A Project Report On

A STUDY ON SUSTAINABLE URBAN TRANSPORTATION IN INDIA

Submitted for the partial fulfillment of the requirement for the degree of

MASTER OF BUSINESS ADMINISTRATION

(INTERNATIONAL TRANSPORTATION & LOGISTICS MANAGEMENT)

By

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INDIAN MARITIME UNIVERSITY, KOCHI CAMPUS

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(A Central University under Ministry of Ports, Shipping and Waterways)

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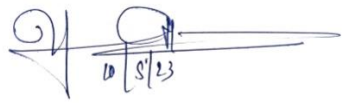
CERTIFICATE

This is to certify that the Project titled "A STUDY ON SUSTAINABLE URBAN TRANSPORTATION IN INDIA" submitted by ARJUN register number 2105305008 student of MBA (ITLM) is a bonafide record of his Project report and submitted to the School of Maritime Management, Indian Maritime University, Kochi campus, under the supervision of Dr. Yogamala H.L., Head of the Department, IMU, Kochi campus. It is also certifying that the above work has not previously formed or submitted for the award of any degree, diploma, associateship, fellowship, or other similar titles, and it is an independent work done by the candidate.



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SELF DECLARATION

I, **ARJUN** (Registration No: 2105305008) student of School of Maritime Management, INDIAN MARITIME UNIVERSITY-KOCHI CAMPUS hereby declares that thisproject report titled **"A STUDY ON SUSTAINABLE URBAN TRANSPORTATION IN INDIA**" submitted in partial fulfillment of the requirement for the degree of Master of Business Administration in International Transportation & Logistics Managementis my original work carried under the guidance of Dr. Yogamala H.L. I also confirm that the report is only prepared for my academic requirement, not for any other purpose. It might not be used with theinterest of the opposite party of the corporation.

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School of Maritime Management (IMU KOCHI)

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Place: Kochi

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My thank and appreciation to my Institution in developing the project and people who have willingly helped me out with their abilities.

I perceive as this opportunity as a big milestone in my career development. I will strive to use gained skills and knowledge in the best possible way, and I will continue to work on their improvement, in order to attain desired career objectives. Hope to continue cooperation with all of you in the future.

I also thank my family and friends for the continuous support in completing my project work.

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EXECUTIVE SUMMARY

India, one of the fastest-growing economies in the world, is achieving annual growth of 8.7 percent. Even as the population grows, the country will work hard to transform itself over the next few decades.

Individual cities cannot afford to provide only cars and two-wheelers. In truth, cities would be even less livable without public transport. The need to encourage public transport instead of private vehicles, which requires increasing the quantity and quality of public transport and also the effective use of demand and management resources on the supply side. People should also be encouraged to use non-motorized transport and investments can be made to improve its safety. Cities are important factors in the better economic situation of a country, and therefore better interconnections are needed, and better mobility is essential for a better quality of life.

Improving urban transport in India requires a holistic approach that addresses mobility challenges holistically. This includes expanding and improving public transport systems, promoting non-motorized transport options such as cycling and walking, and managing demand through congestion pricing and parking policies. In addition, consistent land use and traffic planning are needed to reduce the need for long-distance traffic and encourage compact mixed use.

To achieve this, a number of measures must be taken, including the development of adequate cycling and pedestrian infrastructure, the creation of good connections and an efficient public transport system, promoting the use of electric cars through incentives and infrastructure development, and the use. of alternative fuels.

In addition, urban planning and design should focus on creating compact, walkable and transit-oriented buildings that minimize the use of private vehicles. Finally, there is a need to establish an effective governance structure that coordinates policies, regulations and investments at different levels of government and with private sector stakeholders

Overall, achieving sustainable urban transport in India requires a concerted effort by the government, private sector and citizens, and the benefits are significant, including improved air quality, reduced greenhouse gas emissions and improved quality of life for all.

OBJECTIVES OF THE STUDY

- To find out what does the youth think about the condition of the transport that is present in India.
- To arrive at a conclusion whether the sustainable can development take place or not.
- To spread awareness about the condition of transportation in our country.
- To study and analyze the progress made by Indian transportation development organizations in adopting new technology.
- To identify various programs initiated by the government regarding sustainable development of transportation in Indian economy.

RESEARCH METHODOLOGY

These are classifications of different methods used in research, but they are not sharply distinguished from each other. This study is exploratory in nature and provides clear guidelines for conducting this defined study. Research and suggestions related to relevant books and articles to further evaluate and understand the data and formulate an acceptable and feasible hypothesis.

Data collection: Collect data through surveys, interviews, and other methods to test hypotheses. This may include collecting data on factors such as public transport infrastructure, traffic congestion, air pollution and public attitudes towards sustainable transport.

Data analysis: The data collected will be analyzed using a qualitative approach, which involves identifying themes and patterns from the data. A quantitative approach is chosen because it allows us to understand the variables more clearly and to identify differences and differences that may exist in the variables.

Ethical considerations: The study follows ethical guidelines and obtains informed consent from all participants. Confidentiality and anonymity are maintained to protect the privacy of participants.

Make conclusions and recommendations. Finally, based on the results of the analysis, draw conclusions and make recommendations for policies and practices related to sustainable urban transport in India.

Overall, the research methodology for the “Sustainable Urban Transport in India” project should be systematic and rigorous, using appropriate methods and techniques to collect and analyze data and draw meaningful conclusions.

CHAPTER: 1

INTRODUCTION

INTRODUCTION OF STUDY

In the new age of urbanization it is very important for any developing economy to have an efficiently working and flexible transportation system.

A human body can function properly only if all the nerves, arteries and veins all are perfectlyfunctional. Just like that the functioning of the Indian economy which here can be compared to the human body can only function properly when this connection between the human veins and arteries is applied to our own nation's transportation system.

In this research paper I will like to shed some light upon our transportation system, how we can develop it, which are the main areas for improvement, how can we build a better and sustainable future with the development of transport.

This project is divided into various sections which will help us to reach on a conclusion whether the sustainable urban transportation is actually possible in a country like India.

If yes then how much time will it take us to reach our desired goal. If no then how can we strive towards better development of our essential economic variable transportation.

The area that I'm trying to focus is on some of the modes of transportation in our day to daylives, as these are the modes that are used the most by the people. The main cities that are focused here are mainly the developing and important cities for our Indian economy as we are still in a developing phase it is better for us to strengthen what we already have and increase the efficiency of the rural areas as the process continues.

First of all what is sustainable development, what are its merits, demerits, etc will bediscussed.

CHAPTER: 2

LITERATURE REVIEW

Sustainable Urban Transport in India: Role of the Auto-rickshaw Sector

A Mani, M Pai and R Aggarwal (2012)

As the demand for urban transport in India grows, so does the popularity of auto rickshaws. Production of this type of three-wheeler doubled between 2003 and 2010. In India's largest cities, it accounts for a significant proportion of motorized travel. Strategies to improve urban transport must include a political vision for this increasingly important sector. To this end, this paper examines the role of the auto-rickshaw in promoting sustainable urban transport in India. It develops a political vision for the sector and makes recommendations for reforms to meet the challenges of sustainability.

Ahmedabad's BRT System: A Sustainable Urban Transport Panacea?

Darshini Mahadevia, Rutul Joshi and Abhijit Datey (2013)

The Jawaharlal Nehru National Urban Renewal Mission and The National Urban Renewal Policy gave impetus to bus rapid transit systems in many Indian cities, with Ahmedabad's Janmarg being the largest such network currently in operation. This paper shows that while Janmarg serves latent transport demand, it has not fostered adoption or encouraged abandonment of private car transport. It also left a short day for non-motorized transport systems, which are essential for inclusion and reducing the city's carbon footprint. The research raises the relevant question of whether public transport should be seen as a technological solution or part of a wider solution to urban or social problems.

Determinants of Urban Mobility in India: Lessons for Promoting Sustainable and Inclusive Urban Transportation in Developing Countries

Sohail Ahmad, Jose A. Puppim de Oliveira (2016)

Research from developed economies has analyzed key factors in understanding urban transport, which are important for planning appropriate actions to reduce transport needs and promote more sustainable modes of transport. However, there is little research on urban areas in developing countries, which may hinder our ability to design sustainable transport policies that meet the realities of those countries. To fill this gap, this study measures the impact of urban characteristics and socio-economic and socio-cultural variables on mobility patterns to identify evidence-based policy measures to promote more inclusive and sustainable transport routes. The study estimates the volume of public and private transport (out-of-pocket travel costs) and modal choices in a multivariate

analysis using a nationally representative household survey in India's 98 largest cities. The results show that urban densification in India reduces traffic and increases the probability of using public transport. Small and medium-sized cities mainly use private transport, large cities prefer public transport, but there is no motorized transport. In addition, income is the most important determinant of traffic volume and the use of motorized and private transport. The top quintile is the only one with a positive income elasticity of transport demand. The results show that public and non-motorized transport infrastructures provide sustainable and inclusive development, in addition to other co-benefits such as energy security. Based on these results, several policy recommendations are proposed to improve the sustainability and inclusion of urban transport in Indian cities.

Sustainable Urban Mobility: Challenges, Initiatives and Planning

Viswanadha Kumar Giduthuri (2015)

Urban growth is not spontaneous and uncontrolled, but is driven and shaped by human interaction and physical infrastructure. However, the expansion of cities around the world is characterized by uncontrolled sprawl, which leads to inefficient use of space and natural resources. Communication between people and opportunities for innovation are limited by low density and social segregation. From the point of view of the efficient functioning of cities, accessibility for the transport of goods and services is essential. But accessible cities are encouraged to move toward more sustainable modes of transportation and attract more passengers to different modes of transportation, including sidewalks. Movement is more than just the means of transportation available. Urban design and urban planning should focus on how to bring people and places together, creating cities that focus on accessibility and optimal urban density, rather than simply expanding urban transport infrastructure. This article provides a brief overview of the Indian government's urban planning initiatives towards sustainable urban transport plans and outlines urban planning challenges for local urban bodies, urban planners and policy makers.

CHAPTER: 3
SUSTAINABLE URBAN TRANSPORTATION

1. WHAT IS URBANIZATION?

Urbanization refers to the population shift from rural areas to urban areas, this gradual increase in the proportion of people living in urban areas, and the ways in which each society adapts to this change leads to urbanization.

In 1951, there were only five Indian cities with a population greater than one million and 42 cities with a population greater than 0.1 million, much of India effectively lived in villages. In 2011,there were 468 cities with population above 0.1 million and 53 cities with population greater than 1 million.

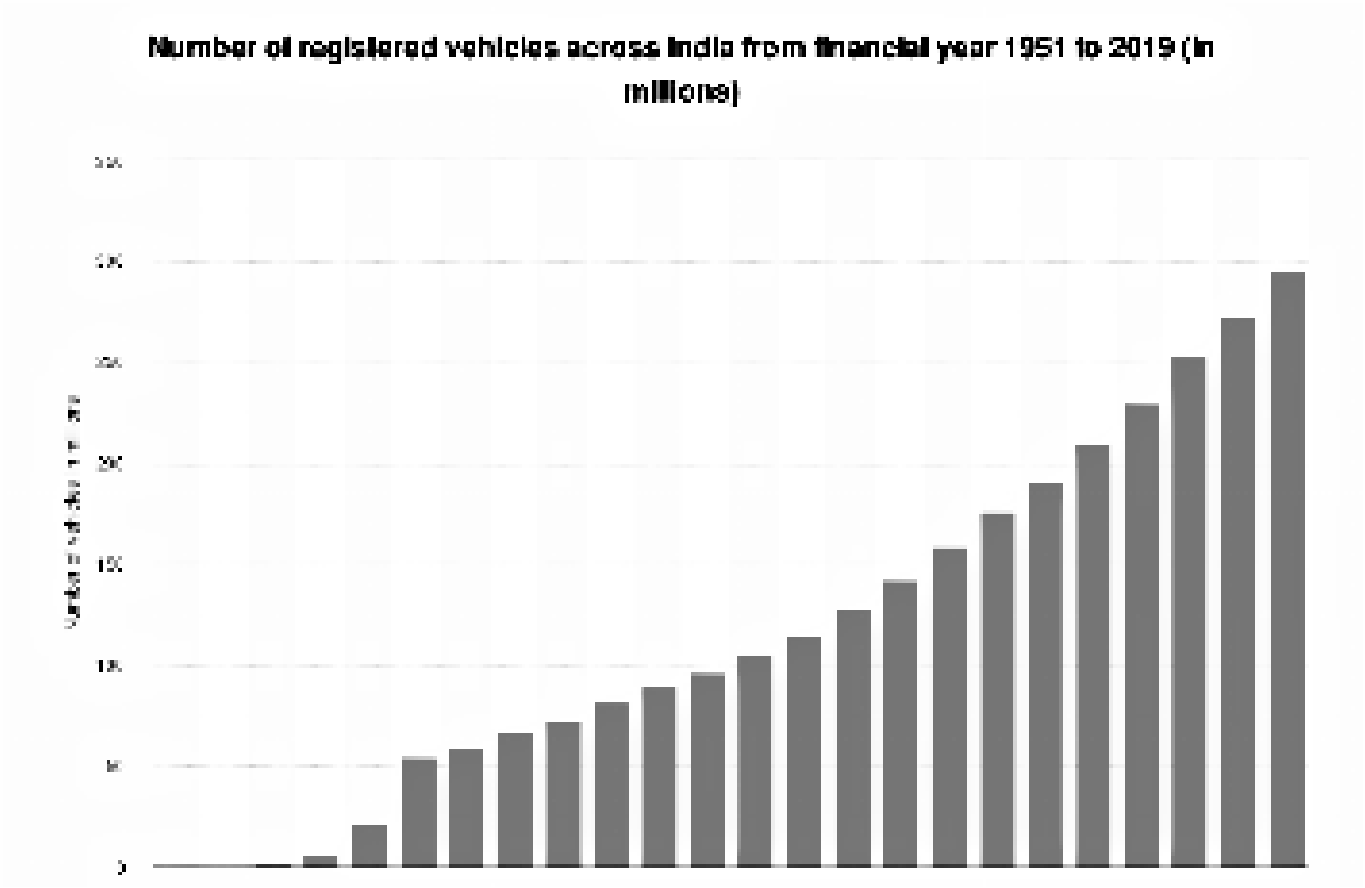
Cities as per population	No. of cities
>10 million	**3**
5-10 million	**5**
2-5 million	**10**
1-2 million	**35**
Total cities with more than 1 million population	**53**
0.5-1 million	**43**
1-0.5 million	**372**
Total number of cities	**468**

Table 1: Number of cities as per population; Population figures as per 2011 census

From 2001 to 2011 the number of people living in urban cities jumped from 268 million to377 million this sudden yet great shift is the reason to consider that the urban yet sustainablemodes of transportation needs to be established as soon as possible.

RAPID MOTORIZATION

Since 2001, the number of vehicles per 1,000 people in Indian metropolitan cities have grown significantly. The total registered vehicles in this country increased by a CAGR(Compounded Annual Growth Rate) of nearly 9.8 % between 1991 and 2009.



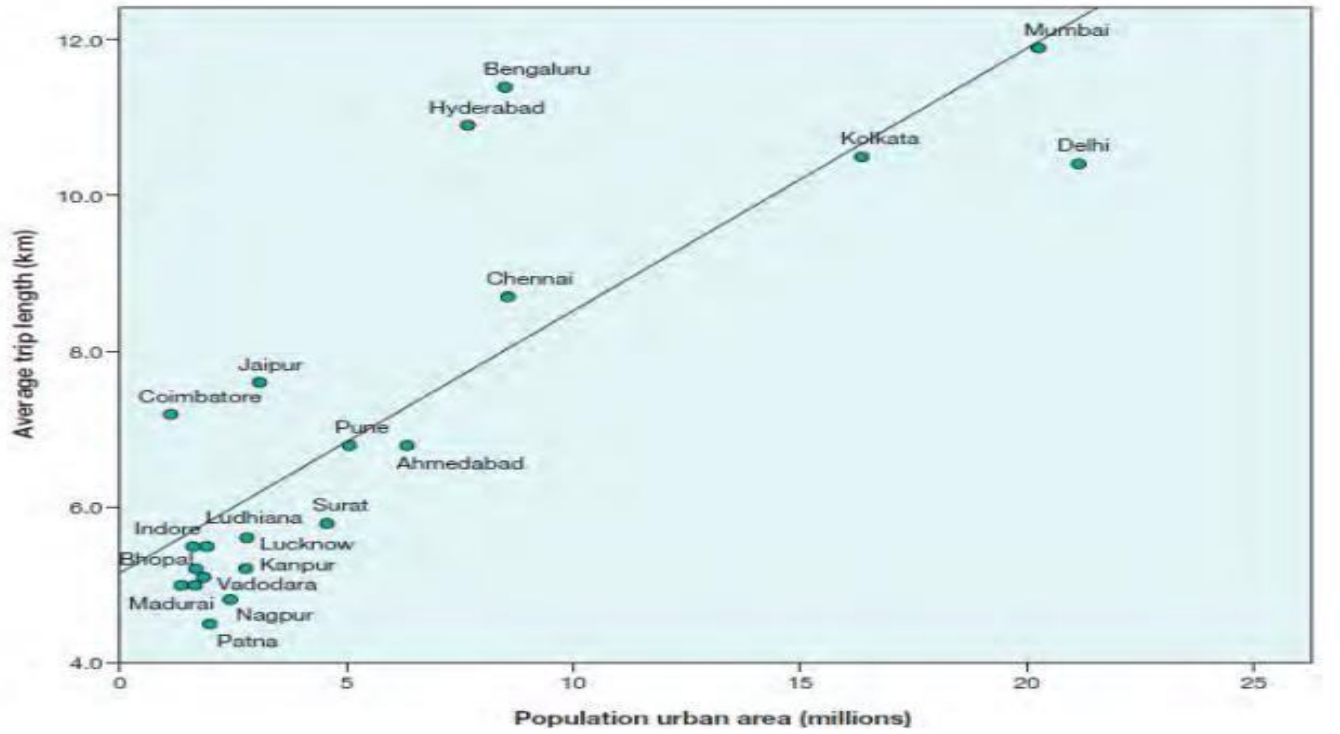
Growth of registered vehicles in India in Millions

Personalized private vehicles like cars and two-wheelers increased at CAGR of 9.6 per cent and 10.3 per cent per annum. The growth of these registered vehicles in cities with population more than a million is significantly higher than the rest of India which is a striking concerning matter

Personalized private vehicles that were present at the time like cars and two-wheelers grew at CAGR of 9.6 per cent and 10.3 per cent per annum. This growth of registered vehicles in cities with population more than a million is significantly higher than the rest of India that can be seen from the graph given above.

2. URBAN TRANSPORTATION PROBLEMS

A.ROAD CONGESTION



As the population grows, it is expected that the average distance and intensity will increase,since there is a direct relationship between these two indicators. Average journeys in metro cities including Bengaluru are more than 8 km, while in all other metro cities it is 6 km or less. This trend in trip length and frequency is only expected to increase as income levels, migration,female participation and service-oriented economies increase. As more and more people regularly commute longer distances for work and education, this inevitably leads to traffic congestion.

B. PARKING PROBLEMS

Parking problems arise when, based on previous figures, it can be observed that the population density is constantly increasing and there are no plans to stop or reduce them in the near future. Latest studies show that Indians are facing an acute parking problem as Indian citizens tend to park on the streets. Street parking is one of the main causes of traffic congestion in India.

Congested and narrow roads creates a huge parking problems.

C. AIR POLLUTION

The severity of air pollution in Indian cities is judged based on CPCB's (Central Pollution Control Board) air quality classification. According to their available air quality data of 180 Indian cities, there is a wide variation in the pollution concentration and severity across cities.Cities are considered critically polluted if the levels of criteria pollutants (namely PM10 and NO2) are more than 1.5 times the standard. Results show that half of the residential areas in cities monitored by CPCB are at critical levels of air pollution.

Air pollution in Indian cities is the fifth leading cause of death in India. Annually, about 620,000 premature deaths occur due to air pollution in Indian cities The Environment Pollution Control Authority (EPCA) report for the decade 2002 to 2022 shows that the number of vehicles increased by 97 per cent, contributing enormously to pollution and direct exposure to vehicular toxic fumes to nearly 55 per cent of Delhi's 17 million people who live within 500 meters from any road side.

D. DETERIORATING ROAD SAFETY

The high reliance of people who are on the roads on non-motorized transport modes such as walking and cycling causes a blend in activity modes in common roads where fast-moving mechanized traffic shares the roads with slow-moving modes leading to an expanding number of fatalities and road accidents.

This was the observation that was made by the World Health Organization, 2013. Indian cities however the non-motor using population of India like the cyclists and pedestrians still use the same way as the 4 wheeler vehicles and 2 wheeler vehicles which does not ensure safety but threatens it and is one of the major causes of road accidents that happen in India, this was a conclusion drawn from the study that was conducted by National Urban Transport Policy (NUTP) in 2008.

Pedestrian fatalities account for a large and critical portion of the total number of deaths, and their magnitude is actually much higher in cities that lack adequate pedestrian access. In New Delhi, Bengaluru and Kolkata, pedestrian deaths account for more than 40 percent.

3. POLICY RESPONSES TO TRANSPORT ISSUES

The Government of India has provided many ways and measures to solve the problem of urban traffic which have been mentioned in detail above. Most large cities are able to make decisions and implement them at the local level, just like other developing countries around the world.

The Government of India implemented many reforms that helped the economy transform from a conventional mode of transport to urban transport and more sustainable urban transport.

Centralized supervision and control is limited at the local level where planning and policy are implemented. Such planning and implementation is necessary to improve the economy and achieve the goal of sustainable urban transport.

The following subsections are the overview of the plans that the Indian government has takenup to enhance the living conditions by urban transportation. These policies are named as

- NATIONAL URBAN TRANSPORT POLICY (NUTP)
- JAWAHARLAL NEHRU NATIONAL URBAN RENEWAL MISSION (JNNURM)

NATIONAL URBAN TRANSPORT POLICY (NUTP)

In 2006, the Central Government under the Ministry of Urban Development (MoUD) published the National Urban Transport Policy with specific policy objectives including safe, affordable, fast, efficient, convenient and reliable access to work, education, clothing, recreational and leisure needs and other similar needs for all residents living in urban cities because the urban population has shown a delicious growth and population due to various migration and other factors discussed earlier in the study.

The NATIONAL URBAN TRANSPORT POLICY introduces measures to reduce the aforementioned problems such as road congestion and air pollution. It mentions four main policies to help solve the problems.

a. Increasing efficiency of road space by favouring public transport.
b. Using traffic management instruments to improve traffic performance.
c. Restraining growth of private vehicular traffic technological improvements in vehicles and fuels to reduce vehicle emissions
d. Safety stock management

NUTP recognized that states play one of the most important roles in the process of sustainable development, and the role of the central government was limited to supporting countries with the necessary financial support and technical expertise in the transition from the central government to the national level; and the problem related to the sustainable development of transport must be solved micro-economically, not macro-economicaly.

It is well known in NUTP that the solution to the complex problems of urban traffic is the development of an efficient and affordable PT system. The price issue has not been fully discussed so that all options are possible. Pricing options are very simple in nature, so they seem to be pronounced or ignored when comparing different things that cause or have caused many traffic problems in the past.

NUTP did not propose specific measures to solve this problem, but it refers to indirect subsidies that operators should provide.

JAWAHARLAL NEHRU NATIONAL URBAN RENEWAL MISSION (JNNURM)

The Jawaharlal Nehru National Urban Renewal Mission (JNNURM) was established by the central government in December 2005 and 63 cities were identified as eligible for central funding in the first phase of urban renewal and reforms.

The main reason for the existence of this system was to create fully functional and well-functioning URBAN LOCAL BODIES (ULB) organizations for successful planning, organizing and implementing policies related to the elimination of urban traffic problems. Another goal was to address the distortions in the urban land market that are mostly caused by many regulations.

To take steps on a larger scale, JNNURM has taken up the task of developing City Development Plans (CDP). These CDPs would help guide the entire development opportunity at the city level to the primary decision maker and implementation of plans. These improvements mainly involved the integration of land use and transport planning and the sustainable handling of infrastructure needs.

All proposed traffic projects comply with NUTP guidelines. To implement this, the program fixed the cost of central assistance at more than ₹ 66,000 crore over a seven-year period and linked the release of aid to the completion of reforms.

Currently, a total of 138 urban transport schemes have been awarded under this scheme under JNNURM and almost 80% of all these projects are in densely populated cities with a population of more than 4 million in each city.

But the JNNURM system is yet to reach its caliber, because many errors have appeared, which have greatly affected the name of the system to discredit some of these reasons, such as post-analysis of the JNNURM system caused an error. Urban transport development lacked effective monitoring and control mechanisms Land use transport integration did not happen Most projects funded by JNNURM improved urban infrastructure to facilitate traffic flow in the short term About 70% of JNNURM funding went to building roads and bridges and very little to sustainable. urban transport policies they discussed, showing the unfair allocation of resources to sustainable modes of transport such as NMT and public transport.

Many critics now claim that there is little progress in the JNNURM project.

4. VARIOUS URBAN TRANSPORTATION AND IMPORTANCE

ROLE OF AUTO-RIKSHAWS

Since the introduction of auto-rickshaws in India in the late 1950s, these vehicles have become an essential part of urban transportation for millions of people. Auto rickshaws play an important and vital role in urban transport systems in India. However, they also represent a highly improvisational and increasingly inefficient sector - and they are getting lost in the changing dynamics of urban transport in India. Today, as the population of cities increases, the demand for urban transport increases, the number of private cars increases and the share of public transport decreases. How do auto rickshaws fit in and play an effective role - both for drivers and passengers? And how can these three-wheeled wonders contribute to the sustainability of urban transport - both through reduced emissions and the safety of everyone on the road?

These auto rickshaw industries play a big role in the sustainability of urban traffic and therefore it is important to get all the insights about the auto-rickshaw industry through all the negative perceptions about auto rickshaws and also new models and innovations that can help in creation urban transport and sustainable development. A better and optimal resource for a safer system and an important role in this transport mix.

DEMAND OF THE AUTO-RICKSHAWS

As the demand for urban transport in India grows, so does the popularity of the auto-rickshaw. Production of this type of three-wheelers doubled between 2003 and 2010. In large cities, the auto-rickshaw sector is very important and accounts for a large number of car trips in every large city. Thus, this important transport sector must be included in any study or report that is made or any government policy that may concern the development of sustainable urban transport.

Avoid-Shift-Improve (ASI) framework which is one of the most important approaches to promote sustainable urban transport. The ASI system is based on three terms:

(1) Avoid unnecessary trips.

(2) Shift to more sustainable transport modes.

(3) Improve performance in all modes.

VEHICLE PERFORMANCE AND NEED FOR IMPROVEMENTS

This subsection examines the performance of the motorized three-wheeler (auto-rickshaw) in urban India in terms of emissions and road safety. The aim is to identify current sustainability challenges and areas of vehicle-related innovation for marketing sustainable urban transport in the auto-rickshaw sector.

EMMISIONS:

Among the various emission categories, particulate matter with an aerodynamic diameter of less than 10 microns (PM10), also known as respirable particulate matter (RSPM), is of major concern in the auto-rickshaw industry. This can be reduced to the following issues:

SMART CITIES

WHAT IS A SMART CITY?

A "smart city" is an urban area highly developed in terms of general infrastructure, sustainable land, communication and market viability. it is a city where information technology is the basic infrastructure and therefore the basis for providing key services to residents. so far, the federal government has decided to set up "109 smart cities" in India. The central idea of smart cities is the union of public services with an integrated transport system. Therefore, information technology plays an important role in the integration and automation of these services.

INDIAN GOVERNMENT ON SMART CITY DEVELOPMENT

The central government of India has launched two major programs - 100 Smart Cities and Atal Mission for Rejuvenation and Urban Transformation (AMRUT) in 500 cities with a population of at least 100,000. Funding is $8 billion and $8.3 billion. Smart city initiatives focus on core infrastructure services, while AMRUT takes a project-based approach to ensure core infrastructure services.

The Indian government is in a great need for a change and the Indian citizens as well there is a change coming with the efforts.

The 20 cities in the first phase will receive ₹ 2 billion ($30 million) in 2015-16 and ₹1 billion ($15 million) annually for the next three years; a total of ₹ 5 billion ($75 billion). State governments and urban local bodies also contribute an equal amount. Many foreign countries such as Japan, France, Germany, Singapore, etc. have come out to support the federal government's decision to develop smart cities.

SUSTAINABLE TRANSPORT AND SMART CITIES:

Smart cities cannot be built without smart transportation. In the Smart Cities program, cities are forced to create efficient urban transport and public transport, creating walkable localities and encouraging the spread of transport options. However, there is no clear direction for the development of sustainable public transport. The urban transportation system is planned, implemented and developed by the state and federal governments; Thus, within the Smart City program, each city can prepare a "Smart City Vision" document that improves the vision and financial proposal of the city.

Sustainable transport can be achieved with smart cities in the following ways:

a. THE EMERGENCE USE OF METRO SYSTEMS

Metros are, by their nature, interconnected rail networks that have proven to be very efficient, which is important to mention in order to achieve sustainability of urban transport.

After the success of the Delhi Metro, many Indian cities are exploring the possibility of implementing metro rail networks. According to the Ministry of Urban Development (MOUD), there are currently around 316 kilometers of metro lines in use across the country and more than 500 kilometers of metro lines under construction. This includes metro/monorail systems supported by state governments and private institutions.

Delhi Metro is the largest metro system with a total length of 213 kilometers and carries 2.8 million passengers daily. Some new subway systems continue to have trouble increasing ridership; The Jaipur Metro, for example, carries only 20,000 passengers a day and suffers a loss of 30 million Indian rupees ($500,000) a month.

Delhi Metro is one of the largest and efficient metro systems in the world.

b. REVAMPING THE BUS SYSTEM:

Buses are the most popular and convenient mode of transportation in urban cities. There are 1.6 million registered buses in India and there are 170,000 buses in the public bus service which carry around 70 million people every day. However, bus traffic was not ready to cover the growing tourist demand.

Only 30,000 buses serve in urban areas, of which around 3,500 operate under a public-private partnership agreement. All bus operators are making huge losses and do not have the resources to make the capital investment needed to acquire new vehicles and technology. the typical age of the car fleet varies from two years to 11.8 years for the country's bus companies.

The National Sample Survey Office (NSSO) conducts an annual survey of household expenditure on services and durable goods in India. In terms of transport cost details, buses are the most popular mode of transport in rural and urban India, followed by auto-rickshaws. The Central Government launched the National Urban Reclamation Mission (NURM) in 2009, starting a massive program to revitalize urban areas, allocating public funds to accelerate the creation of much-needed infrastructure. The program was divided into two phases and ended in 2015. About 222 kilometers of BRT systems are in operation, with the remaining 282 kilometers under construction. MoUD provided financial assistance to 11 cities for the 504 km Bus Rapid Transit System.

To boost investment in the sector, the federal government proposed to open the public bus sector to private companies. This allows buses to run on nationalized routes. According to the Ministry of Road Transport, the opening of the sector will increase the number of passengers to 120-150 million every day.

FUTURE BUS TECHNOLOGY:

The central government has announced an ambitious project to replace all public transport buses with hybrid technology. The government has launched a completely original modified electric bus developed by KPIT Technologies and the Central Institute of Road Transport (CIRT), which converts existing conventional fuel-powered buses into electric buses.

Cities like Bengaluru has started use e-buses for reducing pollution.

The biggest obstacle to adopting the latest technology is the financial implications and capital costs. the typical price of a hybrid bus in India is about 23 million Indian rupees ($375,000), while a premium diesel bus costs 9 million Indian rupees ($150,000). To encourage transporters to buy electric and hybrid buses, the federal government launched the "Faster Adoption and Manufacturing of Electric and Hybrid Vehicles (FAME)" program, which provides a subsidy of 6.1 million Indian rupees ($100,000) for electric and hybrid buses.

c. INNOVATIVE TECHNOLOGY

Mumbai monorail is the first monorail system in India.

The biggest obstacle to adopting the latest technology is the financial implications and capital costs. the typical price of a hybrid bus in India is about 23 million Indian rupees ($375,000), while a premium diesel bus costs 9 million Indian rupees ($150,000). To encourage transporters to buy electric and hybrid buses, the federal government launched the "Faster Adoption and Manufacturing of Electric and Hybrid Vehicles (FAME)" program, which provides a subsidy of 6.1 million Indian rupees ($100,000) for electric and hybrid buses.

Smart ticketing has slowly gained popularity in India. All metro systems have implemented smart ticketing solutions in their "closed" environment; Delhi Metro sells about 16,000 smart cards every day and 1.8 million commuters use the card every day. However, smart ticket systems have not yet been integrated into the bus system. The Federal Government has planned to introduce a sensible National Community Mobile Card (NCMC) that will enable seamless travel through various modes of transport across the country and retail benefits. However, the initiative did not take off. In July 2015, the board established a committee to recommend an interoperable smart card.

The development of water transport is one of the main priorities of the federal government of India. The National Waterways Act 2016 was passed in March 2016 to regulate the development of 111 national waterways, of which 106 are new national waterways. Currently, only 3.5% of India's trade is carried out by water transport, while China's share is 47%. 40% in Europe; 44% in Japan and Korea; and 35% in Bangladesh.

CHAPTER: 4

FINDINGS AND SUGGESTIONS

FINDINGS

Sustainable urban transport is an important issue in India, where rapid urbanization and economic growth have led to significant congestion, air pollution and accessibility problems. Here are some observations about sustainable urban transport in India:

- Public transport: One of the most important aspects of sustainable urban transport is the availability of efficient and affordable public transport. In India, the use of public transport such as trains, buses, monorail and metro has increased significantly in recent years. However, it is still necessary to invest in improving infrastructure and service quality so that even more people start using public transport.

- Intelligent Transportation Systems: The use of technologies such as Intelligent Transportation Systems (ITS) can help us to improve the efficiency and safety of urban transportation. Several Indian cities have started implementing intelligent transport system solutions such as electronic toll collection, real-time traffic monitoring and GPS-based public transport systems.

- Motorized transport: Non-motorized transport, such as cycling and walking, is an important part of sustainable urban transport. But in India, these modes of transport are often marginalized and unsafe due to lack of infrastructure and awareness. Several cities in India have started investing in bicycle and pedestrian paths to encourage the use of non-motorized transport.

- Electric Vehicles: In India, electric vehicles are considered an important part of sustainable transportation. The Indian government has set a target for 30% of all vehicles on the road to be electric by 2030. Several states in India have also announced policies and incentives to promote EV adoption.

SUGGESTIONS

India's rapid urbanization has significantly increased air pollution and traffic congestion, underscoring the urgent need for sustainable urban transport. Here are some suggestions for sustainable urban transport in India:

- Promote non-motorized traffic: Encourage walking and cycling by providing safe and dedicated lanes, bicycle parking and pedestrian infrastructure. This can be achieved through various initiatives such as general awareness campaigns, subsidies for the purchase of bicycles and the construction of bicycle paths.
- Promotion of electric vehicles: Encourage the use of electric vehicles by offering incentives such as tax credits, subsidies and charging infrastructure. The Indian government has already announced its plan to achieve a 30 percent share of electric cars by 2030, and the private sector is expected to invest in the development of electric cars
- Public transport: To encourage the use of efficient and environmentally friendly public transport systems such as buses and metro trains. This can be achieved through subsidies, lower prices and increased connectivity. Governments can also encourage private companies to invest in public transport infrastructure by offering tax breaks and other incentives.
- Implementation of urban planning: Ensure that sustainable transport is considered in urban planning. Build mixed-use buildings that allow people to live, work and play in the same area, reducing the need for long commutes. Make sure new places are designed to be pedestrian and cyclist friendly and have safe walking and cycling routes.
- Implementation of Congestion Pricing: Congestion pricing can help reduce traffic congestion in congested areas by charging higher fees during peak hours. It can be used to finance public transport infrastructure and encourage people to switch to sustainable modes of transport.

CHAPTER: 5

CONCLUSION

In conclusion, urban transport is a complex and multifaceted problem in India. The country faces many challenges such as inadequate infrastructure, increasing traffic congestion, poor public transport services and high air pollution. Although progress has been made in recent years, much more needs to be done to improve the situation.

One of the main solutions to India's transport problems is the development of sustainable and efficient public transport systems such as buses, trains and metros. It not only reduces traffic congestion but also provides affordable and easy-to-use means of transportation to all citizens. In addition, promoting the use of non-motorized transport such as bicycles and walking can help reduce congestion and promote healthy lifestyles.

In addition, the government and the private sector must invest in the development and improvement of infrastructure, including roads, bridges and highways, to facilitate connectivity and access. Promoting the use of electric and hybrid vehicles can also help reduce emissions and mitigate the environmental impact of traffic.

Improving urban transport in India requires a holistic approach that addresses mobility challenges holistically. This includes expanding and improving public transport systems, promoting non-motorised transport options such as cycling and walking, and managing demand through congestion pricing and parking policies. In addition, consistent land use and traffic planning are needed to reduce the need for long-distance traffic and encourage compact mixed use.

Overall, addressing India's urban transport challenges requires a holistic approach involving multiple stakeholders, including the government, private sector and citizens. Working together, it is possible to create sustainable and efficient transport systems that promote economic growth, environmental sustainability and social equity.

CHAPTER: 7

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