Making Siliguri a walkable city

Dibyendu Bikash Bhattacharyya\textsuperscript{a}, Soumen Mitra\textsuperscript{b}\textsuperscript{*}

\textsuperscript{a}Department of Architecture, Women’s Polytechnic, Government of West Bengal, Chandannagar, India
\textsuperscript{b}Department of Architecture, Town and Regional Planning, Bengal Engineering and Science University, Shibpur, West Bengal, India

Abstract

Walkability provides a foundation for a sustainable city. The effectiveness of walkability is linked with socio-economic, environmental and psychological issues. Walkability provides safety, security and comfort for the city dwellers while traveling as well as cleanliness and transparency in mobility by reducing street congestion, street pollutions, vehicle fuel cost and road fatalities. Present motorization and urbanization in Indian cities, resulting in reduced mobility and increasing hazards, has thrown a challenge to the planners and decision makers in favor of conversion of motorized cities to walkable cities. In this paper, the prospects for walkability and related issues has been analyzed and discussed for Siliguri city. Siliguri, a medium sized city of West Bengal, India has emerged as a major urban center and acts as Gateway to the entire north-eastern states of India. Planners fear that the population of Siliguri may reach up to 2 million by 2025. As Siliguri is not a planned city, it has been experiencing problems in meeting present demand with its social and physical infrastructure. The streets of Siliguri is almost choked by mixed traffic, usually paratransits and personalized two/four wheelers, slow moving vans, dense urban corridors and existence of busy commercial set ups along major roads. The rapid motorization and increasing level of economic status of the city dwellers has put immense pressure on transportation system of the town resulting in high level of congestion and fatalities. Thus, keeping many aspects as constraints, there is an urgent need to identify the prospects of walkability in the city for sustenance. In this paper, an effort has been made to identify possibilities of transforming Siliguri into a walkable city where more people will opt for walking as their first choice for short trips and to make longer distance trips using a combination of walking and public transport instead of using personal automated vehicles. The research finally reveals that there are ample opportunities to make Siliguri walkable, however, detail investigations and quantification of walkability indices are required for implementation.

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* Corresponding author.
E-mail address: mitrasmen@yahoo.co.in
1. Introduction

Recently, many Indian cities are deadly captured by rapid urbanization and increasing motorization creating unmanageable pressure on city-transportation system. Indian cities are primarily built for walking and cycling and are characterized by narrow collector streets with rampant organic growth. But due to rapid motorization and increasing car ownership, the transport scenario is rapidly changing resulting in high level of street congestion seizing mobility of people, increasing rate of environmental pollution, fuel consumption and above all road fatalities and severe accidents.

To arrest the situation, National Urban Transport Policy (NUTP) has emphasized on more pedestrian movement and organized public transport system to achieve a sustainable transport base in cities. The scope for pedestrian movement lies under the concept of walkability. As defined, walkability is the extent to which the built environment supports & encourages walking by providing for pedestrian comfort & safety (Michael Southworth, 2005). “A highly walkable environment invites walking by means of a richly connected path network that provides access to the everyday places people want to go. It is safe and comfortable with streets that are easy to cross for people of varied ages and degrees of mobility. Spaces are attractive with street trees or other landscape elements. The pedestrian network links seamlessly, without interruptions and hazards with other transit modes such as bus, train or subway minimizing automobile dependence. It supports walking for utilitarian purposes such as shopping or the journey to work as well as for pleasure, recreation and health” explained as per Wikipedia. The importance of walkability is of great interest among the transport researchers and also for Indian government.

In this paper, an attempt has been made to identify possibilities of making a city walkable and to assess its measure through quantified indices to achieve a sustainable situation of the city. As a case study, Siliguri city of West Bengal has been selected which exhibits lots of problems in transport due to high rate of urbanization and motorization.

2. Walkability: Aspects and Measures

2.1. Effectiveness

Walkability provides a foundation for a sustainable city. The effectiveness of walkability is usually fourfold and linked with socio-economic, environmental and psychological issues. First, it results environmental protection and creates greener environment. Second, it promotes sociability among citizens in a neighborhood. Third, it helps to promote mental and physical health of citizens. Fourth, walkability reduces expenditure for travel.

2.2. Limitations and constraints

To promote walkable environment in cities, a few relevant aspects must be kept in consideration. The average speed of a physically fit adult is 4-6 km /hour and due to limitations in animate energy, the maximum average distance of walking is observed as 500 m. The walking speed usually is reduced in change of elevation in roads. The propensity for walking is reduced considerably by adverse weather, whether it is rain, snow, or broiling sun. There will be difference in preference of walking, if the commuters carry considerable luggage. Therefore, the measures of walkability near wholesale markets will have to be designed cautiously. Above all, there must be sufficient arrangements of safety while walking because the absence of sidewalks forces pedestrians to use the street or narrow shoulders and contributes to increased risk of fatal or injury accidents.
2.3. Measuring walkability

Walkability is a concept and it may not be realized till the system is designed. To design the appropriate system over the existing condition, there must be a tool for measuring walkability in cities or neighborhoods. One way of assessing and measuring walkability is to undertake a walking audit. An established and widely used walking audit tool is PERS (Pedestrian Environment Review System) which has been used extensively in the UK. Another tool is the Walk Score which is an algorithmically derived Walkability index based on the distance to the closest amenity in each of several categories, but does not consider factors such as sidewalk availability, safety of the neighborhood, and topography. Related Transit Score and Bike Score measures have also been developed. Park in his thesis identified 52 walkability indicators divided into 7 broad segments (i) curb-to-curb roadways (ii) pedestrian crossings (iii) buffer zones (iv) sidewalks (v) sidewalk facilities (vi) street scale and enclosure and (vii) nearby buildings and properties.

CAI-Asia Center, in their study, has focused the conditions of walkability in Indian Cities emphasizing walkability surveys in 6 Indian Cities (Bhubaneswar, Chennai, Indore, Pune, Rajkot and Surat), pedestrian preference interviews, assessment of current policies and institutions relating to pedestrians and walking environments in the cities and comparing Indian cities with other Asian cities.

2.4. Criteria for Walkable Cities

As research on walkability is going on, there are number of methods to measure walkability through walkability index on various parameters. However, five basic parameters have been identified from them; those cover most of the aspects of walkability i.e. physical, social, psychological and environmental. To reduce computational burdens and expensive surveys, these five parameters have been chosen. These, as a whole, exhibit a tentative overview of walkability in a selected zone and also identify the scope for improvement to achieve higher walkability index. The five parameters are

1. Connectivity of path network, both locally and in the larger urban setting.
2. Linkages with other modes, bus, streetcar, trains, etc.
3. Fine grained and varied land use patterns.
4. Safety both from exposure to traffic and personal security.
5. Quality of path, including width, paving, landscaping, signage and lighting.

First three parameters indicate the smoothness of walking in a zonal scale and the parameters are quite quantifiable. The fourth parameter is based on perception of local people based on some behavioural issues of travel. The last one is a micro-level approach for development and strengthening the walking environment with appropriate instruments. These five parameters have been used to analyze the situation of walkability and its prospect in Siliguri city.

3. Overview of Siliguri City

Siliguri is one of the fastest growing cities of West Bengal State, India. It is situated in the narrow corridor stretching between Bangladesh in South, Bhutan and China in North and Nepal in North West (Fig.1) and is the gateway to the entire north-eastern part of India. This strategic location is the locomotive for a rapid growth not only in population, but also in economy and which is reflected by high level of motorization in present days.

In the last few decades, Siliguri has grown rapidly in terms of area, density and population (Fig. 2). Its spatial area (presently 41.9 sqkm distributed over 47 wards) has expanded five fold since 1931. Population growth has been extraordinary, increasing from 6067 in 1931, being 4.72 lakhs in 2001 and more than 7 lakhs as per 2011 census data. The planners assess the population of Siliguri may reach upto 2 million by 2021. The spatial pattern of the city is almost linear, stretching almost 9 km in north-south and maximum 5 km in east-west.
As of today the traffic & transport situation of Siliguri is grim. Apart from travels of city dwellers, significant load of tourist population traveling to the north-eastern region is observed for many decades. The pressure has created an unmanageable situation for many major trunks like Hill Cart road, Sevoke road, Burdwan road and Bidhan road. Majority of the road sections have volume/capacity ratio more than 1.5. The “Y” shaped intersections, unorganized public transport system, mixing of slow & fast moving vehicles etc. create severe congestion along major road stretches. The safety of travel has been lost by increasing numbers of two wheelers and cars, use of extensive intermediate public transport, absence of city bus service and abundant cycle-rickshaws for short journeys. Such inefficient transport system causes social, economic & financial wastages.

To improve the situation, appropriate development strategy of transport infrastructure is essentially needed in Siliguri. Existing socio economic pattern and land use distribution ensures presence of pedestrians and NMVs on the road. So walking and bicycling connected with suitable public transport system should be viewed as essential ingredients in an integrated, intermodal transportation system to give travelers transportation options and to bring sustainability.
4. Possibilities of Walkability for Siliguri

The possibilities of walkability in Siliguri have been discussed and analyzed based on five criteria as stated in previous section. This is explained following.

4.1. Connectivity

Connectivity of the path network is determined by the presence of sidewalks and other pedestrian paths and by the degree of path continuity and absence of significant barriers. As shown in Fig. 3, the existing urban structure of Siliguri resembles a “Semi-lattice” type of arrangement rather than being built on a “Tree concept”. With this structure, it has the potential to achieve high a degree of connectivity. Only about 14 percent of all roads in Siliguri have footpaths. A recent household survey to assess existing modal split for Siliguri reveals that nearly 10 percent of the total trips are walking trips. The required infrastructure for such a vast pool of walkers is quite inadequate and unsafe. Another major problem is the presence of a railway line that physically divides the city, and contributes to traffic congestion. To address these problems one underpass near Fuleswari Market and one flyover at Mahabirsthana have been built. But no separate facilities have been made for the pedestrians.

The probable solution of connectivity is to develop footpaths in roads of east-west orientation, such that, they can be used as both pedestrian set up as well as feeder of paratransit vehicles in selected streets connecting major commercial zones, institutes and offices. Major north-south trunks may be used as main vehicular (buses) flow.

4.2. Linkage with other modes

A complete pedestrian network will offer full connectivity between all modes so that one can navigate the entire system easily. Linkages with public transport and paratransit (intermediate public transport or IPT) systems are an integral part of a successful pedestrian plan. Siliguri has distinct disadvantages in this regard. Before 2001, there was no conventional intra-city public transport or paratransit system. There were however innumerable cycle rickshaws and some auto rickshaws operating in the city. A city-wide bus system was introduced in Siliguri in 2001. At that time there were 13 routes in operation using a fleet of 42 mini buses. Over time this system was reduced to the point where today only 3 buses are operating on a single route. City auto rickshaws (8-seater) are operating successfully in Siliguri as a public transport system. But auto rickshaws do not begin a trip until they
are filled with passengers at the point of origin. Passengers wishing to board from intermediate points along the routes are unable to find a seat and are forced to opt for cycle rickshaws or motorized two wheelers which create further congestion on roads (Fig. 4). Between 1996 and 2003 there was a four-fold increase of the number of motor cycles and scooters travelling the roads of Siliguri. Nearly 20 percent of the total trips were being made by motor cycles and scooters and increased environmental impact of such vast numbers of motorized two wheelers has occurred.

Fig. 4. Pedestrian vehicular conflicts on major roads in Siliguri

Most of the streets in Siliguri are awfully busy with mixed traffic. However, most of the internal streets are not 500 m. away from major streets. Hence, there may be two levels of vehicular operation. Firstly, bus services in major trunks and Auto-rickshaw services in second level internal roads. The local streets, as they are closely linked with the second category roads; they may be fully pedestrianized with specific infrastructure to ensure intermodal linkages with pedestrians.

4.3. Fine grained and varied land use pattern

A walkable city has an accessible pattern of activities to serve daily needs. This means that one can reach most local services within a range of approximately one-half mile in about 10-20 minutes on foot. Typical activities that fall within this “neighborhood access” category include shops, cafes, banks, grocery stores and elementary schools. The concept of the “Compact City” model involves achieving higher population densities and mixed land uses that will support public transport and reduce the demand for travel as trip lengths are reduced between uses. Interrelationships between “Place-Work-People”, three essential elements of human life can be maintained more effectively in this model. The existing land use pattern shown on 3 and the Ward Wise Population Density shown on 2 indicate that the ‘Compact City’ model is achievable in Siliguri. However, to achieve the desired goal it is necessary to have high quality social and physical infrastructure, effective public transport, and a safe and livable urban environment. Amongst 47 wards in Siliguri, 15 of them have already achieved their desired density. The low density areas around the periphery could be developed more intensely and mixed-use infill development could further reduce urban sprawl.

4.4. Safety

Passenger – vehicular (PV2) conflict cannot be avoided on congested road sections. PV2conflict along major roads in Siliguri is illustrated in Fig. 4. This situation increases the risk of passenger injury or fatality in collisions.
with other vehicles. This risk can be reduced by adopting suitable measures to improve passenger safety. The primary survey in Siliguri indicates that there is a distributed traffic flow i.e. extended peak hours due to existence of large business persons instead of only office workers. If the conflict of vehicle with passengers in inner streets is resolved, higher safety and security may be achieved.

4.5. Path Quality

The quality of path is an essential element of walkability. Width, roofs & shades, and surface condition of walkways, drainage & lighting systems, grade separation, landscaping & amenities – all of these should be properly addressed to provide comfort and safety for the pedestrians of varied ages and physical abilities. Possibilities of path quality in Siliguri are discussed below covering five major attributes.

Width of the walkways should be at least wide enough for 2-3 people to pass one another or to walk together in groups. In Siliguri, footpaths are wide enough in this respect. But the effective width is often impaired by various obstructions. As illustrated in Fig. 4 and Fig. 5, these obstructions include signs and lamp posts, bus shelters, trees and hawkers. In some cases, almost 75 percent of effective width is used by shop owners. All of these ultimately reduce the capacity of the sidewalks and produce an unacceptable situation in which extensive contact with others is necessary to make any progress (representative of LOS operation). There must be appropriate strategies and policies on behalf of government for rehabilitation of street hawkers grouped in multiple spaces distributed properly. This may lead to removal of congestion on the streets.

Heavy rainfall is one of the main obstacles to walking. Also, often there are no arcades, awnings or other such covers to protect the pedestrians from heavy torrential rain. The frequent water-logged condition does not affect life in Siliguri. The city is situated in the Piedmont zone, a transitional zone between high hills of the Himalayas and flat plains, where the natural contour of the ground effectively drains off rain water.

![Fig. 5. Hill Cart Road: Walkway obstructions present on both sides](image-url)

Uniform and adequate illumination is an essential factor to attract visual interest and prevent crime at nighttime. Grade-separated paths are most desirable in places where vehicular traffic is heavy and serious conflicts may occur with pedestrians. At present there are no pedestrian overpasses or underpasses in Siliguri, even though the volume-to-capacity ratios of the major roads have surpassed the desired level and major intersections have high load factors. In response to the seriousness of this issue, the development authority has undertaken some steps to build pedestrian overpasses in the most congested locations.

Landscaping and amenities play a large role in attracting and convincing people to walk more. Architects and urban designers can also play a large role by designing streetscapes that will be able to refresh and rejuvenate...
physically tired pedestrians. Noisy traffic, polluted air, and the glaring of lights and garish signs are all present in the streets of Siliguri to discourage people from walking.

5. Conclusion

Development of walkability plan for Siliguri is earnestly required to ensure positive march towards sustainability and make Siliguri efficient, liveable and engine of growth for the entire region in future days. The walking plan should include the views of professionals from variety of fields including transport planning, transport engineering, health, tourism, social inclusion, crime prevention, urban design. To achieve sustainability, needs of the pedestrians should be addressed properly to reduce dependence on personal motor vehicles. Redesigning of existing arterial and sub-arterial roads to create segregated public transport lane, separate motorized & non-motorized lane, wide footpath and spaces for vendors will benefit all road users. It will increase capacity of road sections when measured in passengers/hr/lane.

A walkability index may be developed in this context to quantify the present scenario as well as possibilities of future development. The index value will act as indicator of comparative scenario for each ward of the Siliguri Municipality and further the quantified results may be disseminated to the ward authorities for micro-level interventions and implementations. Development of walkability may start with 5 abovementioned parameters, however, be divided into various necessary sub-parameters to address the depth of present problems. As Siliguri acts as a major transport hub for lakhs of tourists in the region, hence, their movements may be separated suitably resolving conflicts with the city travelers and therefore improving mobility for both the users.

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