

POLICY ISSUES FOR SUSTAINABLE TRANSPORTATION

Kedar Dahal

BACKGROUND

The history of urban growth started since the development of Mesopotamia civilization between 5000BC to 3000BC. They grew up around temples or palaces and developed commercial functions under the auspices of the priests (Hammond, 1985). However, the rapid extension and expansion of these urban centers in the world came after the 18th to 19th century. Industrialization, increasing trade, transport and communication and the improving agriculture were powerful factors of urban growth in the 18th/19th century. In the past, urbanization and urban development concentrated only in the developed countries, especially, Western Europe and North-East USA. The urbanization of the under developed countries began in the 20th century. After the Second World War, many Asian countries began to gain their political independence. The popular mentality then was to pursue industrialization and urbanization as the path to modernization. As a result of such an urban biased development mentality, the growth of primate cities and the trend of rural-urban migration were re-enforced leading to various types of problems in the big cities and their hinterland (Ng, 1995). After industrial revolution, the rate of urban growth and development rose both in developed and developing countries although in the developed countries, some preventive methods to control the high rate of urban growth were introduced, and made a certain framework of urban development, e.g. Garden Cities proposed by Howard and in Britain.

Urban transportation is not a new topic. In ancient time planners were more careful about urban design, morphology and forms of urban areas. Transportation obviously played vital role for the shape and pattern of the urban development in the past and has great implications for sustainable urban development at present. However, environmental degradation from the transportation is alarming and threatening to the rapidly growing urban centers of the world. Ebenezer Howard's concept of "Garden Cities" in the early 20th century had also perceived the issue and was planned as settlements in which every one could walk to work. Vehicle emissions are major source of air pollution. Diesel trucks and cars emit a wide variety of unhealthy gases, such as carbon monoxide, nitrous oxides, polyaromatic hydrocarbons (PAHs), and other products of incomplete combustion. Diesel emissions are a leading source of the highly toxic dioxin, which accumulates up in our food chain. Safety and noise are also additional environmental external costs of transport. As traffic increases, the level of sound pollution also increases. Ironically, the increasing noise causes more people to move to the country for peace and quiet, which adds to the number of long-distance commuters who create traffic congestion. Within this background, the sustainable development emerged in 1990s. Transportation is one of the core

aspects of development. At present, the issue of sustainable transportation has been getting popularity due to several reasons; first, public transport which is reliable, clean and safe, second; personal transport which can be easily and safely used, and third; good choice of location for homes and work within easy reach of a wide range of transportation.

OBJECTIVES OF THIS PAPER

The main objective of this paper is to trace-out fundamental concepts of the sustainable transport and its practices and implication in the world. In addition to appropriate sustainable transportation, strategies and opportunities and related issues are also discussed in this paper.

THEORETICAL NEXUS

SUSTAINABLE DEVELOPMENT

Sustainable development may be conceptualized as a juxtaposition of two schools of thought: development theory and environmental sustainability. Balanced and integrated in different discipline viz. social, economic and environment, is called sustainable development. Recent thinking in both concepts was first combined within the Brundtland Report "Our Common Future" published in 1987 which defined "Sustainable Development as development that meets the needs of present without compromising the ability of future generation to meet their own needs". Agenda 21, product of Earth Summit (1992) is an important action oriented document, emphasized partnership, policy integration, politicize environment and implementation mechanism in the policymaking process and consensus building at local, national and international levels.

This would mean ensuring quality of life for everyone, now and for generations to come. It is concerned with achieving economic growth with a better understanding of its relationship with social and environmental dimensions of life and development process so that without compromising living standards, we protect and wherever possible enhance the natural environment in an equitable manner. Therefore, sustainable development is a multi-dimensional concept as stated by Andrew Blower (1995) and it is a scientific principle and a political goal as well as a social practice and a moral guideline.

Agenda 21 (A21) of 1992 Earth Summit at Rio de Janeiro strongly urged all the signatory countries to develop their national sustainable development plans. Agenda-21 is a mantra, a blue print that is generating the true essence of 'sustainability' after the United Nations Conference in Rio de Janeiro in 1992. In A21, the relationship of environment with social, economic and political dimensions of development was acknowledged and a step towards universal partnership to protect the atmospheric and oceanic resources in a common and shared way was taken. Although before 1992 a number of efforts like conference in Stockholm in 1972, the report of World Commission on Environment and Development, Our Common Future (Brundtland, 1987) have been taken, but nothing could reflect global consensus and political commitment on environmental cooperation on this scale.

A21 has derived different implementation measures to strike a balance between economic development and a socially, environmentally harmonious society. The program areas of A-21 include all spheres of development, from land use to transport, environment to economy, capacity building for human resource development etc. Before Agenda 21, the concept of sustainable development remained important but vague. A-21 laid out clear policies for carrying out effective implementation.

Partnership: Agenda 21 of 1992 Earth Summit strongly urged all the signatory countries to develop their national sustainable development plans for 21st century and could be regarded as the first comprehensive and systematic action for sustainable society. The implication of environmental degradation at one place is not limited into that particular area, but it affects a much wider area, in other words, ecological impacts do not follow political or geographical boundaries. The consequences have become explicit through vast soil erosion, land slides, acid rains etc. henceforth, countries are cooperated in a spirit of global partnership to conserve, protect and restore the 'ecosystem' and propagate global environmentalism.

Policy integration: Environmental issues in many countries are confined to the issue of earning daily bread and butter. A21 emphasizes on a cooperative way of eradicating poverty as an indispensable requirement for sustainable development. For this, it has agendas like providing shelter, promoting sustainable energy and transport system, encouraging minority groups etc.

Politicize environment: The strategy for sustainable development is to have a political system that secures citizen participation in decision-making. Basically, by fostering widespread participation of government, market and civil society at the national and local levels, environmental issues will be best handled. A-21 focuses on community empowerment by education, awareness and redistribution of power and responsibility at the grass root level, so that community themselves can decide about themselves, and can emerge as a dominant force. State shall facilitate public by effective judicial and administrative proceeding and making information widely available. A21 called for a framework for policy and institutional integration, which is the foundation of sustainable development.

Implementation measure: After the conference, all countries started developing environmental legislation in their own parameters. EIA, as a national instrument should be undertaken for any development, which could adversely affect the environment, is advanced as a precautionary principle. The concept of polluter pays, is developed as national law regarding liability and compensation for the victims of pollution and other environmental damage.

SUSTAINABLE COMMUNITIES

Sustainable community refers to the sustainable neighborhood and the community. Neighborhood is defined as a residential or mixed-use area around which people can conveniently walk. Its scale is geared to pedestrian access and it is essentially a spatial construct, a place. It may or may not have clear edges. It

does not necessarily imply 'local'. It means a network of people with common interests and the expectation of mutual recognition, support and friendship. With 'interest' communities of work, school, club or leisure activities normally do have a specific locational focus...., While community refers to the layers of the society in which interactions takes place between people who are neither close family members and friends, nor yet total strangers. Community is neither private nor fully public. It shapes our social identity and helps us make sense of complex and dynamic world. Cook and Ng (2002) define 'sustainable community [could be] described as one, which has an enduring integration of the social, economic and physical characteristics of our total environment'. The concept of sustainable community evolved after the implementation of the principles of the sustainable development. Sustainable community depends on team effort, partnership between the various arms of government and community including the private sectors, based on the trust, equality and the honoring of diversity. Such cooperation and partnership implies a high degree of social capital.

Most urban planners today emphasize planning through sustainability approach promoting three principles: equity, welfare and futurity in order to make better plans. Nevertheless, they always face the wicked problems and conflicts of interests during implementation. There are three types of priorities and conflicts. Economic development planner sees the city as a center and location for production, consumption, distribution and innovation while environmental planner sees the city as a consumer of resources and production of waste pollution and social planner sees the city as a location of conflict over the limited resources, services and opportunities (fig. 1). In this context, it is very difficult to achieve the sustainability and requires high level of commitment, participation and cooperation among various arms of government, non-government and community-based organization particularly in the field of transportation.

Fig. 1: Three triangles of interests in the sustainable transportation planning.



Source: Campbell, 1996.

SUSTAINABLE TRANSPORTATION

Sustainable transportation is one component of the sustainable development. Sustainable transportation systems are those which, for example, aim to reduce emissions, fossil fuel consumption, the consumption of agricultural land, park land and wildlife habitat. Most fundamentally, this means an emphasis on reducing the role of the private automobile as the prime mode of transportation and shifting travel toward other sustainable modes such as public transport, cycling and walking. Transportation infrastructure has a strong impact on urban land use patterns, and congestion, both of which result in profound environmental impacts. Sustainable transportation must be affordable, operates efficiently, offers choice of transport mode and supports a vibrant economy.

CURRENT PROBLEM

Automobiles in many under-developed countries discourage the pedestrians due to the government offices and institutions nearby the business areas. Due to the narrow and lengthy roads, haphazard growth of residential buildings, weak traffic management, traffic light, signal and sign, people in many cases, choose to ride/drive automobiles rather than walking. Even Metropolitan cities of the developing countries have no footpaths and sidewalks. In contrast, in the western countries, many people like to walk and cycle rather than driving private car or motors. People's attitude towards use of automobiles had changed and encouraged to walking, cycling or use public transportation for example Tram, Metro or Train or public buses. Even the government provides policies for encouraging walking and cycling or use Tram or Metro.

Obviously, sidewalks separated pedestrians from automobiles, but the sidewalks are too narrow difficult to walk in a group and are not comfortable. Somewhere parked car on sidewalk has hampered pedestrian movement. At some places sidewalks are poorly maintained that has decreased the image of the city.

Foot Bridge and pedestrian corridors built in many countries and in many urban areas reduce the level of interaction between pedestrian and traffic vehicles. However, in many underdeveloped countries, due to the lack of awareness and poor quality of the bridges, people generally do not like to use them properly. Interface between traffic and pedestrians has been seen particularly due to the lack of awareness, inadequate street light, street sign and signals and enough zebra crossing. On the other side people for example, blind, deaf and disabled, do not have any significance. How do they know about the place of zebra crossing, streetlight like yellow, red or green, or bus stop? These kinds of issues have been seen in the current transportation planning in the world. Therefore, planning for equal opportunities particularly for the disabled and aged group have not been prepared properly. Infrastructure based transportation planning (for example expansion of road networks, bridges and vehicles) does not meet the principle of sustainable transportation planning.

Transportation is an important tool to help meet overall sustainability objectives but in many African and Asian countries, sustainable transportation policies and programmes have not been adopted in the national plan and policies.

While, transport plays an important role in shaping the patterns of urban development, and their linkages with peripheral areas. Income level, technological advancement, travel behaviour, land use, environmental consciousness, and changing socio-demographic structure have hampered transportation planning and policies. Therefore overall problems of the transportation management are; roads are not pedestrian friendly, lower priority for pedestrian than vehicles, poor pedestrian connectivity, increase conflicts and hazards, deterioration of urban environment, no proper transportation policies on national level, illegal hawkers on the streets, transportation operation: loading and unloading activities on the street, and, parking on the street.

However, there are several opportunities for the sustainable transportation planning in the world. Increasing demand of the pedestrianization, sidewalks, and footbridges and in many countries, national level policies and planning encourage the planner and city managers to make several policies and programmes towards sustainable transportation. In many developed countries, footbridges are so important that connects to the business areas, institutional areas and administration areas.

PEDESTRIAN AND PARKING: CONFLICTS AND INTERRELATION

There are three different factors related to the sustainable transportation in the urban development; 1. Urban area must be easy accessible, 2. Enough parking space, and, 3. Pedestrian-friendly transportation (Kent, 2001).

Pedestrian is an inseparable part of urban development. In the western countries, many people walk, cycle or use public transportation system e.g. tram, metro or train, even in the Western Europe cycling is providing a form of sustainable transportation in the urban areas. In many countries, Tram is a popular mode of transportation for the inner core area. The down town areas constructed side walks and maintained high density levels with market, shops, offices, entertainment and government as well. All within close walking distance of each other's. Pedestrian, however, plays important role in the urban development, is ingredient to develop urban and downtown area for several reasons.

First, pedestrian helps to maintain the higher densities essential to down towns from the outset. Variety of activities and functions going on within the close proximity provide downtown with a unique competitive edge that other settings cannot watch. Automobile in the downtown area encourages spreading out downtown activities.

Second, pedestrian is essential to the economic survival of downtown urban areas through business especially street-level-shops and services, restaurants that depend on walk-by-customers. It also has encouraged explored and exposed many commercial establishments. Pedestrian friendly environment in downtown area encourages people stay and spend more money at the local business.

Third, friendly pedestrian in downtown area enhances the gathering place for community through special events, circus, lottery or celebrations. It also

encourages communication. Look, meet and interact with other members of our community is also a great advantage of walking.

Fourth, walking gives a good perception an image of the downtown area. No pedestrians, no vitality in the downtown. Therefore, volume of pedestrians in an area gives a vivid picture of the level of importance of the area.

Finally, pedestrianization, in the sustainable transportation, provides a scenario of the future plans and policies of the government sectors.

INTERNATIONAL EXPERIENCES AND SUSTAINABLE TRANSPORTATION

In the United States, sustainable transportation and its linkages to land use and urban development patterns, economic growth, environmental impact and social equity has increased recent years. As a result, many US transportation agencies are re-examining their policies and planning.

In Europe many countries especially Sweden, Germany, the Netherlands, Denmark and United Kingdom, have been actively addressing sustainable transportation issues for several years through making national and local plans and policies together with economic development, social equity and environmental conservation. The integration of sustainable transportation into socio-economic and environmental factor has been an important aspect and commercial arguments have strongly come to the mind of experts. This means that economic feasibility has become a major motive for sustainable transport connections to rural and peripheral areas (Button and Nijkamp, 1997).

In Europe, sustainable transport is seen as a much broader concept having economic and social as well as environmental dimensions. Sustainable development is viewed as development that improves services equity, the standard of living and quality of life, while at the same time protecting and enhancing the natural environment and honoring local culture history. Therefore, social, economic and environmental objectives are integral parts of sustainable transportation planning in Europe rather than focusing on mitigation efforts.

Sustainable transportation is safe, high quality, accessible, ecologically sound, economical and positive contributor to the regional development. Therefore, goals for sustainable transportation include improved service quality and quality of access to goods and services, safety, improved air quality, noise reduction, improve water quality, protection of habitat and open spaces, historical preservation, reduces carbon emission, increase social equity, economic development and satisfying quality of life, plus local goals consistent with the overall objectives.

In an Asian country like in South Korea, Presidential Commission on Sustainable Development has been set up and several other laws, for example, public transport promotion law and mobility handicapped transport laws published under the Ministry of Construction and Transportation. Even Seoul city government has decided to introduce Bus reform and Green Parking 2006 Projects for the sustainable urban transportation. The projects are revolutionary in nature, which has completely changed the existing road system. The project has

been deployed in order to enhance the speed and efficiency of bus system followed by increase in uses of bus as a public transportation. Green parking 2006 is in the process of implementation in Seoul city. The plan based on the idea of traffic calming, to calm down the traffic at the connector roads in the residential area. It also targets to increase the parking spaces in residential areas.

In Canada, the National Transportation Act 1987 empowered the National Transport Agency to eliminate 'undue obstacles' in transport for people with disabilities. The Act gives the National Transport Agency Authority to make and implement the actions regarding the infrastructure (design, construction, and modification of all vehicles and transport facilities including signage), training for transport personnel (Penner and Stark, 1993).

In the United Kingdom, two important phases identified under the Transport Act 1985. First, upgrading of public transport vehicles and infrastructure to be accessible. Second, those people who are not able to use these accessible transport services; door-to-door services would be expanded and improved.

In Sweden, the Community-Responsive Public Transport was introduced. There are three major stages of the programme, first, fixed route transport using accessible vehicles, second, service routes, which are fixed using smaller vehicles over a broader network and, third, special transport services, e.g. door-to-door services for those who cannot travel even short distance and bus park (Stahl, 1991). Therefore, access, quality service, safety and good environment and sound economic development are overall objectives for transportation planning and transportation planning should meet the social and economic needs of the community.

In Netherlands, "Green Heart" framework has been highlighted in the national goal to enhance economic growth and environmental protection. Within the framework, various strategies related to the land use and traffic management has been identified. Land use strategies aim to support the quality of transport service available. Transport strategies emphasize the quality service and design for transit, bicycle and pedestrian.

Transportation planning in Netherlands has emphasized to the trip chain and door-to-door rather than mode-to-mode. For example, bicycle, tram and pedestrian are linked to the transit stations. More importantly, a separate bicycle route formed along sidewalks, provide fast and relatively safe environment. Bicycle, pedestrian and automobiles paths are marked by separate colours, for example red brick for bicycle and yellow for pedestrians. Sophisticated design and greenery along the routes form another key characteristic of the sustainable transportation in Holland.

In Germany, sustainable transportation system is based on the multimode and least cost planning. Avoid motor trips, shift trips to less damaging modes and optimize road capacity, improving vehicles technologies are core-guiding principle of sustainable transport. Management and operation is of prime importance and linked with land use planning (US Department of Transportation, 2001).

STRATEGIES FOR SUSTAINABLE TRANSPORTATION

In many countries, sustainable transportation has been directed not only to the transportation system and management but also to the community objectives, economic development and environmental sustainability.

Table 1: Scopes of Sustainable Transportation

Community Objectives	Economic Objectives	Environmental Objectives	Transportation Objectives
<ul style="list-style-type: none"> • Maximizing accessibility for the community, in particular maximizing access to major employment opportunities; • Minimizing traffic induced severance and intimidation in the community; • Maximizing the safety of the transport system. 	<ul style="list-style-type: none"> • Facilitating economic development; • Maximizing the economic performance of the city. 	<ul style="list-style-type: none"> • Minimizing greenhouse gas emissions; • Minimizing consumption of energy and construction materials; • Minimizing impact on the natural and cultural heritage; • Minimizing impacts on local environmental quality. 	<ul style="list-style-type: none"> • New technology and operation promote non-polluted vehicles • Impose road tax • Promote Tram and Metro • Encourage walking and cycling • Bus improvement • Park-and-ride • Roads improvements • Remove on street parking

Land use and transportation are related with each other. Land use strategies are viewed as important ways to manage transportation demand and its impact. In Europe, for example, policies governing the location and land uses are designed to reduce trip length and facilitate the use of transit, biking and walking. It means 'short trip' approach has been put forward as a development strategy in the transportation sector. Policies used in pursuit of sustainability especially linkages among land use and urban development, economic growth, environmental impact and social equity.

Parking improvement particularly for the bus, car is an important aspect of the sustainable transportation in urban areas. In many cities, parking is being a core problem in the downtown areas that brings confrontation between businesses, pedestrian and vehicles. Loading and unloading vehicles in the core urban downtown is difficult in the many urban areas of the world. Parking in urban areas is often scarce or expensive. Therefore, a multistory parking concept has been developed in recent years in developed countries of the world.

Bicycling and pedestrian creates safe and green environment in urban areas. Bicycling is recognized as an important mode of transportation particularly for short distance. Extensive system of bikeways, bike parking

and facilitate the bikes on transit/parking have been established in many European countries. Pedestrinization, where automobiles are restricted, in many urban areas are possible to short distance destinations that link to the business, institutional and administrative functions. In brief, the principle of sustainable transportation guided towards eco-development and eco-neighborhood. These principle are outlined below:

- Promote and enhance more environment friendly transportation modes. Example; the city will require comprehensive pedestrian and bicycle networks in or new neighborhoods.
- Efficiently and equally, serve the country's comprehensive economic, environmental and social equity goals. Example; all transportation projects shall be designed and implemented to facilitate and assist the country's growth management programmes.
- Reduce the use of conventional automobiles. Example; automobiles traffic within the city's historic, commercial districts shall be discouraged. Promote walking, bicycle, and discourage private car, taxi and other vehicles.
- Encourage public transportation rather than many roads and traffic vehicles. Encourage Tram and Trolley bus in the downtown. Make all transportation modes environment friendly.
- Improve parking stations. Promote parking charge concept and multistory parking in the core downtown area that has helped the construction, operation and expansion of the parking spaces. Discourage lorry truck and tractors in the urban areas.
- Expand pedestrianization area and improve the quality of sidewalk and footbridges. Balancing parking with pedestrian through location of parking and their linkages. Well-connected pedestrian areas into business and institutional areas.
- Integrate transportation planning into land use plan.
- Change attitude of the people.
- Provide proper signs, signals, and zebra crossing that have been promoting equal opportunities for all communities of our society.
- In aggregate, 'Four E' approach has been identified for sustainable transportation planning and management.
- Adopt Engineering (design): Quality of street, quality and patterns of sidewalk, design and planning of transpiration routes and networks.
- Enforce, laws, rules and regulations: National and local laws and regulation to promote sustainable transportation.

- Educate or create awareness: Provide people awareness and traffic education to the pedestrian and citizen.
- Encourage participation: Community participation in the management and control of traffic and transportation system.

CONCLUSION

The issue of sustainable transportation has become an interest to the planners and policy makers in recent years in the world in order to balance and integrate development. Sustainable transportation is not a single aspect but it is a multidimensional and integrated aspect where the level of social, economic and environmental development depends. Therefore, safe and clean route networks and the quality of vehicles are only a single aspect and could not deal with sustainable transportation as a whole. Hence, its effects on the overall economic, social and environmental performances of the country should be measured and defined properly. Sustainable transportation is more than a mitigation measure but it requires policy commitment and collaboration among the relevant agencies. Western European model of sustainable transportation, which is appreciated by US Department of Transportation (Federal Highway Administration, Study Team, 2001) is potentially useful as a way to resolve transportation-resource conflicts. Policy integration, participation, quality design and people's awareness are important to meet the goal of the sustainable transportation. Pedestrian friendly and parking should be promoted for the downtown planning and its development.

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