and Figures.

Year	No. of passengers Originating (million)	CAGR	Passenger-km (million)	CAGR	Average Lead (km)
1950-51	412		6,511		15.8
1960-61	680	5.10%	11,770	6.10%	17.3
1970-71	1,219	6.00%	22,984	6.90%	18.9
1980-81	2,000	5.10%	41,086	6.00%	20.5
1990-91	2,259	1.20%	59,578	3.80%	26.4
2000-01	2,861	2.40%	88,872	4.10%	31.1
2008-09	3,802	3.60%	1,24,836	4.30%	32.8
2009-10	3,876	1.90%	1,30,917	4.90%	33.8
2010-11	4,061	4.80%	1,37,127	4.70%	33.8
2011-12	4,377	7.80%	1,44,057	5.10%	32.9
2012-13	4,477	2.3%	1,45,652	1.10%	32.5
2013-14	4,522	1.7%	1,68,589	15.7%	37.0

Metropolitan structure and land-use assumes a significant part in the ridership of rural rail framework. This outcomes in variety in use of rural rail routes across various urban communities. Every day ridership on rural rail route framework in Mumbai, Pune, Kolkata, Chennai, Delhi and Hyderabad.

Table-2: Daily Ridership in Suburban Railway of Different Cities (2013-14).

Source: IR Year Books, IR Annual Report and Accounts, IR Facts and Figures.

City/ Region	Suburban Railway	Length (km)	Daily Ridership (million)
Mumbai	Mumbai Suburban Railway	434	8.00
Pune	Pune Suburban Railway	103	0.11
Kolkata	Kolkata suburban railway	1172	2.80
Chennai	Chennai suburban railway	286	1.36
Delhi	Delhi Suburban Railway		0.37
Hyderabad	MMTS and Suburban in Hyderabad	97	0.20

Table-3: Sub-urban rail system of various cities.
Source: IR Year Books, IR Annual Report and Accounts, IR Facts and Figures

System	City	Opening Year	No of Lines	Notes	Operated by
Mumbai Suburban Railway	Mumbai	1857	3 lines	Broad gauge	WR, CR
Chennai Suburban Railway	Chennai	1931	6 lines	Broad gauge	SR
Kolkata Suburban Railway	Kolkata	1854	3 lines	Broad gauge	ER and SER
Delhi Suburban Railway	Delhi	1982		Broad gauge	NR
Multi-Modal Transport System (MMTS)	Hyderabad	2003	3 lines	Broad gauge	SCR
Pune Suburban Railway	Pune		2 lines	Broad gauge	CR
Barabanki-Lucknow Suburban Railway	Barabanki-Lucknow		2 lines	Broad gauge	NR, NCR and NER
Lucknow-Kanpur Suburban Railway	Lucknow-Kanpur		2 lines	Broad gauge	NR, NCR and NER

2.2 Sub-urban Rail in Uttar Pradesh

The multicultural province of Uttar Pradesh is at present home to 16% of India's complete populace. Uttar Pradesh assumes a vital part in Economic advancement of India as it best the outline in many crowded territory of India. The state additionally stands firm on top footing in high populace development rate in India. Uttar Pradesh has seen a quick development in its populace over the most recent 50 years. Every year, the state adds a larger number of individuals to its always expanding populace than some other state in India. From 1991 to 2001, Population of Uttar Pradesh expanded by 26%, accordingly showing that state has a high populace development rate. Populace thickness in UP (Uttar Pradesh) as of now remains at 828 individuals for every square kilometre, making it one of the thickly populated states in India. Allahabad is the most populated locale in the state. Kanpur and Lucknow are the two most populated urban areas in Uttar Pradesh. As of now, the two urban areas are home to north of 6 million individuals in India. The state is seeing a yearly development of 2% in its populace which is exceptionally high when contrasted with different states in India. Starting at 2021, Population in territory of Uttar Pradesh is assessed to be 241 million individuals. The whole state addresses thickly populated regions with a high rate of birth. The number of inhabitants in the state was assessed to be around 207 million out of 2013. This tremendous populace lives in 75 areas of Uttar Pradesh which are additionally partitioned into various urban communities and towns.

2.3 Lucknow Sub-Urban Railway

Lucknow Division of N. E. Railway came into existence on 1st of May 1969 Lucknow Division's working is on broad gauge & metre gauge both. The division serves 14 districts of northern and eastern parts of Uttar Pradesh. This division is enriched with many important rivers viz. Gomti, Saryu, Rapti & Ganga, which also define the culture & religion of the area. There are also many places of tourist & religious interest.

Barabanki-Lucknow and Lucknow-Kanpur- Barabanki-Lucknow Suburban Railway (36 km) is a suburbanite rail administration worked by Northern Railways, North Central Railway and North Eastern Railway to interface Lucknow with Barabanki. These administrations are for the most part run utilizing EMU and MEMU rakes. In any case, it doesn't have devoted rural tracks however shares the tracks with significant distance trains. Locally it is called BL meaning Barabanki Lucknow.

Lucknow-Kanpur Suburban Railway (72 km) is a suburbanite rail administration worked by Northern Railways, North Central Railway and North Eastern Railway to interface authoritative capital Lucknow with the monetary and modern capital Kanpur of the state Uttar Pradesh. These administrations are generally run utilizing EMU and MEMU rakes. In any case, it doesn't have devoted rural tracks however shares the tracks with significant distance trains. It is affectionately called LC meaning Lucknow Cawnpore (old name of Kanpur).

Fig -2: Lucknow city railway network

Source:https://indiarailinfo.com/station/map/lucknow-charbagh-nr-lko/336

2.2 Need of Study

- To share the load of traffic on roads through Railway stations which have less traffic.
- Since in Lucknow road cross-sections are not good enough to cater the present and future needs of transportation.
- So it will decrease the load by using railway stations since they are underutilized.
- Study will develop further grounds for other such cities.

2.2 Aim

The aim of the research use under-utilized small railway stations as local transportation hubs in Lucknow.

2.2 Objective

1. To identify the local railway stations within the city and to analyze the amenities.
2. To study the traffic movement and railway movement within the city in order to understand the basic needs of the public and also how will railway stations caters local public movement and to not get mixed with the normal railway public.
3. To provide better and convenient intra-transportation system using railway stations within Lucknow city
4. Try reducing the loads on the city roads and traffic.

5. Also to improve the amenities and facilities.

6. To reduce the use of private transport.

2.2 Broad Methodology

- In order to achieve the objectives stated the study will include the following sequential stages-
- To understand issues and potentials of transportation systems in Lucknow through literature studies.
- Identifying the small railway stations which can be converted in the local transportation hubs.
- Literature and case study of Local railway station.
- Finding inferences and giving recommendations for future proposal.

2.2 Scopes and Limitations

- This study can boost the framework to the busiest mode of transport system in India.
- It will also provide the basic parameters to start the research on project similar to this.
- This study will help in reducing traffic congestion, pollution and will help the urban designers to understand the science of integration, accessibility, circulation in their designs.
- This research will only be limited to railway stations within Lucknow.

3. LITERATURE REVIEW

3.0 General

Transport is the lifeline of physical and socioeconomic growth of any town, city, state and nation. In urban areas, efficient modes of transport, better facilities and passenger friendly services lead to city efficiency.

Transport is the lifeline of physical and socioeconomic growth of any town, city, state and nation. In urban areas, efficient modes of transport, better facilities and passenger friendly services lead to city efficiency.

Better planning, designing, operation and management of facilities combine two or more modes to provide utility and service for safe, rapid, convenient and environmentally compatible movement of people.

3.1 Requirement of Local transportation hub Systems

- With its 2.2 million (COI, 2001 Estimates) residents Lucknow has currently over 3million population in urban areas. The master plan has envisaged that a population of about 3.2 million and 4.0 million by years 2011 & 2021 respectively.
- The rapid growth of the city and the associated urban region has accentuated the demand supply mismatch amidst the constrained transport infrastructure resulting in economic and social externalities.
- The inadequate public transportation system in Lucknow is overwhelmed by upsurge of private automobiles. Private vehicles constitute 90 percent of total vehicles registered in Lucknow City.
- The supply of city buses being only 6 per lakhs population is inadequate for city. The benchmark is between 70 to 80 buses per lakhs residents in an urban area in India.

3.2 Traffic Scenario in Lucknow

A movement request modular and future beginning objective dependent on the projected populace and business were ready in the itemized overview directed by the DMRC for the arrangement of the DPR of Lucknow metro project. In the DPR whole review region has been isolated into 127 zones among them 119 are inner zones and the remaining are outer.

Table-4: Population and employment data

Description	2001	2011	2021	2031
Population	22.45 lakhs	29.08 lakhs	44.41 lakhs	54.61 lakhs
Employment	6.17 lakhs	9.19 lakhs	13.50 lakhs	17.47 lakhs

(Source: Lucknow Master Plan 2021, 2031* WSA Analysis)

There were 1010226 registered vehicles in Lucknow till March 2009 with a growth rate of 7% in fiscal 2008-2009. Private transportation providers constitute a very sizeable portion of public transport.

Table-5: Goods and passengervehicles

Year	Goods Vehicles			Passenger Vehicles						Total	Growth
	Heavy goods vehicle	Light goods vehicle	Wheelers goods vehicles	Buses	Taxi	Auto rickshaw	Two wheelers	Four wheelers	Tempo taxi		
2004-05	5303	4780	2392	3553	4602	1544	601745	97317	7381	728617	
2005-06	5541	5018	2782	3831	5080	2228	660332	106874	7475	799161	10%
2006-07	5893	5783	3197	3914	6283	4762	720158	105447	8233	863670	8%
2007-08	6068	6783	3576	3842	7083	5008	771846	129316	8216	941691	9%
2008-09	6242	7657	3776	3741	7399	5015	825088	142861	8447	1010226	7%

Considering the above surging volume of traffic in the city an alternative transportation solution is required in order to fulfil the needs of Lucknow. Besides this in old Lucknow area there a frequent traffic jam caused due to heavy traffic and low availability of a mass transit system.

3.3 Railway Station in Lucknow

Lucknow is the capital of the state of Uttar Pradesh as well as the second largest city in North India, after New Delhi. As a city known for its delicious food and culture, Lucknow is also one of the transportation hubs in North India. It is well-connected with other major cities by air, road, and rail. Here we will talk about small and less used railway stations of Lucknow.

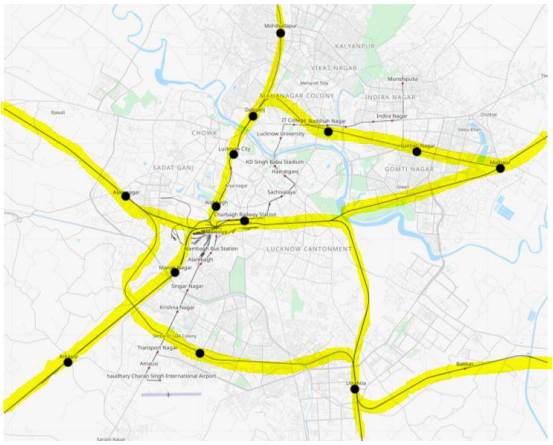

Fig -3: Lucknow Local Rail Network

Source https://www.openstreetmap.org/

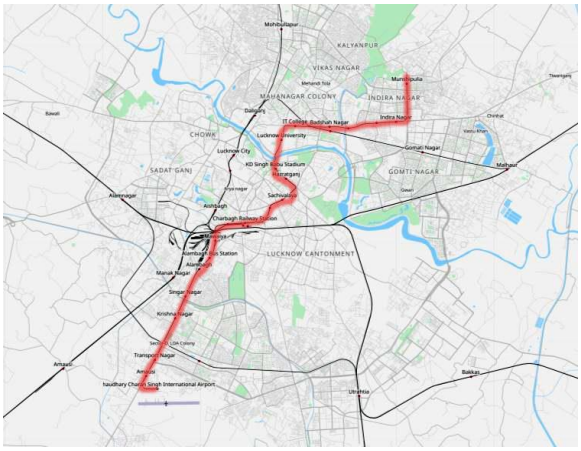

Fig -4: Lucknow Metro

Source https://www.openstreetmap.org/

Fig -5: Superimposition of Railway and Metro Network (Author)

Source https://www.openstreetmap.org/

4. DATA ANALYSIS

Metropolitan regions are development magnets. Consequently, for advancement, consideration should be given to metropolitan regions. The urban communities in India have been becoming throughout the long term. The requirements of networks additionally become greater. To address these issues the foundation prerequisite, including that of the vehicle frameworks, is additionally going up, and is additionally expected to increment in future in every single metropolitan region.

Rural rail, metropolitan rail, suburbanite rail, or territorial rail, assumes a significant part in the public vehicle arrangement of a considerable lot of India's significant urban communities. Rural rail is characterized as a rail administration between focal business region and rural areas, a city or different areas that draw enormous quantities of individuals consistently. The trains offering such types of assistance are ordinarily named rural trains and are the ones that stop by any stretch of the imagination, or practically all, of the stations along a course. In Mumbai, these are alluded as "neighborhood trains" or "local people". The vast majority of these will more often than not be very sluggish.

Rural rail in India works on lines imparted to other traveler and cargo trains (like Lucknow-Kanpur Suburban Railway) or a blend of committed rural lines and lines for significant distance trains (like the Mumbai Suburban Railway).

4.1 Case Study Area Characteristics

It is necessary to take appropriate steps for optimally using the carrying capacity of public transport modes and their proper integration with other modes. Of late, share of public transport in Delhi has declined to 43% as compared to the desirable figure of 70-75%.Now-a-days; there is rise in the

number of middle class population desirous of owning personalized modes. Further, automobile companies have also been coming up with new models of mini cars at affordable price. Hence, personalized vehicles have been increasing. It is important to synchronize metro, bus, personalized modes, etc. to evolve multi modal transport system along with non-motorized transport.

4.2 Parameters for Impact Assessment

Literature review and various research studies clearly indicate that the impact of a transit hub is manifested in the change in land attributes of adjoining areas. In the case of transit hub, it is the station area where the change is most prominent. The parameters of study and basis for analysing the context in order to assess the impact of transit system that have been selected are:

1. No. of modes of transport
2. Footfall per day
3. Accessibility
4. Major transport mode
5. Pedestrian connectivity
6. Un-utilized space
7. Designated path for different transport mode
8. Key facts
9. Key takeaways

These parameters will be studied in response to the passenger dispersal at stations selected as the intent of the study is to relate passenger attributes with land attributes associated with a transit station and the corridor between stations.

4.3 Inferences

After analyzing the above case studies and literature studies we conclude that to develop a multi modal transit hub, we need to concentrate on following aspects such as:

- There should be Integration of non-motorized vehicles in infrastructure.
- A facility of proper Auto-court to accommodate large volumes and types of vehicular traffic.
- Designated loop for different modes of transport must be planned.
- Parking space should be enormous.
- Extensive bicycle infrastructure (wide well-marked bike lanes and enormous formalized 'bike beds'--parking) is required.
- Ample space for pedestrian movement.
- Designated bus lanes and boulevards.
- Physical barriers erected in street to direct pedestrian flow.
- Extensive space should be provided for pick and drop for the passengers.
- Variety in right-of-way allocation parking/loading types are dispersed rather than concentrated.
- Heavy focus on pedestrians and designated urban park and plaza space.
- Formalized vehicular and pedestrian zones with partitions, and there should be categorized areas for a range of parking options.
- A Comprehensive, iconic way to find multitude of vehicular types.
- Adaptive reuse of 'leftover' spaces and under-performing asphalt as signature pedestrian spaces.
- Extensive use of one-way vehicular circulation.
- Maximization of primary vehicular loop around the station.

5. FINDINGS AND RECOMMENDATIONS

5.1 General Findings

- Not enough infrastructure at these railway stations to cater local public.
- Little-used, footbridge.
- Metro is doesn't have a well spread network to cater local public all around the city.
- Railway stations are not or under-utilized.

5.2 Design Recommendations

In light of conversation in the previous passages, the accompanying methodologies for expansion of the travel limit might be proposed for the Sub-Urban Rail route of Lucknow

Resuscitate: The Sub-Urban Railway ought to be restored as a method of metropolitan transportation in Delhi. It ought to be created as an option in contrast to Road Transport and as a Feeder/Connector to the Lucknow Metro.

1. Redesign: The current foundation of the Sub-Urban Railway ought to be redesigned for the reason. The stations ought to be made effectively available what's more noticeable. The arrangements of obstruction free climate and programmed tagging ought to be consolidated for the accommodation and consistent exchange of the suburbanites.

2. Expand: The recurrence of the trains on the course ought to be expanded to increase the conveying limit and decrease the hanging tight an ideal opportunity for the suburbanites.

3. Improve: Initiatives to produce mindfulness about the Sub-Urban Railway ought to be taken to make it well known with suburbanites. As a significant number of the stations are situated nearby legacy and sporting destinations, social or the travel industry extraordinary trains could likewise work during non-top hours or during occasions.

    - Easy to Use: The hub should be easily discernible to residents and visitors
    - Connected: The hub should connect as many transit systems and routes as possible within the shortest distance possible
    - Imbedded: The hub should offer convenient access to adjacent areas of Centre City
    - Iconic: The hub should be iconic and memorable

6. CONCLUSION

Lucknow is evolving as a complex and complicated Mega-City. The solutions to the problems of Lucknow have to be indigenous and innovative. In the specific case of its Urban Transit, having a network of multiple modes with seamless integration will improve the carrying capacity and effectiveness of the system. Sub-Urban Railway is a mode of transportation which may be employed to fill the modal gap existing in the present system. The infrastructure is already in place and can be renewed with very little investment to substantially augment the transit capacity of Lucknow.

There are no prescribed guidelines for the development of local transportation hub in Lucknow, and because of the heavy traffic and footfall load there is need to redevelop these transit hubs as a component, so that they can serve to maximum no. of people and provide them easy access and better facilities.

There is need to see these transit hubs in new form because in present time and in future these are the destinations which provide pace to the people life and developments.

In present time 70% of people prefer their own vehicle for travel, so there is need to reduce these stats for that we need to develop the transport hub in a way where people love to go.

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