Sustainable Solutions for Better Public Road Transportation

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Abstract
Transportation undoubtedly fastens economic growth by providing ways to initiate various modes. Population explosion, industrialization, and urbanization created more challenges to environmental stability. Urban transport is one of the essential components of urban development. Sustainable transportation includes the most efficient and convenient movement of people and vehicles with the least amount of energy, congestion, and environmental impacts. Therefore proper sustainable transport solutions are needed to pace with the developmental process. The paper attempts to provide some solutions that can ensure better human health and protection of the environment. These solutions include minimizing toxic gas emissions, electro mobility, road traffic management, congestion pricing, better parking policies, etc. These ecofriendly modes can improve the quality of public road transport and human life.

Keywords: Sustainable solutions, Toxic gas emissions, Electro mobility, congestion pricing, parking policies and EV Policy.

Introduction

As more and more percent of the population gets engaged in economic activities, especially in manufacturing and service sector activities, the demand for travel naturally increases. And as young people seek education in faraway places, the demand for travel also gets enhanced. Studies have shown that more than 75 percent of the increase in travel demand in cities in India is accounted for by employment and education needs (GOI, 2005). Travel demand is met by an array of modes of transport like private vehicles, including cars, two-wheelers, rail services, and public transport. Among these, public transport is the most reliable and affordable means of transport for people at large. In a country as large as India, road transport net work is indispensable to ensure the mobility of both people and commodities. Although road transportation is not as eco-friendly and energy-efficient as other alternative modes like rail and water, given the geographic terrain and the remoteness of places in India, road transport appears to have no other immediate alternative. Yet, in the face of the growing concern of environment and exhaustion of fossil resources, attempts have been made to fine-tune road transportation to the requirements of emerging sustainable transport. In this paper, an attempt has been made to present certain instances of sustainable road transport modes in India.

India ranks second position in the world's road network. It covers approximately 6,603,293 kilometers. Increasing population and urbanization over the years created a sphere of increased mobility of the people. People's travel demand increased from their own economic, social, physical, psychological needs. This also led to the growth of the vehicular population. Road transportation attains more importance in India's scenario, even though it has several inefficiencies compared to water and air transportation modes.

Along with traffic congestion, inadequate transport facilities, environmental problems, air, water, noise, and land pollutions are growing over the years. The development of transportation created so many changes in our travel behavior like travel time, cost, selection of the mode of transport, etc. There is always a gap between the transportation demands of people and the efficiency of transport infrastructures. Whenever this gap increases, there continues the problem of unsustainability.

The term sustainability includes more comprehensive meanings. According to World Bank, 'Sustainability is defined as the condition in which there are a balance and stability between social, economic, environmental and physical factors, satisfying the present needs as well as not compromising on the ability of future conditions.' Sustainable Transportation can be defined as the most efficient and convenient movement of people and vehicles with least amount of energy in terms of fuel and efforts, at most favorable costs and with least amount of congestion and environmental impacts which would help to attain the continuous economic development without having negative environmental impacts. These solutions include minimizing toxic gas emissions on the environment, Electro mobility, Road transport management, Congestion pricing, parking policies, etc.

Sustainable Transportation can Ensure

- Improvement in the quality of life of people and the environment
- Efficient use of natural resources
- Meeting the needs of the present generation without compromising the needs of future generations

Ensures the emission standards of pollutants

- Selection of better means of transportation consistent with the ecosystem
- Application of public transport planning to solve various problems associated with public transportation

Sustainable Transportation Solutions

Minimizing Toxic Gas Emissions to the Environment

The transport sector contributes around 70% of environmental pollution in India. There is a direct relation between road transportation and environmental pollution. Emission from the road transport sector depends on the fuels used for transportation. Usage of emission-reducing fuels and a model switching to public transportation will help to reduce toxic gas emissions to the environment. In Delhi, the usage of CNG was made compulsory for all public transport vehicles in 2000. Some measures for controlling toxic gas emissions to the environment by the transportation sector are:

- Removal of old buses from the road unless they use CNG or other clean fuels.
- It is regularly cleaning of fuel and air filters.
- Make emission testing for all vehicles.
- Application of congestion reducing policies, especially during peak hours.
- Organize public awareness programs to make people better aware of issues relating to toxic gas emissions to the environment.

As a developing country, India needs to control these emissions by adopting appropriate planning strategies. It is expected that the number of vehicles on the road will double to 250 million by the year 2025. Therefore as an emission-reducing strategy, customers are needed to follow the latest emission standards as far as possible.

Kochi Public Transport Day-A Unique Experience in Kerala

Launched in December 2010, in the backdrop of the inauguration of the Vytila Mobility Hub, Kochi Public Transport Day, or Bus Day[1], is a unique

1. The concept is originally mooted by the Centre for Public Policy Research (CPPR), a think-thank based in Kochi.

campaign to sensitize the daily commuters and the residents of Kochi city about the private and social benefits of using public transport instead of private vehicles. The main intention behind this is to reduce single-occupancy vehicles on the roads of the city, which makes more traffic congestion besides adding to the quantum of carbon emission per day. The first thing to motivate the commuters to use public transport is to provide them with sufficient buses with required comforts. For this, private and public participation mode can be resorted to. Private buses are to be made available on the roads, especially at peak hours. A City Bus Corporation can be floated to facilitate public transportation in the city with the participation of both State-owned corporations and the private bus owners. To make traveling comfortable for differently-abled people, the concept of inclusive transport can be adopted. But the pertinent question is whether this Bus Day celebration has been able to meet its state objectives (Praveen, 2016).

One important thing which deters passengers from using public transport is the difficulty of getting information regarding the time of arrival of buses at pick up points. On account of this, passengers are likely to lose a lot of time in pick up points, and this ultimately affects their efficiency in time utilization. To address this problem, Chalo App has been devised to track the arrival of buses. Passengers can download this App in smart phones and track the time of arrival of buses in their pick points to arrange their travel. Unfortunately, unlike rail timing Apps such as 'Where is My Train,' this App does not appear to be popular among the commuters of public transport. With the inclusion of more specification in the App, it can be made more interesting and useful to the commuters.

Congestion Pricing

Traffic Congestion, a common catastrophe of Indian roads, especially urban roads, is caused by twin factors: the escalation in the number of vehicles[2] on the road and the lack of concomitant expansion of road network plus the problems in the widening of existing roads network. Congestion has both private and social cost. Its private cost lies in increasing fuel consumption and decrease in working hours on account of being trapped in traffic congestion while its social cost lies in increasing air pollution and other kinds of external harmful effects like that of on the human health. Overall economic efficiency will get adversely affected if congestion on raods crosses a certain limit. It is estimated that in busy lanes of Kolkata the average speed of vehicle gets reduced 10 km per hour during the peak time. The idea of congestion pricing in peak hours works as a penalty for those who drive in peak hours. If due to congestion pricing some travelers keep themselves off the roads, this will help improve the travel time of others. Besides, this will reduce the intensity of carbon emission during the peak hours. However, studies conducted on the effectives of congestion studies in Bangalore city, one of the busiest cities of the world, have shown that the congestion pricing polices do not turn out to be effective (Kreindler, 2019).

Car Pooling and Share Taxi

Carpooling is possible among the coworkers of an organization who have to daily commute to the working place. Under carpooling one worker with a private vehicle allows other coworkers to use the same to the daily commute to the working place and the users share the expenses. This works out to be a good idea and has been popular among the elite working class who otherwise would have used their private vehicles to travel daily to their working places, increasing congestion on roads and creating air pollution. The basic intention behind this is to reduce the number of single-user vehicle on the roads, the social cost of which is enormously higher. Car Pooling has an inbuilt mechanism to motivate the passengers to avail of this facility. This has the advantage of too little intervention from outside to promote this kind of travel mode.

2. It is found that in six major Indian cities, growth in the number of vehicles has outpaced the growth in population. Between 1981 and 2001, population in these cities on an overage increased only 1.89 times whereas number of vehicles shot up more than 7 times. But this growth is highly observable in cities with poor mass transit system. But in Kolkata and Mumbai where rail based mass transit system is in existence, this growth in the number of vehicles is comparably very low.

Nevertheless, the institutions can create some stimulus to encourage their workers to use Car Pooling effectively. This will effectively reduce the travel budget of the Companies. Online taxi cabs like Ola and Uber offer share taxi services, which replaces the necessity of a passenger incurring expenses for traveling in a single-vehicle. Passengers heading to a commonplace can avail of these services, which burns the pockets of passengers a little lesser (private cost) apart from considerably reducing congestion on roads and pollution of air (social cost).

The above described are some of the instances of sustainable transportation that reduce both the private and social cost of traveling in a big way.

Electro Mobility

Fossil fuel-based vehicles not only pollute the air but also results in the decline of non-renewable energy for future generations. The excess extraction of such fuels may cause irreparable damage to the ecosystem. Considering these drawbacks, more attention has been paid to electric vehicles in recent times.

Electromobility is the use of electric vehicles to reduce toxic gas emissions and to improve air quality. These vehicles are fully or partly driven electrically. Unlike gasoline and diesel vehicles, they don't emit any carbon die oxide when driven. Therefore they are more ecofriendly. However, electricity is cheaper than fossil fuels.

Moreover, electric vehicles require less maintenance and repairs. E buses will deliver high performance and have a high efficiency than vehicles with a combustion engine. One of the main goals of the Indian energy sector is to make electricity as a prime energy source. Electromobility contributes more to solve environmental challenges through renewable electricity sources. The government should ensure apt demand and supply-side incentives to boost the electric vehicle industry in India. Mass transportation run on electricity or other efficient fuels would make transport more convenient, safe, and efficient both for people and the environment.

Delhi, as one of the world's largest CNG, propelled bus fleet, to realize its dream to have clean, green, and people-centric mobility, planned to deploy 1000 electric vehicles for connectivity and several public charging and snapping stations in the next year. The Draft EV policy 2018 by the Delhi government sets an ambitious target for battery electric vehicles to make up 25 percent of new vehicle registrations and to make 50 percent of the public transport bus fleet zero emission by 2023. The broad objectives of this Draft EV policy include Better air quality, Reduced noise pollution, Enhanced energy security in combination with low carbon power generation mix. Several states have also announced an EV policy for sustainability (eg. Kerala, Karnataka, Telangana, Maharashtra, Andra Pradesh, and Uttar Pradesh.

In Kerala, over 10 million vehicles on the road have created serious mobility challenges accompanied by increased road accidents and air pollution. Therefore E-mobility is considered as a sustainable solution for protecting its biodiversity. It will provide a comfortable free ride with shared mobility and energy efficiency. For this, KSEB will participate in e-mobility development by ensuring the optimally high base load on the grid at attractive power tariffs. KSRTC currently procures around 1000 new buses annually, and some of these can be replaced with EVs and appropriate sizing of the batteries, charging infrastructure, and innovative electric tariffs. The reduction in maintenance cost of electric buses, reduced breakdowns losses, reduction of fuel cost per km can be securitized for a longer period and used to service the initial capital cost of EV buses.

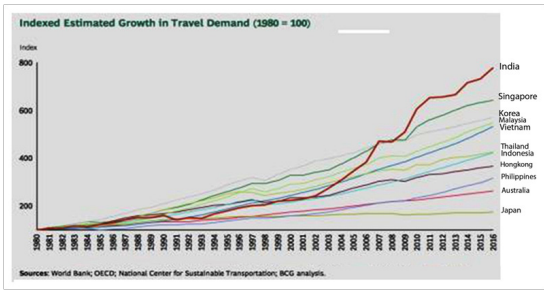
Road Traffic Management System

An Intelligent Road Transport System aims to provide innovative services relating to different modes of transport and traffic management to users and also make them safer, better informed, and more coordinated and smarter use of transport (Sarkar& Jain- 2018). Various technologies are part and parcel of this system, which include; traffic signal control, message signs, speed cameras, parking guidance and information, weather information, etc. Along with this, efficient roadside infrastructures also empower the system controlling by providing route guiding, speed limiting systems, etc. Smart transportation in modern days like vehicle sharing, implementing smart parking solutions, etc.

Congestion Pricing

Traffic congestion has been one of the major issues that cities are facing. According to a study conducted by Boston Consulting Group (BCG), Traffic congestion during peak hours in Delhi, Mumbai, Bengaluru and Kolkata together costs Rs 1.47 lakh crore annually. The term congestion charging is used to describe a distance, area, or cordon based road user charging policy around congested city centers. Congestion pricing is also known as value pricing, peak-period pricing, time of day pricing, etc. ERP (Electronic Road Pricing) is considered as a systematic tool for measuring congestion. The charging zone would cover the areas that are perceived to be the most congested ones. Charges would be highest during peak hours. The strategy of congestion pricing regulates demand and helps to manage congestion without increasing supply. It makes the consumers pay for the additional congestion they create or for the negative externality during the peak demand. This will make users more aware of their impact on the environment. Congestion pricing may be in the form of cordon based, distance-based, or time-based.

Figure 1



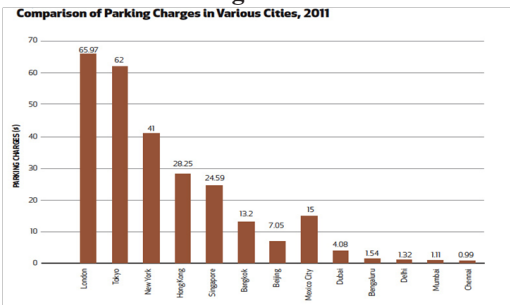
The Boston Consulting Group (BCG) is the world's leading advisor on business strategy. According to their study on indexed estimated growth in travel demand in countries of Southeast Asia, almost all countries experienced an alarming growth rate in travel demand over the years (Figure 1). India's rapid growth of population over recent decades has led to a considerable expansion in travel demand. According to a BCG study on the relationship between transport demand, population and wealth transport demand has increased by almost eight times since 1980. Indian cities are mostly congested in the world ranking. Delhi, Mumbai, Bangalore, and Kolkata together costs USD 22 billion per year. These cities are needed to reduce their dependence on private vehicles and to opt for desirable and efficient public transport solutions to face related problems.

Parking Policies

For sustainable mobility, parking policies should be effectively integrated to better transport plans. Parking policy is considered to be one of the key links between transport and land use policy (Marsden, 2006). Governments are framing parking policies to reduce congestion on roads. The conventional parking policies which gave more importance to increase parking supply have failed to reduce parking pressure, congestion, and pollution. To overcome this, The National Urban Transport Policy (NIPT) of 2014 has recommended a grade scale of parking fees to recover the economic costs of parking in India. A model shift to public transport can ensure sustainability in transportation. Some parking solutions for sustainable mobility can be enlisted as;

- Underground parking is proposed in highly congested areas.
- For long term parkers, off-street parking is proposed rather than on-street parking, because it can save street space.
- Parking priorities should be provided first for physically disadvantaged than for short term parkers, and then for long term parkers.
- They are charging of penalties for long term on-street parkers.
- Mitigation of all types of illegal parking.

Figure 2



CBD – Central Business District

Source: National Transport Development Policy Committee, 2013.

Figure 2 about here indicates the parking charges in various cities of the world. According to the 2016 Handbook of Urban Statistics of Ministry of Urban Development, India imposes the lowest parking fees. In India, street parking is free or minimally priced in all cities compared to other countries. Due to these lowest parking fees, it fails to recover the cost of investment. Restriction on personal vehicle usage and free parking along with appropriate parking area management plans and intellectual pricing policies will help to achieve the targeted controlled demand for parking in cities.

Conclusion

Sustainable transportation includes the most efficient and convenient movement of people and vehicles with the least amount of energy, congestion, and environmental impacts. Increased mobility of people as a result of population explosion and urbanization questioned environmental stability on a wide scale. Therefore some sustainable solutions are needed to make the transport sector more efficient. Reducing toxic gas emissions to the environment through emission-reducing fuels and a model switch to public transportation is such a solution. Electromobility as a solution will help to improve air quality through the use of electric vehicles with the least cost compared to other fossil fuels. Better transport management, as a solution provides innovative services and policies to users. Along with this, congestion pricing and better parking policies will contribute more to efficient and environmentally friendly transportation practices.

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