MANTECH Publications

Journal of Transportation Engineering and Its Applications
Volume 7, Issue 3, September-December, 2022

Rail Transportation at High Speed as Case Study for Reengineering Transportation System: Analysis for Sustainable Model of Business and Economy

Dr. Jitendra Chicholkar[1], Pankaj Sahay[2]
Professor[1], Student[2]
Department of Civil Engineering
Mukesh Patel School of Technology Management and Engineering
Corresponding Author's Email id: *-sahaypankaj683@gmail.com[2]*

Abstract

The smooth flow of people and products depends on sustainable transportation networks, which provide the fundamental infrastructure needed for these movements. Modern society is predicated on the availability and use of sustainable transportation networks, and as their use rises due to the population's unrelenting increase, congestion and pollution problems are exacerbated. Growing interest in sustainability, sustainable development, and sustainable transportation is notable, and the paradigm shift in people's perceptions toward raising living standards in order to save the planet is an important issue to take into account as citizens of the world. Theoretically, the paper emphasizes the use of public transportation, particularly high-speed rail transportation, to protect the environment and gain advantages like clearing traffic on the roads, cutting fuel costs, reducing accidents, ensuring stress-free travel, enhancing health, and reducing vehicle pollution. Discussion topics included a comparison of private and public transportation, the advantages and disadvantages of various modes of transportation, the transformative effects of having high-speed public rail transportation, and policy measures to move toward sustainable transportation systems with an integrated approach.

Reengineering the current, unsustainable transportation system is advised in order to make room for high-speed rail services, which have substantial advantages. The world can no longer afford to have individualised

Page 152-165 © MANTECH PUBLICATIONS 2022. All Rights Reserved

transportation facilities at a cost of unsustainable environmental effects. Sustainable mobility is not an option; it is a need.

***Keywords**: - High Speed Rail; Integrated approach; Policy measures; Public transport system; Sustainable transport*

INTRODUCTION

Many economies have grown quicker and reaped the short-term benefits of the global economy as a result of increased globalisation, which is accompanied by a culture that is becoming more consumer-oriented. For the seven billion people on the planet—which is anticipated to grow to nine billion by 2050—commercial activities have picked up steam, and industries have multiplied. To serve the expanding needs of the world, many nations' transportation infrastructures still need to be improved and redesigned. The public transportation system is developing more quickly than the global economy as a whole. The distance between geographical regions of the world has decreased because of advances in science and technology, notably in transportation, but not because of inequalities. For economic progress, both urban and rural regions must have good physical connectivity (Stephen Gibbons and Stephen Machin, 2004). Since globalisation, demand for transportation infrastructure and services has increased in many economies. Governments have not developed an appropriate public transportation infrastructure in contrast to these advancements, allowing private transportation to expand quickly. Around 75% of the greenhouse gases (GHG) connected to energy are emitted by transport systems, which accounted for 23% of global emissions in 2004. (James Woodcock et al., 2009). Currently, petroleum accounts for 95% of all transportation energy. Transportation infrastructure, such as roads, bridges, and railroads, contains energy that is used in both the construction and usage of vehicles (Wikipedia, (n.d.).

Unreliable public transit is the cause of today's unsustainable levels of car pollution (Nagurney, A. 2000). Since the transportation system is the nerve system of the economy and affects many facets of human life, it is essential that it be sustainable, accessible, and well-developed. Additionally, high inflation brought on by rising oil costs globally and global warming as a result of a strong

Page 152-165 © MANTECH PUBLICATIONS 2022. All Rights Reserved

reliance on private transportation had an impact on economies that were largely dependent on fossil fuels.

Private versus Public Transportation System

Private transportation, as opposed to public transportation, is a form of transportation that is not accessible to the general population. In much of the world, private transportation is the predominant mode of transportation. For instance, passenger cars, motorcycles, and trucks account for 86.2% of passenger miles in the United States. Automobiles, motorbikes, taxis, and private planes are a few examples of private transportation. Unlike bicycles, which have motors, walking, scooters, and rollerblading do not (Wikipedia 2, 2009). Public transportation is a shared passenger transportation service that is accessible to everyone, as opposed to modes like taxis, carpooling, or leased buses that do not allow strangers to take rides without prior private agreement (Wikipedia 3. n.d.). Buses, trolleybuses, trams, trains, fast transit (metro, subways, undergrounds, etc.), and ferries are examples of public transportation modes. Mobility is often not sustainable in underdeveloped nations, and for the general population, access to sustainable transportation is a major goal (Janelle and Hodgek, 2000).

Comparison of various modes of transport

There are regional variations in the use and scope of public transportation due to economic and historical factors. In emerging and underdeveloped nations, transportation is public. While private transportation is frequently employed in industrialised nations, The moment has come to design and employ a sustainable public transportation system, regardless of development and the type of economic prosperity.

a) Airline - An airline operates regularly scheduled flights between airports. Air travel may reach very high speeds, but there are lengthy wait times before and after flights, therefore it is sometimes only practical over longer distances or in places where there is insufficient ground infrastructure to support other forms of transportation (Wikipedia3. n.d.). However, nations like India impose extremely high taxes on air travel, making it exceedingly expensive and out of the reach of middle-class people. Additionally, every passenger is paid a fee for the development of the airport, and all

Page 152-165 © MANTECH PUBLICATIONS 2022. All Rights Reserved

new airports that are now being developed in India are quite expensive.

Although they may not be as luxurious, smaller cities may have comfortable airports that serve as transportation hubs. Sustainable and high-quality transportation are important factors (Linda Steg and Robert Gifford, 2008).

b) Railways - The problem of traffic congestion brought on by the use of roads, particularly the traffic of passenger automobiles, 2-wheelers, 3-wheelers, and tiny 4-wheelers, has long plagued the whole world. Passenger automobiles typically carry 1-2 people per vehicle, making them the least efficient form of transportation in terms of fuel use, the use of traffic areas, and environmental harm. Because public rail passenger transportation has many advantages, a new transportation strategy that encourages its use will be the key to solving the problem.

For nations with high levels of population density and high demand for transportation services, high speed rail (HSR) is the preferable option (Abramovi et al., n.d.). If this form of transportation offers a greater net projected social benefit than the next best option, public funding should be committed to it. The case for investing in HSR is heavily reliant on the amount of traffic already present where the new lines are built, the anticipated time savings and generated traffic, the average willingness of potential users to pay, the release of capacity in congested roads, airports, or conventional rail lines, and the net reduction of negative aspects of private transportation (De Rus, 2008).

Table 1

Modal ratio of railway transport (excluding metro) compared to other modes of transport.

Sl. No.	Country	Ratio	Year	Sl. No.	Country	Ratio	Year
1	Belgium	6.9	2006	18	Poland	6.7	2006
2	Bulgaria	5.4	2006	19	Portugal	4.4	2006
3	Czech Republic	6.9	2006	20	Romania	9.3	2006
4	Denmark	9.0	2006	21	Slovenia	3.2	2006
5	Germany	7.7	2006	22	Slovakia	5.9	2006
6	Estonia	1.7	2006	23	Finland	4.9	2006
7	Ireland	5.1	2006	24	Sweden	8.2	2006
8	Greece	1.6	2006	25	United Kingdom	5.9	2006
9	Spain	5.3	2006	26	Croatia	4.4	2006
10	France	9.2	2006	27	Macedonia	1.7	2006
11	Italy	5.5	2006	28	Turkey	2.5	2006
12	Latvia	5.1	2006	29	Norway	4.5	2006
13	Lithuania	1.0	2006	30	Switzerland	16.4	2006
14	Luxembourg	3.9	2006	31	United States	0.3	2004

Page 152-165 © MANTECH PUBLICATIONS 2022. All Rights Reserved

15	Hungary	12.6	2006	32	Japan	27	2000
16	Netherlands	8.3	2006	33	Indonesia	6.3	2005
17	Austria	9.8	2006				
Source: Wikipedia4							

The above table 1 shows that there is immense potential for HSR services that have great scope for reduction in pollution and minimize accidents, apart from freeing congested roads. Moreover, travelling in railways always leads to walk to the office or home from the station which is good for health rather than current model of private transport where people just do not get an opportunity to walk. Therefore, HSR may be preferred all over the world to benefit everyone.

c) Roadways- Good physical connectivity in the urban and rural areas is essential for economic growth of any nation (Worldbank1. (n.d.). However, thickly populated plain areas may have high speed rail infrastructure to save cost of energy and other associated benefits. In case of private transport, there is a huge demand for skilled drivers (Jagdish Nehul, 2011), whereas in public rail system this issue does not arise. Except, where good rail system is not physically, environmentally and economically viable, road transport may be preferred by the governments. Despite improvement in quality of roads in various countries, the benefits of public transport far exceed the private transport that happens mostly by road (Suneet K. Maheshwari. 2010).

d) Waterways: A waterway is any navigable body of waters which can include rivers, lakes, seas, oceans, and canals. Navigable waterways may be developed for transportation with modern transport vehicles.

Transformative Effects of High Speed Public Transportation System on the Economy

Having high speed transport brings significant changes in the economy from materialistic society to preference towards public transport systems. Few significant benefits include:

a) Comfort and Convenience of Travelling. When there is reliable, effective and efficient public transport, more and more public opt in place of individualized and expensive private travelling. Particularly many Indians opt for private vehicles only to reach their work place in time as public transport is unreliable. In addition, people get tired in

Page 152-165 © MANTECH PUBLICATIONS 2022. All Rights Reserved

driving private vehicles amidst heavily congested roads, traffic and consequently this tiredness will result in loss of productivity in work place.

b) Reduction in Cost and Time of Transportation. Reliable public transportation system reduces each person's travel costs such as fuel costs, tolls, and the stress of driving. Public transport is also a more environmentally friendly and sustainable way to travel as sharing journeys reduces carbon emissions, traffic congestion on the roads, and the need for parking spaces. In addition, accidents will come down as consequence to the less number of vehicles on road. When international oil prices were increasing few years ago several state Governments made five-day work week and encouraged saving fuel. This practice may be extended to state governments as well in India and other parts of the world where six-day work week is in existence.

c) Increase in Employee Productivity. Currently in many parts of the world, travel time between the home and work place is increasing consequent to the increase in number of vehicles on the road. In most parts of Indian metro cities the travel time to reach work place is an hour and half. This precious time is lost on account of unsustainable transport system. This affects the productivity of people driving vehicles through congested traffic amidst narrow roads and driving vehicles in violation of traffic rules, especially 2-wheelers.

d) Reduction in Environmental Pollution. Transport systems have significant impacts on the environment, accounting for between 20% and 25% of world energy consumption and carbon dioxide emissions. Greenhouse gas emissions from transport are increasing at a faster rate than any other energy using sector. Road transport is also a major contributor to local air pollution and smog (Wikipedia1. n.d.).

e) Reduction in Social Cost. The social costs of transport include road crashes, air pollution, physical inactivity, time taken away from the family while commuting and vulnerability to fuel price increases. Many of these negative impacts fall disproportionately on those social groups who are also least likely to own and drive cars (Wikipedia1. n.d.). Sustainable public transport system will decrease pollution substantially by way of lesser automobile pollution, less manufacturing of automobiles, less congestion of traffic, less accidents and health hazards. In

Page 152-165 © MANTECH PUBLICATIONS 2022. All Rights Reserved

addition many those who think of buying a private vehicle will have a second thought as public reliable transport system is in place. The intended investment in automobiles will be diverted in some other avenues.

f) Reorganization of Urban Development. When there is a high speed transport system connecting various cities and suburbs, many new areas will develop and people settled in cities too will move out for better living spaces without affecting their proximity to city centres. In fact, sub urban areas may be well developed so that few years down the line, they becomes centres of economic activity and existing congested city centres will be free to be developed. This will ease pressure on cities automatically. However, government should not regulate too much with respect to the demarcation of urban and rural areas as the investments will differ and distort development.

g) Balanced Regional Development. Development takes place in and around the areas that have transport facilities and well connected with other modes of transport. If there is sustainable public transport system, many rural and semi-urban areas too will develop. Lack of public transport facilities in developing countries, inhibits rural and small entrepreneurs as the cost of logistics is expensive. In fact, if India had well- developed transport sector, its economy would grow three per cent perpetually given its market size.

h) Minimized International Volatility. Restructured transport systems from heavily dependent on roadways to railways will result in huge reduction of vehicles on roads, less fuel consumption, and less prone to international crude price volatility. International crude price is one of the highly contributing factors for the inflation affecting interdependent economies in the increasing globalized world.

5. Policy Measures for a Sustainable Transportation System

Sustainable transport refers to any means of transport with low impact on the environment, and includes non-motorised transport, i.e. walking and cycling, green vehicles, sharing vehicles, and building or protecting urban transport systems that are fuel-efficient, space-saving and promote healthy lifestyles (Wikipedia1. (n.d.). Since benefits of sustainable transport are immense, there is an imperative need to have sustainable transportation system as the cost of energy has been rising steadily and is expected to increase as the

Page 152-165 © MANTECH PUBLICATIONS 2022. All Rights Reserved

population is increasing and oil reserves are decreasing. Countries that have severe traffic congestion and poor public transport system must aim to modernize, expand, and integrate the transport system. Nations must mobilize resources for the noble cause of sustainable transport system and gradually shift the role of government from that of a producer to an enabler.

a) Strategic Policy Measures. The field of sustainable development can be conceptually divided into four general dimensions given in the fig 1: social, economic, environmental and institutional. The first three dimensions address key principles of sustainability, while the final dimension addresses key institutional policy and capacity issues (Wikipedia5, n.d. and Henry Lamb, 2011). Governments have to take strategic measures with respect to plan, design, implement and review of sustainable transport systems. Democratic countries may have disruptive political factions which do not support common agenda, even if it is very beneficial. Therefore, governments must take decisions in the interest of nation and world at large to provide comfortable, reliable, effective and efficient public transportation system.

International bodies such as World Bank, IMF, and WTO must actively support sustainable transport projects around the world particularly in countries that consist of large number of political parties, where decision making is difficult task.

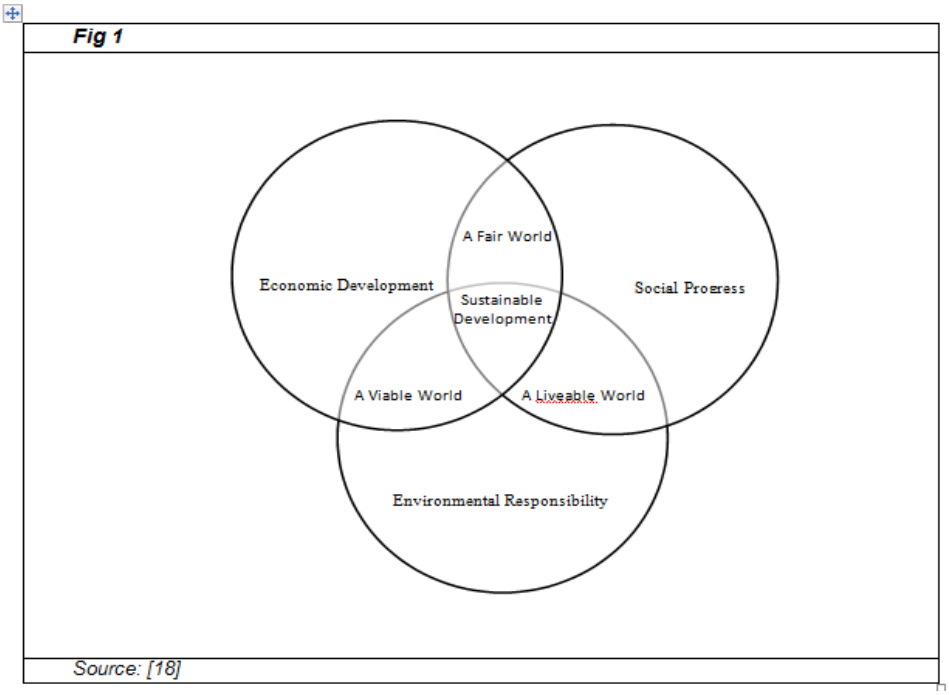


Figure 1

Page 152-165 © MANTECH PUBLICATIONS 2022. All Rights Reserved

b) Development of Various Modes of Transport Systems. Sustainable transport systems make a positive contribution to the environmental, social and economic sustainability of the communities they serve. Transport systems exist to provide social and economic connections, and people quickly take up the opportunities offered by increased mobility. The advantages of increased mobility need to be weighed against the environmental, social and economic costs that transport systems pose (Wikipedia1. n.d.). All modes of feasible transport must be developed in order to not only ease traffic on few modes of transport but also to vision for future needs. Long waiting for travel unlike in India, must be done away within a stipulated time. Moreover, congested cities must have circular roads to bypass the city and reach from one end of the city to the other side. These circular roads must be every half a mile so that 80-90 per cent transportation is through public transport. Governments in emerging and fast developing cities and towns must reserve space for local trains, in such a way that every half a mile a high speed rail line could be developed. Transportation must carry a paramount importance for government and it must plan sustainable transport system on most priority basis before expensive private properties are built. In today's modern world of countries such as India, one has to wait for long time to travel between long distances. Railway tickets need to be purchased about a fortnight in normal season and a month in advance in holiday season. Road network is heavily congested and dusty with no appropriate place with washrooms. Given this situation, there is a necessity for Bullet Trains/High Speed Rail Transport. Even if cities have no space for stations new railway stations may be built outside cities with connectivity of roads to cities nearby.

C) An Integrative Approach for The Overall Development Of Transportation System. Countries such as India do not have an integrative approach in transportation system. All the modes of transport come under different ministries and have very little in common. Each ministry plans and executes projects independent of another ministry's priorities and implications. This approach costs the nation and the environment and therefore, necessitates an integrative transport development system. An integrative approach not only reduces the cost of a project but also balances the requirements of public in general. For an example, road between Chennai city Pondicherry city is 85 miles, connected by

Page 152-165 © MANTECH PUBLICATIONS 2022. All Rights Reserved

two highways and a rail network. Hoverer, rail network is not encouraged and one of the highways has severe traffic congestion while the other is normal. In all, none is comfortable to the commuters. Simple changes in policy of introducing fast passenger trains at regular intervals will ease traffic and accidents on roads. Within cities, there is no sustainable connectivity between the various modes of transport. Traffic congestion imposes economic costs by wasting the time of people, delays the delivery of goods and services and increases the health hazards. Moreover, any infrastructure project is implemented; its capacity is far limited by the demand for the usage of the same. Hence, reengineering the transport systems is vital to plan for sustainable transport infrastructure.

D) Alignment Of Policies Related To Rural Development. There are many government incentives to promote development of rural areas. However, there several bottlenecks for development such as poor quality of roads, poor connectivity with nearby towns, etc. In fact Indian Government has given a priority of setting up new IIMs and IITs only in large cities that have better transport systems and other Central Universities in rural areas, largely under developed. This policy has vital implications. First, qualified faculty and employees will settle for jobs in cities with all facilities and lesser qualified will opt for other institutions, making further poor quality in rural areas. Hence, governments must realize that unless all facilities are well developed in rural areas, they cannot be developed. Well qualified people will move to cities in search of better opportunities. Therefore, to move people out of today's polluted living spaces in many cities, governments must develop infrastructure, particularly very good transport system that encourages people to move out of cities to live in least polluted and congested open places. In addition, all policies related to rural are development need to be rethought and aligned with sustainable transport systems.

e) Sustainability. Sustainable development and sustainable planning may require changing the way people think about and solve transportation problems Valentí Rull. 2010). Therefore, awareness cannot be created without inclusion in education programs right from high school on the environmental sustainability. Moreover, compulsory awareness programs on sustainability concept must be made for government servants who make decisions in their organizations

Page 152-165 © MANTECH PUBLICATIONS 2022. All Rights Reserved

/institutions. This has to be included as a core subject in high school and may be small units in higher education too. Industry has huge stake in sustainable development and today's organizations motives of high growth rates must be rethought in the light of redefined strategy of growth and peace of human beings. Corporate activities may be watched for sustainable contribution.

F) Avoidance of Vested Interest. Sustainability, sustainable development, and sustainable transportation are all gaining popularity (Todd Litman, David Burwell, 2006). However, defining sustainable transportation is one of the most important decisions. Vested interests, who always appear to play a large part in programmes that try to reduce fuel usage and provide greener goods and services, may benefit from a narrow definition. In poor nations, policymakers frequently use a limited perspective when planning initiatives and are unable to look beyond their immediate surroundings. In such situations, the international community and/or organisations must be able to promote vigorous awareness campaigns on sustainable transportation, not only to rescue other nations but also to preserve all of humanity by increasing the amount of livable space.

CONCLUSION

Nations must identify various transportation sector deficiencies, including inadequate roads and highways, outdated technology, congested routes, slow railroad speeds, inadequate berths and rail/road connectivity at ports, inadequate runways, inadequate aircraft handling capacity, inadequate parking space, and inadequate terminal buildings at airports, and improve public transportation systems for significant benefits (World Bank 2, 2005). Traditional transportation methods need to be redesigned to increase mobility, particularly for automobiles, and take wider effects into account. The primary goal of transportation is access, and there are tried-and-true methods to increase access while at the same time minimising negative social and environmental effects and controlling traffic congestion. To create more thriving, livable, and sustainable cities, all countries must effectively increase the sustainability of their transportation networks (Wikipedia 6, n.d.). Businesses cannot develop alone, and they require direction from public policy makers who have the vision to integrate business interests with sustainable development. In order to make way for high-speed rail services, which significantly reduce pollution from the transportation sector, minimise reliance on

Page 152-165 © MANTECH PUBLICATIONS 2022. All Rights Reserved

fossil fuels that are susceptible to fluctuations in the price of crude oil internationally, and mitigate global warming, it is necessary to reengineer the current unsustainable transportation systems. Sustainable transportation is a requirement, not a luxury. The world can no longer afford to have customised transportation options at an unaffordable environmental cost. Therefore, it is essential that governments, to the greatest extent feasible, provide the people with appealing alternatives to sustainable public transit that are secure, hygienic, economical, and less polluting Feather (1995).

REFERENCES

1. Jagdish Nehul. (2011). Transport industry faces huge shortage of skilled drivers: BGTA. March 21. Retrieved from http://indiatransportportal.com/2011/03/transport-industry- faces-huge-shortage-of-skilled-drivers-bgta/

2. Abramović, B., Petrović, M. & Blašković Zavada, J. (n.d.). Use of railways for urban passenger transport. Retrieved from http://library.witpress.com/pages/PaperInfo.asp?PaperID=19 406

3. De Rus, G. (2008). The Economic Effects of High Speed Rail Investment. OECD/ITF Joint Transport Research Centre Discussion Papers. No. 2008/16, OECD Publishing. Retrieved from http://www.oecd-ilibrary.org/transport/the-economic-effects-of-high-speed-rail- investment_235171703148

4. Henry Lamb. (2011). Sustainable Development Explained. July 21. Retrieved from http://gulagbound.com/18048/sustainable-development-explained/#.T6_laOjrpdw

5. Feather, N. T. (1995). Values, valences and choice: The influence of values on the perceived attractiveness and choice of alternatives. Journal of Personality and Social Psychology, 68(6), 1135–1151. doi:10.1037//0022-3514.68.6.1135

6. Janelle, D. G., D. C. Hodge. (2000). Information, Place, and Cyberspace: Issues in Accessibility. Springer verlag gmgh. 341.

Page 152-165 © MANTECH PUBLICATIONS 2022. All Rights Reserved

7. Linda Steg and Robert Gifford (2008). Sustainable Transport and Quality of Life. Retrieved from http://web.uvic.ca/psyc/gifford/pdf/Sustainable%20transport%20Perrels%20chapter%202008.pdf DOI:10.1016/B978-0- 08044-709-4.00011-2

8. Nagurney, A. (2000). Sustainable Transportation Networks. Edward Elgar Publishers. Northampton. U.S.

9. Valentí Rull. (2010). The myth of sustainable development. translated from: Rull, V. 2010. El mito del desarrollo sostenible. Collectanea Botanica, 29: 103-109. Retrieved from http://www.ibb.bcn-csic.es/pantepui/index_archivos/myth.pdf.

10. Stephen Gibbons and Stephen Machin. (2004). Valuing Rail Access Using Transport Innovations. Centre for Economic Performance, London School of Economics and Political Science. London. Retrieved from http://eprints.lse.ac.uk/19989/1/Valuing_Rail_Access_Using_Transport_Innovations.pdf

11. Suneet K. Maheshwari. (2010). Transportation sector overview. Retrieved from http://www.ltinfra.com/pdf/Feb2010_Transportation%20Sector%20Overview_S.K.Maheshwari.pdf

12. Todd Litman, David Burwell. (2006). Issues in sustainable transportation. International Journal of Global Environmental Issues. September 13, Inderscience Enterprises Ltd. 6 (4). 331-347. doi:10.1504/IJGENVI.2006.010889

13. James Woodcock, Phil Edwards, Cathryn Tonne, Ben G Armstrong, Olu Ashiru, David Banister, ... Ian Roberts. (2009). Public health benefits of strategies to reduce greenhouse-gas emissions: urban land transport. Retrieved from http://www.indiaenvironmentportal.org.in/files/urban%20land%20transport.pdf. doi:10.1016/S0140-6736(09)61714-1

14. doi:10.3989/collectbot.2010.v29.011

Page 152-165 © MANTECH PUBLICATIONS 2022. All Rights Reserved

15. Wikipedia1. (n.d.). Sustainable transport. Retrieved from http://en.wikipedia.org/wiki/Sustainable_transport

16. Wikipedia2. (2009). Private transport. Retrieved from http://en.wikipedia.org/wiki/Private_transport

17. World Bank2. (2005). Highway and Railway Development in India and China, 1992-2002, March, Retrieved from http://siteresources.worldbank.org/INTSARREGTOPTRANSPORT/Resources/India-China-Hway_Rly-comparison.pdf

18. Wikipedia4. (n.d.). Rail usage statistics by country. Retrieved from http://en.wikipedia.org/wiki/Rail_usage_statistics_by_country

19. Wikipedia5. (n.d.). Sustainability. Retrieved from http://en.wikipedia.org/wiki/Sustainability

20. Wikipedia6. (n.d.). Sustainable city. Retrieved from http://en.wikipedia.org/wiki/Sustainable_cities

21. Valentí Rull. (2010). Who needs a greener revolution? Achieving food security for the future pits production increase against growth control. EMBO Reports, 11, 659 - 663 doi:10.1038/embor.2010.116

22. Wikipedia3. (n.d.). Public transport. Retrieved from http://en.wikipedia.org/wiki/Public_transport

23. Worldbank1. (n.d.). Transportation: India. Retrieved from http://www.worldbank.org.in/WBSITE/EXTERNAL/COUNTRIES/SOUTHASIAEXT/INDIAEXTN/0,,contentMDK:22354859~pagePK:141137~piPK:141127~theSitePK:295584,00.html

Page 152-165 © MANTECH PUBLICATIONS 2022. All Rights Reserved