Sustainable Transportation System

Er. Ishrat Sultana

Civil Engineering Department, Aravali College of Engineering & Management

Abstract- Sustainable transportation is completely on environment friendly transportation systems. Also the effect of this gives positive impact on society and is economical. The effectiveness and efficiency also being measured in transportation sustainability. Migrating transportation from fossil-based energy to renewable energy by using renewable resources. For this purpose walking and cycling is much recommended.

Keywords- Environment friendly, economical, effectiveness, efficient, renewable energy , renewable resources, time saving, less harmful, walking, cycling.

I. Introduction

Sustainable transport refers to the broad subject of transport that is sustainable in the senses of social, environmental and climate impacts. Components for evaluating sustainability include the particular vehicles used for road, water or air transport; the source of energy; and the infrastructure used to accommodate the transport (roads, railways, airways, waterways, canals and terminals). Transport operations and logistics as well as transit-oriented development are also involved in evaluation. Transportation sustainability is largely being measured by transportation system effectiveness and efficiency as well as the environmental and climate impacts of the system [1].

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, with poor households benefitting greatly from low carbon transport options. The advantages of increased mobility need to be weighed against the environmental, social and economic costs that transport systems pose.

Transport systems have significant impacts on the environment, accounting for between 20% and 25% of world energy consumption and carbon dioxide emissions [2]. The majority of the emissions, almost 97%, came from direct burning of fossil fuels. 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.

The European Union Council of Ministers of Transport, defines a sustainable transportation system as:

- Allows the basic access and development needs of individuals, companies and society to be met safely and in a manner consistent with human and ecosystem health, and promotes equity within and between successive generations.
• Is affordable, operates fairly and efficiently, offers a choice of transport mode, and supports a competitive economy, as well as balanced regional development.
• Limits emissions and waste within the planet's ability to absorb them, uses renewable resources at or below their rates of generation, and uses non-renewable resources at or below the rates of development of renewable substitutes, while minimizing the impact on the use of land and the generation of noise.

Sustainability extends beyond just the operating efficiency and emissions. A life-cycle assessment involves production, use and post-use considerations. A cradle-to-cradle design is more important than a focus on a single factor such as energy efficiency.

Transport sustainability is about the safety, equity and sustainability of travel: transport systems and usage which promotes sustainable urban living. This theme involves projects, which investigate the nature of long term and large scale change in transport systems and the future design and form of sustainable urban areas.

The Engineering and Physical Sciences Research Council (EPSRC) in October 2008 which involves the university of Leeds, Oxford, East Anglia, Salford and Manchester commenced that walking and cycling can make a considerable contribution to sustainable transport goals, public health, and the sociability of communities.

II. The Methods

The main aim of sustainable transport is to reduce energy consumption and the emission of polluting gases. An overview on the methods that are being used for improvement of urban mobility, the reduction of pollutants and the management of industrial processes. Sustainable transportation methods aim to reduce the social and environmental impacts during the execution of transportation activities.

Urban Mobility

Patlins(2017) analyzed the development of the public transportation system. The research consisted of a bibliographic review where it was verified that the analysis and comparison of the transportation systems in different cities and countries, as well the analysis of the future requirements of the transportation system. It was identified that there is still no definition in the literature of principles of sustainable development for public transportation systems. The author sought to improve the definition of sustainability, aiming at the development of the transportation system. These systems cannot be sustainable without understanding environmental sustainability. The sustainable development of the public transportation system is an aspect of global sustainability and must be measured quantitatively by indicators.

Reduction of CO₂ Emission

Mehar et al. produced research about sustainable transportation systems that aim to reduce pollution and the emissions of greenhouse effect gases. The focus of the research was electric vehicles, where they described the components of sustainable means of transportation and their solutions, projects and standardization. For the authors, a transportation system is composed of three principal categories: fleet management, schedule planning and energy usage. These categories if managed and well planned provide a reduction of CO2 emission in transportation activities.
Walking

Walking as a means of transport is commonly used for short trips. This means that it is actually difficult to assess pedestrian mobility at country level, as the national travel surveys often do not register the shorter trips. Also, the walking parts of trips made primarily by public transport are usually not taken into account. At present, the importance of walking is therefore underestimated.

Walking is a way of travelling used mainly for two purposes: short trips to specific destinations such as shops when there is probably not too much to carry and leisure trips where the walking in itself is the main purpose. About 15-30% of all person kilometers walked (on an average day) is for shopping purposes. Home-leisure trips cover about 30-55% of the person kilometers.

Cycling

The bicycle is used for short trips to shops and for leisure purposes where the bicycle-tour probably is an aim in itself. However, cycling is also a common way for travelling to work. Between about 30 and 40% of the person kilometers by bicycle is travelled on home-work trips. Home-leisure trips cover about 20-45% of the person kilometers.

Some groups of traffic participants walk or cycle more than others. These differences are also reflected in their crash involvement. Age groups for which walking is particularly important, are children below the age of 12 and adults aged 75 and above. People aged over 75 years make one-third of their trips on foot. They use the car slightly more often (38%), but considerably less often than younger adults aged 25 to 74 years, who use this vehicle for more than half of their trips. The bicycle is considerably less popular for elderly people: they use the bicycle for only 17% of all trips. Together with people aged between 25 and 29, they use the bicycle the least.

The bicycle is more important in the youngest age categories. Children in the age group from 0 to 11 years travel by bicycle as often as they walk (both 29%). The same is the case for young adults aged between 18 and 24 years. Next to walking (20%) and cycling (23%), public transport (18%) is a commonly used mode of transport among them. For young people in secondary school (12 to 17 years of age), the bicycle is by far the most important vehicle: they use their bicycle for no less than 52% of all trips.

III. Result

The concept of sustainable transportation is intricately linked with the development of sustainable transport modes, infrastructures and operations. Similar to the concept of sustainable development, three major dimensions are considered:

Environment- A reduction of the environmental impacts of transportation is a likely strategy for sustainability. Transportation contributes to harmful emissions, noise and to climate change. About 15% of the total greenhouse gases and 22% of the CO2 emissions are attributed to transportation. However, as vehicles are becoming more environmentally efficient the global fleet of vehicles is increasing as well. An improvement of the land use impacts of transportation, especially the impacts of infrastructure construction and maintenance, is also a strategic goal to achieve. Transportation systems are also a generator of wastes (vehicles, parts, packaging, etc.) that must be reduced, reused and recycled.
Economy- Transportation is a factor of economic growth, development and employment. It requires materials for modes and infrastructure and energy for operations, which can be used more efficiently. Transportation should also have a fair pricing strategy, meaning that users are bearing the full costs (direct and indirect) of their usage of the transport system. A transport system where competition is fair and open is likely to promote modal choice and efficiency. In a system where transport is a public or private monopoly, price distortions and misallocations of capital are created, which on the long run are likely to render the system unsustainable.

Society- Sustainable transportation should benefit the society. It should be safe, not impairing human health and should minimize disturbance on communities. Access and equity are also two important principles as transportation should promote the access to goods and services for as many people as possible.

IV. Conclusion

This article concludes that we have to save our earth and this can be started by us only. We as a responsible person can take such measures which will not harm our earth. By using cycle and walking we can start doing such things, although for long distance it is not feasible but for that also public transport or electric cars can replace the existing cars which consumes too much of fuels and produce pollution. We can see from many foreign countries that have controlled their pollution level by reducing the use of fuel consuming vehicles.

References

[1] Jeon, C M; Amekudzi (March 2005), "Addressing Sustainability in Transportation Systems: Definitions, Indicators, and Metrics" (PDF), Journal of Infrastructure Systems, 11: 31–50, doi:10.1061/(ASCE)1076-0342(2005)11:1(31)

[2] Helping to Build a Safe and Sustainable Transportation Infrastructure (PDF), U.S. Department of Transportation’s Research and Innovative Technology Administration, May 2010

[3] World Energy Council (2007). "Transport Technologies and Policy Scenarios". World Energy Council. Archived from the original on 2008-12-04. Retrieved 2009-05-26.

[4] Adapted from UK Department of the Environment, Transport and the Regions, 1999.

[5] Achaiiri, R., Ben Mohamed, E. and Bouri, A., 2013. Literature Review: Conditions of Sustainable Transport.

[6] Alberti, M., 2008. Advances in urban ecology integrating humans and ecological processes in urban ecosystems (No. 574.5268 A4).

[7] Ahman M. Government policy and the development of electric vehicles in Japan. Energy Policy 34 (2006) 433-443.

[8] Ajanovic A.Recent developments in electric vehicles for passenger car transport. World Academy of Science, Engineering and Technology, Issue 75, March 2013, Madrid

[9] Ajanovic, A., 2014. Promoting environmentally benign electric vehicles. Energy Procedia, 57, pp.807-816.

[10] Akinyemi, E. and Zuidegeest, M., 2000. Sustainable development and transportation: Past experiences and Future Challenges. World Transport Policy & Practice, 6(1).

[11] Atash, F., 1994. Redesigning suburbia for walking and transit: Emerging concepts. Journal of Urban Planning and Development, 120(1), pp.48-57.

[12] Austin, M., Belzer, D., Benedict, A., Esling, P., Haas, P., Miknaitis, G., Wampler, E., Wood, J., Young, L. and Zimbabwe, S., 2010. Performance-based transit-oriented development typology guidebook.

[13] Authority, A.R.T., 2006. Sustainable Transport Plan, 2006-16. Auckland Regional Transport Authority.

[14] Beaglehole, R., Bonita, R., Horton, R., Adams, C., Alleyne, G., Asaria, P., Baugh, V., Bekedam, H., Bilo, N., Casswell, S. and Cecchini, M., 2011. Priority actions for the non-communicable disease crisis. The Lancet, 377(9775), pp.1438-1447.
[15] Bernick, M. and Cervero, R., 1997. Transit villages in the 21st century.
[16] Best Practices in Road Safety. (2007). Handbook for Measures at the Country Level - Project funded by the European Commission. https://ec.europa.eu/transport/road_safety/sites/roadsafety/files/pdf/projects_sources/supreme_d_handbook_for_measures_at_the_european_level.pdf
[17] Black, W.R., 2000. Socio-economic barriers to sustainable transport. Journal of Transport Geography, 8(2), pp.141-147.
[18] Buis, J., 2009. A new Paradigm for urban transport planning: Cycling inclusive planning at the pre-event training workshop on non-motorized transport in urban areas, 4th Regional EST Forum in Asia, 23 February 2009. Seoul, Republic of Korea.
[19] Buehler, R., 2012. Determinants of bicycle commuting in the Washington, DC region: The role of bicycle parking, cyclist showers, and free car parking at work. Transportation research part D: Transport and Environment, 17(7), pp.525-531.
[20] Broughton, J. and Buckle, G., 2005. Monitoring progress towards the 2010 casualty reduction target.
[21] Broussard, S.R., Washington-Ottombre, C. and Miller, B.K., 2008. Attitudes toward policies to protect open space: A comparative study of government planning officials and the general public. Landscape and Urban Planning, 86(1), pp.14-24.
[22] Brussels Environment, 2015. http://www.environment.brussels/state-environment/ summary-report-2011-2012/noise/focus-acoustic-evaluation-car-freesunday-action
[23] Calthorpe, P., 1993. The next American metropolis: Ecology, community, and the American dream. Princeton architectural press.
[24] Cervero, R., 2002. Built environments and mode choice: toward a normative framework. Transportation Research Part D: Transport and Environment, 7(4), pp.265-284.
[25] Cervero, R. and Zupan, J., 1996. Commuter and Light Rail Transit Corridors: the land use connection. Parsons, Brinckerhoff Quade & Douglas, Incorporated.
[26] Curtis, C., 2008. Planning for sustainable accessibility: The implementation challenge. Transport Policy, 15(2), pp.104-112.
[27] Csáji, B.C., Browet, A., Traag, V.A., Delvenne, J.C., Huens, E., Van Dooren, P., Smoreda, Z. and Blondel, V.D., 2013. Exploring the mobility of mobile phone users. Physica A: statistical mechanics and its applications, 392(6), pp.1459-1473.
[28] Das, P. and Horton, R., 2012. Rethinking our approach to physical activity. The Lancet, 380(9838), pp.189-190.
[29] de Dios OrtÃozar, J. and Willumsen, L.G., 2011. Modelling transport. John Wiley & Sons.
[30] Defining Sustainable Transportation, 2005. https://www.wellingtonpark.org.au/assets/wellingtonpark_CSTdefining_sustainable_transportation2005.pdf
[31] Daly, H.E., 1991. Ecological economics and sustainable development: from concept to policy (No. 1991). World Bank, Environment Department, Policy and Research Division.
[32] Eriksson, L., Janssen, T., & Wittink R. (2003). Traffic calming schemes Opportunities and implementation strategies. (The concept of traffic calming: an overview - Chapter 2). Ingrid van Schagen ed., R-2003-22,Leidschendam, 2003, SWOV Institute for Road Safety Research, The Netherlands.