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Transforming Bangalore's Public Transport: Strategies for Reducing Greenhouse Gas Emissions (SDG 13)

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Abstract: ***The following research paper helps in understanding the future intentions of Bangalore's public transportation systems. Through thorough research and investigation, it found out that Bangalore's rapid urbanisation strained its public transport system, which led to an increased dependence on private vehicles and rising greenhouse gas emissions. This research was aligned with the Self Development Goal 13, which investigates how targeted improvements in Bangalore's public transportation would help reduce those carbon emissions. The research found that Bangalore's public transport is underutilized due to concerns over cleanliness, overcrowding, and safety, leading to high private vehicle dependence and increased emissions. While the government plans to expand metro services, introduce 13,500 e-buses by 2030, and integrate transit modes, progress remains slow, and promotion is lacking. Learning from global cities like London and Singapore, strategies such as congestion pricing, improved traffic management, and Transit-Oriented Development (TOD) can enhance efficiency. Public opinion suggests that if safety, cleanliness, and accessibility improve, more people would shift to public transport. Prioritizing these improvements can significantly cut emissions and make Bangalore's transport system more sustainable.***

I. INTRODUCTION

The transport sector constitutes a significant part of global climate change challenges currently faced by the world. Cities throughout the world now face increasing environmental pollution and traffic congestion because they continue to grow rapidly. As India's modern technologic hub Bangalore joins other cities which gained the "Silicon Valley" status, emerging as a key player in innovation, startups, and advanced research across fields like AI, biotechnology, and software development. The city's expanding IT sector and growing population number has stressed the transport infrastructure to the point where citizens increasingly adopt private transport. Public dependence on cars and two-wheelers has fueled noticeable growth of greenhouse gas (GHG) emissions which emphasizes the need to redesign Bangalore's public transport operation.

The research investigates SDG 13: Climate Action by studying strategic public transport system improvements which will reduce emissions throughout 2030 in Bangalore. Multiple cities across the world achieve results in emission reduction from transport systems by implementing new policies alongside adopting modern technologies and constructing better infrastructure. London established congestion fees as a measure and Singapore created an advanced mass transit system and bus system. By adapting this proven approach to its particular identification of problems Bangalore possesses the ability to reduce emissions substantially while creating a cleaner urban environment.

The improvement of public transportation systems in Bangalore goes beyond emission reduction. The implementation delivers advantages which benefit people's finances as well as enhance their social and health situations. A strong interconnection between transit routes combined with operational efficiency leads to reduced expenses for commuters along with minimized exposure to pollution and processes that assist low-income areas through better access. The implementation of a sustainable urbanization infrastructure helps India accomplish national objectives for climate action while supporting urban development. The success of Bangalore as an economic center makes its development of environmentally friendly transport solutions ready to be adopted by other cities across India.

II. METHODOLOGY

To ensure a comprehensive analysis, this research employs a mixed-method approach, combining primary and secondary data collection. The study examines current transportation trends, emissions data, policy frameworks, and real-world case studies to determine the most effective solutions for Bangalore.

Primary Data Collection - Surveys will be conducted with Bangalore residents to understand their daily transport choices, key challenges, and willingness to shift to public transport if improvements were made. These surveys will focus on travel time, cost, comfort, accessibility, last-mile connectivity, and environmental awareness. Additionally, expert interviews will be conducted with urban planners, policymakers, transport officials, and environmental scientists to gather insights into policy gaps, infrastructure limitations, and potential innovations. On-ground emissions and traffic monitoring will also play a crucial role. Data will be collected on vehicular emissions, congestion hotspots, and peak traffic trends in Bangalore's busiest corridors. These findings will be compared with existing government reports to ensure accuracy.

Secondary Data Collection - A thorough review of government reports and policy documents, such as India's National Urban Transport Policy, Bangalore's Comprehensive Mobility Plan, and state emission reduction targets, will be conducted. This will help in understanding existing policies and identifying gaps that need to be addressed. Additionally, case studies from global cities like London, Singapore, Delhi, and Tokyo will be analyzed to learn from successful transport models that have effectively reduced emissions.Scientific research and articles will also be examined to gain insights into sustainable transport models, electric vehicle adoption, and emission control policies. This will provide a strong foundation for proposing practical solutions tailored to Bangalore's needs.

Data collected suggested that Bangalore's future public transport development plans focus on increasing public transit usage, enhancing the road network, and expanding the commuter rail system. The city aims to operate 13,500 e-buses by 2030, with an interim target of 2,500 by 2024, and seeks to integrate various modes of transport, including buses, metro, and suburban rail, through Transit Oriented Development (TOD) along mass transit corridors. Additionally, Bangalore plans to establish a defined road hierarchy, introduce more rings and radial roads, and create safe pedestrian and bicycle facilities. The Suburban Rail Project will enhance connectivity between the outskirts and central business districts, while other initiatives aim to regenerate road infrastructure as a public asset, reduce transport sector emissions, and improve air quality. The data which I found was relevant and sufficient as a first gathered data, and then asked people about this. They approved of it which meant that it was sufficient.

III. ANALYSIS AND FINDINGS

Currently, people rely more on private transport rather than public transportation as they feel like public transport is not clean and feel claustrophobic due to the amount of people onboard together. Also, some people mentioned that they do not use public transport as it is often unsafe due to some incidents that have happened earlier in the country. However, it was found that there is not enough emphasis on the usage of public transport. The government does not advertise for this as they do for brands- instead, they use their own private transport rather than encouraging public transport.. My analysis and findings answer my research question to an extent as it aids my knowledge about public transportation systems in Bangalore, future plans about public transport, and public opinion about the same (public opinion is crucial as after all, it is going to be them who use the transportation systems).

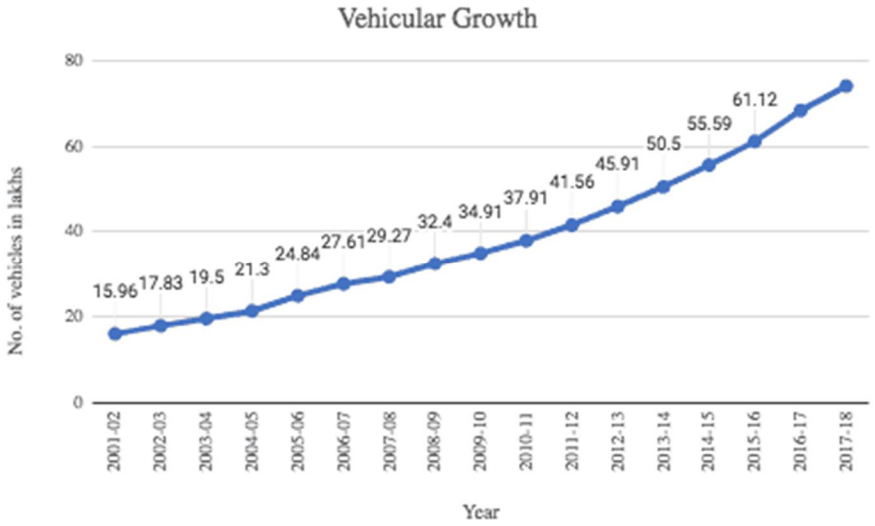


Fig 1. Statistics of number of vehicles on the road in Bangalore (through secondary research)

The graph titled "Vehicular Growth" (fig.1) illustrates the steady and continuous increase in the number of vehicles (in lakhs) over the period from 2001-02 to 2017-18. The data reveals that the number of vehicles grew from 15.96 lakh in 2001-02 to 61.12 lakh in 2017-18, showing an almost fourfold increase over 17 years. The trend appears to be exponential rather than linear, with the rate of growth accelerating in later years.

From 2001-02 to 2007-08, the growth was relatively moderate, increasing by approximately 10 lakh vehicles in six years. However, from 2008-09 onwards, the rate of increase became significantly steeper, with nearly 30 lakh additional vehicles between 2010-11 and 2017-18 alone. This sharp rise suggests increasing dependence on private vehicles, likely due to inadequate public transport infrastructure, rapid urbanization, and population growth in Bangalore.

The implications of this trend are concerning, as a higher number of vehicles contribute to traffic congestion, air pollution, and greenhouse gas emissions. If this trajectory continues, the city's transport infrastructure could face even greater stress, underscoring the need for urgent interventions such as public transport improvements, traffic management strategies, and sustainable urban mobility solutions.

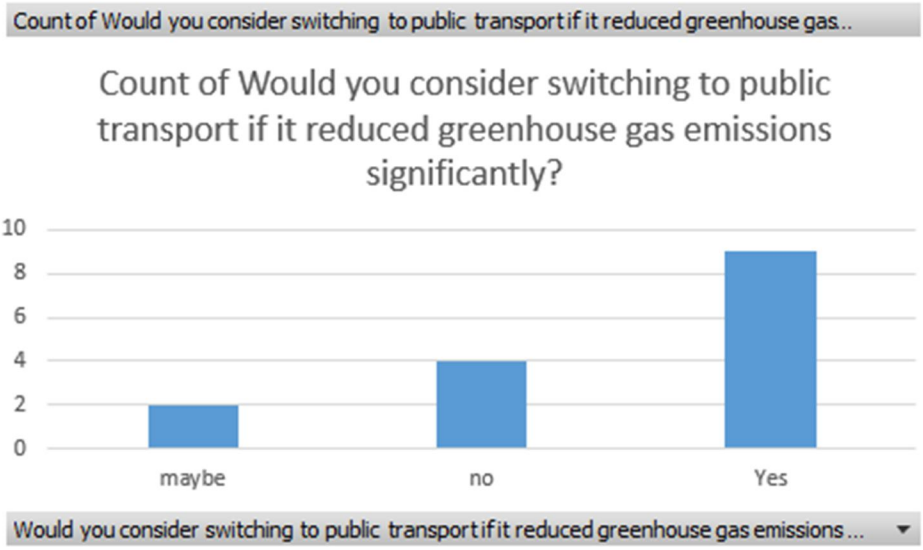


Fig. 2 Medium of my primary research data

The bar chart presents responses to the question: "Would you consider switching to public transport if it reduced greenhouse gas emissions significantly?" The data indicates that a majority of respondents are willing to switch, with the highest number of responses (around 9) selecting "Yes." A smaller but notable portion (around 5) answered "No," indicating that some individuals are not inclined to change their transport habits. A minimal number of respondents (around 2) selected "Maybe," suggesting some uncertainty or conditional willingness to switch. Overall, the results highlight a positive inclination toward public transport adoption for environmental benefits, though some resistance remains. This suggests that while many people are open to shifting, further improvements in public transport infrastructure, incentives, or awareness campaigns may be needed to encourage broader adoption.4 Overall, based on my methodology and research, indications suggest that more vehicles on the road mean that people prefer private vehicles over public transportation. However, the question below could mean that people are not well aware that public transportation would help reduce greenhouse gas emissions, which prevents the need for them to use public transportation over private. To add on, people also mentioned that if public transport actually reduces greenhouse gas emissions, people would be willing to use it.

IV. CONCLUSION

This research highlights that targeted improvements in Bangalore's public transport system can play a huge role in cutting emissions and making the city more sustainable. Expanding the metro, increasing electric buses, and implementing policies that prioritize public transport are some of the most effective solutions.

For future research, it would be useful to explore the economic feasibility of these changes and potential policy challenges. Looking at funding options, technological advancements, and how commuter behavior changes over time will be key to long-term success. With the right approach, Bangalore can create a cleaner, more efficient, and climate-friendly transport system.

REFERENCES

Government Reports & Policy Documents

[1] Ministry of Housing and Urban Affairs (India). National Urban Transport Policy (NUTP). Retrieved from https://mohua.gov.in/
[2] Bangalore Metro Rail Corporation Ltd. Namma Metro Expansion Plan. Retrieved from https://english.bmrc.co.in/
[3] Bangalore Metropolitan Transport Corporation (BMTC). Annual Transport Report 2024. Retrieved from https://www.mybmtc.karnataka.gov.in/
[4] Karnataka State Pollution Control Board (KSPCB). Transport Emissions Report. Retrieved from https://kspcb.karnataka.gov.in/
[5] Indian Institute of Science (IISc). Bangalore's Air Quality & Traffic Congestion Study. Retrieved from https://iisc.ac.in/

Research Papers & Journal Articles

[6] Shrivastava, R., & Mohan, D. (2022). Sustainable Urban Mobility: Challenges and Solutions for Indian Cities. Journal of Urban Planning. Retrieved from https://journals.sagepub.com/home/upm
[7] Agarwal, P., & Banerjee, S. (2023). Impact of Metro Rail on GHG Emissions in Bangalore. Environmental Research Letters. Retrieved from https://iopscience.iop.org/journal/1748-9326
[8] World Bank. (2021). Green Mobility Strategies for Emerging Economies. Retrieved from https://www.worldbank.org/en/topic/transport
[9] Indian Institute of Technology (IIT) Delhi. (2023). Urban Congestion and Public Transport Efficiency in India. Retrieved from https://home.iitd.ac.in/

Case Studies from Global Cities

[10] Transport for London (TfL). London's Congestion Charge and Public Transport Success. Retrieved from https://tfl.gov.uk/
[11] Singapore Land Transport Authority (LTA). How Singapore Reduced Private Car Dependency. Retrieved from https://www.lta.gov.sg/
[12] Delhi Metro Rail Corporation (DMRC). Delhi Metro's Role in Cutting Urban Emissions. Retrieved from http://www.delhimetrorail.com/
[13] Tokyo Metropolitan Government. Integrating Multi-Modal Transport for a Low-Carbon Future. Retrieved from https://www.metro.tokyo.lg.jp/english/

Media Reports & News Articles

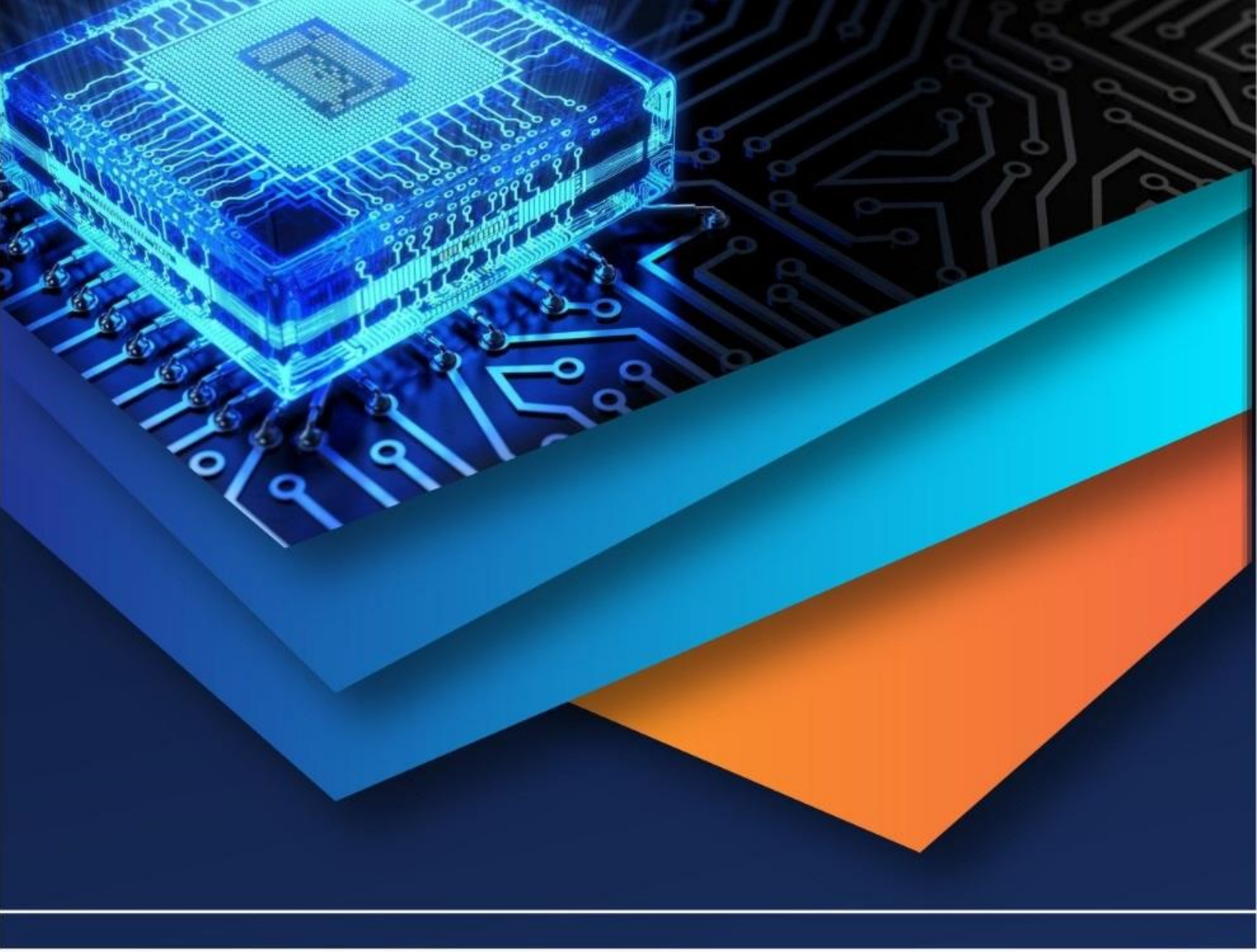
[14] The Hindu. (2024). Why Bangalore's Traffic Woes Are Getting Worse. Retrieved from https://www.thehindu.com/
[15] Times of India. (2023). BMTC's Plan to Electrify Its Bus Fleet. Retrieved from https://timesofindia.indiatimes.com/
[16] The Indian Express. (2024). Bangalore's Metro Expansion and the Future of Public Transport. Retrieved from https://indianexpress.com/
[17] BBC News. (2023). How Asian Cities Are Fighting Air Pollution Through Transport Policies. Retrieved from https://www.bbc.com/news

Web Resources & Databases

[18] International Energy Agency (IEA). India's Transport Emissions Data. Retrieved from https://www.iea.org/
[19] United Nations Sustainable Development Goals (UN SDGs). Goal 13: Climate Action & Urban Transport. Retrieved from https://sdgs.un.org/goals
[20] Global Carbon Atlas. CO_2 Emission Trends in Indian Cities. Retrieved from http://www.globalcarbonatlas.org/en/
[21] Bangalore Development Authority (BDA). Urban Mobility Reports & Future Plans. Retrieved from https://eng.bdabangalore.org/

Expert Interviews & Survey Data

[22] Citizen Matters. Bangalore Transport Issues. Retrieved from https://citizenmatters.in/
[23] Centre for Science and Environment. India's Urban Air Quality and Transport Impact. Retrieved from https://www.cseindia.org/
[24] Bangalore Smart City. Public Transport Initiatives & Sustainable Mobility. Retrieved from https://www.smartcitybangalore.org/



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