

Analysis of the Public Transport Network for a Multiple-core Hill City, Darjeeling

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ABSTRACT

Darjeeling is a hill-station in the northern part of West Bengal with a population of 118,805 (Census 2011). The area and its transportation infrastructures were built for a far less population of about 10,000 during the British rule and have had very few developments since then. The growth rate of the population over the decade in the town is 14.77% (Census 2011). This rising population and limited area within the town is pushing its developments towards the town's peripheries. This can also be attributed to the hilly terrain of the place. Darjeeling which was initially morphologically monocentric with only a dominant centre is now heading towards polycentrism morphologically and functionally. The morphologic polycentric growth also requires its transformation into a functionally polycentric shape. As Darjeeling is becoming a polycentric city, it becomes necessary to adapt its public transport network to this development. Apart from this, Darjeeling is a tourist destination. About 3,00,000 tourists visit Darjeeling every year (Tourism Department). The tourist season in the hills that eventuates twice every year, which adds to the population, causes a lot of traffic congestion and long traffic jams. To improve the scenario, use of public transport can be encouraged as opposed to private vehicles. As well as to provide better transport facilities during the peak tourist season and reduce traffic congestion. In this study it is tried to introduce a better public transportation network by providing new links and providing alternatives in existing links.

Keywords: multi-core city, public transportation network, public transportation system

1. INTRODUCTION

Darjeeling city is in the northern part of the state of West Bengal. Darjeeling was originally established as a health sanatorium for British soldiers in the year 1835 and was built for a population of about 10,000. Over the years the town became famous for the fine tea grown in the slopes and has gained popularity as a tourist destination. Transportation wise very few infrastructural developments have been made. This however has not stopped the urbanisation of this hill city. The percentage of population of Darjeeling district has increased from 32.3% (2001 Census) to 39.4% (2011 Census) with regard to the urban population. This share of urban population is higher than the state percentage of 31.87%. Owing to the rise in population and rapid urbanisation, development is spreading towards the exterior points in the town. These are arising as new centres for human settlements and activities. The city which was originally morphologically monocentric is slowly turning into a polycentric one. But this is required as there is no scope of the expansion in the main centre due to limited area and the hilly terrain.

The city is experiencing urbanization but the not much was done for its development. This has led to several areas coming up as urban core within the city, giving rise to a multi-core city structure. The rising population is continuously burdening the infrastructure built for a far less population. Apart from this, houses and other buildings have sprung up both in the town and periphery without proper planning and regulations. Being a hotspot for both domestic and foreign tourists, the town is constantly under stress. Nearly 4 lakh domestic and 25000 foreign tourists visit the hill station every year adding to the city's population. During the tourist season that occurs twice every year from March to May and another from September to November, one can witness a huge number of vehicles in the city. This causes a huge and long traffic jam.

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Tourism and tea are the main source of economy for Darjeeling, and these both require good transportation systems and better public transportation network. Traffic congestion and limited transport facilities would adversely affect the economy of the region. Transport network has a vital role to play for developing any economy. Thus, it is important for public transportation networks to be revised for better mobility of people and goods in and out of the city. There should also be a good connectivity with the other developing centres of the area.

Alonso, W., 1964, Muth, 1967, and Mills, 1967; 1972 stated and improved the monocentric and polycentric city concepts. Monocentric city had a unique centre termed as Central Business District (CBD) whereas polycentric city diverged from this unique centre and expanded over a wider area outside the CBD. It is seen that with time the CBD loses its dominance and activities grow away from it as well. Thus, the polycentric cities are born out of the monocentric ones. Bertaud, A., 2004 stated that monocentric and polycentric cities are animals born of the same species evolving at different time periods. Fujita, M. et al., 2001 described the evolution of polycentric structure. Urban polycentrism can be described as a formulation of economic activities in confined areas that are experiencing population growth and capital investment which in turn gives way for multiplying the process.

2. STUDY AREA – DARJEELING

Darjeeling district is located in the northern part of the state of West Bengal. Darjeeling district consists of four sub-divisions namely, Sadar (where Darjeeling City is located), Kurseong, Mirik and Siliguri. Three of the mentioned are hill subdivisions and Siliguri is located in the plains. Darjeeling extends from 27° 13'N to 26° 27' N Latitude and 88° 53' E to 87° 59' E Longitude.

The study area is Darjeeling city, the headquarters of the Darjeeling District. It situated at an altitude of 6710 feet with an area of about 10.57 sq. km. It has a population of 118,805 (Census 2011). The Darjeeling municipality currently has 32 wards. Urbanisation is developing the monocentric town to form into a diverged polycentric one with other urban cores developing. The two important urban cores are Lebung and Ghoom. These cores have developed due to growing commercial importance by tourist activities and limited space in central core. Also, Ghoom is a junction of two important roads connecting Mirik and Siliguri. Thus development of such urban cores would be beneficial for the overall economy.



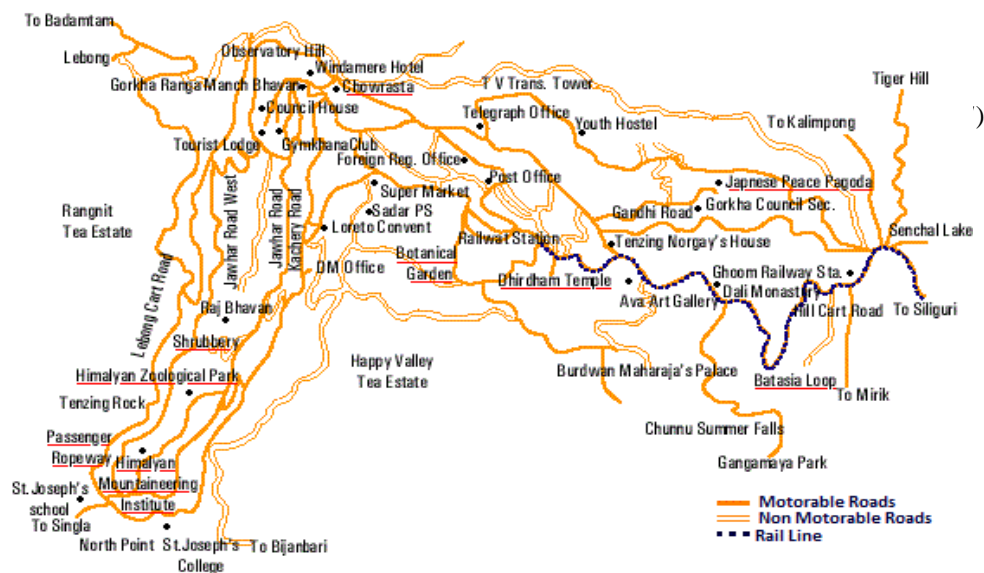


Figure 2. Map of Darjeeling with roads

(Source: <http://touristplacespl.blogspot.com/2011/08/darjeeling-information-place-to-visit.html>
 Accessed: 15 July 2017)

The trip generation and attraction were compiled in a study conducted Nag Dipanjan et al., in Sustainable Transportation Option for a tourist Hill town. Case Study: Darjeeling. It was seen that there was significant trip attraction in the areas of Leborg and Ghoom as compared to rest of the places. These are the new developing urban cores. Thus, we can say it is heading towards a multi-core city.

There is a good number of tourist both domestic and foreign visit the Darjeeling hills every year. This increases the population of the town nearly four times and sometimes even more than that. The tourist season eventuates twice every year from March to May and another from September to November. This increased population put a considerable amount of stress on the roads and other infrastructure. This is clearly visible in terms of the long traffic jams that take place during the peak tourist season. The city also has limited parking spaces that add to the

problem. The centre of the city is already crowded and has no available space to accommodate more number of vehicles. Both these factors cause a great problem for everyday travelling within the city and sometimes to and from other places as well.

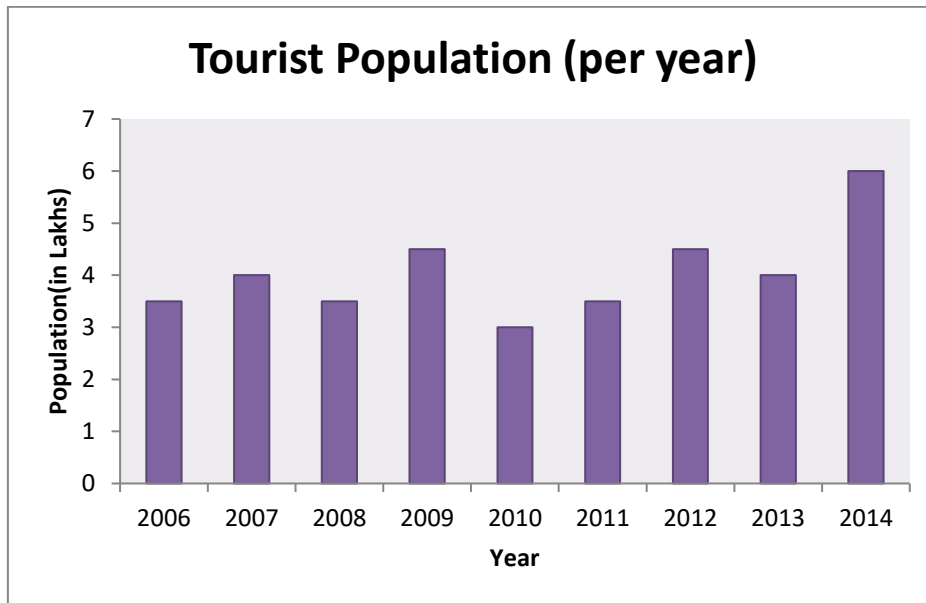


Figure 4. Graph showing annual tourist population in Darjeeling
(Source: <http://www.gtatourism.com/home.html> Accessed: 11 May 2017)

3. CURRENT TRANSPORTATION SCENARIO IN DARJEELING

Darjeeling faces various transportation problems and limited area to address it. Unlike in the city in plains, where ring roads can be built to reduce the external-external trips instead of passing the centre, it is not possible for a hilly urban area. However, alternate routes and one-way routes needs to be planned to save time and provide feasible mobility. Unplanned and random development has led to congestion in the city and roads. Limited parking space is another major problem. Apart from this, roads are encroached by on-street parking and shops. With very few inches of land spared for new infrastructures in the centre of the city and even creating few new parking spaces within the municipality area has not done much as a solution.

The most important mode of public transportation for Darjeeling remains para-transit systems. It is the most preferred and convenient transportation system within the city and to other places from the city in the existing transportation conditions. Few buses also ply in certain routes. The most important route is the National Highway 55, connecting Darjeeling and Siliguri, which is another important city in West Bengal. State buses operated by North Bengal State Transport Corporation ply in this route. There are six buses with a seating capacity of 30 that does daily trips in this route. Within Darjeeling, people prefer to hire taxis or take para-transit (syndicate services) or walk whenever distances are less.

Table 1. Table showing Modal split (in Percentage)

	Locals	Tourist
Car	28	77
Bus	1	3
Walking & Car	6	15
Walking	65	3

(Source: Nag D. et al)

The table shows transport preference of both locals and tourists. It can be said from the above data, that car remains the most popular mode of transport for tourists. These cars usually comprise hired taxis and para-transit systems. For locals the most preferred mode apart from hired cars of transportation remains walking. This can be due to improper and inconvenient public transportation and limited parking space even if they own cars. Bus has a very low percentage for locals and tourist, implying poor and undeveloped public transportation system. When travelling from one urban core to another, there is loss of time and fuel when travelling via the existing route. The cost of travel is also very high due to limited modes of transport. To improve travel time and reduce the trips of cars, public transportation should be improved.

3.1 Some important Roads and their existing conditions

The following lists some of the important roads within Darjeeling Municipality area. The existing conditions of the roads like some geometric parameters, type and encroachment is also given. We can see that the all the roads are single lane with considerable encroachment. Most of the encroachment is due to on-street parking, suggesting shortage of parking area in the region.

Table 2 Table showing some Important Roads

Sl. No.	Name of Road	Type of Road	Avg. Width of Carriage way	Length Within Municipal Limit
1	Hill Cart	Arterial (NH)	7.0m	6.1km
2	Lebong Cart	Arterial	7.0m	10.36km
3	Laden La	Arterial	5.0m	0.65km
4	NC Goenka	Arterial	5.0 m	0.3km
5	Bazar Cart	Arterial	5.5m	0.95km
6	AJC Bose	Sub-Arterial	4.0m	0.73km
7	Dr. Zakir Hussain	Sub-Arterial	4.5m	4.06km
8	Robertson	Sub-Arterial	5m	0.7km
9	RK Ksharv	Collector	3.5m	0.34km
10	Nehru	Sub-Arterial	4.5m	0.4km
11	Collington	Collector	3.5m	0.55km
12	Auckland Zigzag	Collector	3.75m	0.46km
13	K. Lama	Collector	3.5m	0.56km

(Source: Nag D et al.)

A study was conducted for Sustainable Transportation Option for a tourist Hill town-Case Study: Darjeeling, in this the Level of Service of the important roads was found out. It was mostly observed that the Level of Service

of roads were not up to the standard. Most roads had Level of Services of C, D and E. This is due to the fact that the capacity of the roads is far less than the real scenario; road encroachments also decrease the level of service of the road.

3.2 Transport Network in Darjeeling city

We try to understand the transportation network of the city. The existing transport network in Darjeeling does not support a proper public transport system. Most of the roads as seen earlier, do not have a good level of service. It is important that the growing multi-core city have a suitable public transportation network to support the functionally transforming urban cores. Links with lower level of services should be reduced of traffic and alternate routes identified.

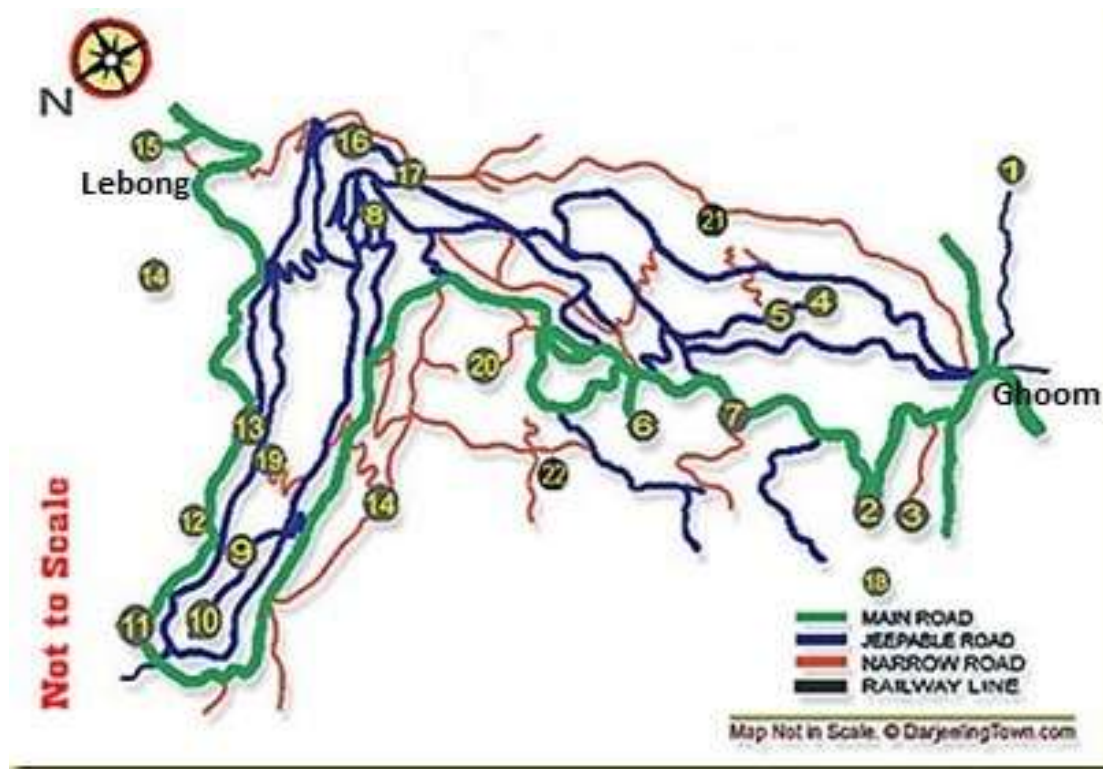


Figure 5. Transportation network of Darjeeling

(Source: <http://patandpaulharvey.blogspot.com/2012/02/a-few-days-in-darjeeling.html> Accessed: 18 July 2017)

4. CONCLUSIONS

The congestion within Darjeeling is due to growing population and visiting tourist along with the encroachments along the roads. As mentioned earlier there, is a severe problem of parking which leads to further encroachment on the roads. The main centre in the heart of the city is very crowded with no further scope of improvement on the existing infrastructure. This part attracts the most number of trips and has the highest activity. There is no proper public transit system for people leading to more congestion due to use of small cars and hired taxis.

We can suggest the following for a better transportation system

- Use alternative links in the existing routes and revisit the traffic movement of the city
 - The new developing urban cores i.e. Ghoom and Lebong should be directly linked without having to go through the centre in the city. This can be done by opening alternate links and re-routing vehicle without going through the congested areas of the city. Also, it is essential to re-plan the traffic movement of the entire city. Many alternative links can be considered for vehicles coming from other areas to the urban cores to reduce the traffic in the main routes.
- Introduce proper public transportation system

Mini buses, if not large ones should be introduced in the Hill Cart Road from Ghoom to Lebung via the main core of the city. Once buses are introduced the number of hired cars will decrease, reducing traffic. The route to Singmari and Ropeway experiences long traffic jams during the peak tourist season. Battery operated cars that were introduced and later stopped has to be re-introduced. This can take tourists from Chowrastha to Ropeway and back. This will considerably decrease the cars plying from Malgodown to Singmari/Ropeway.

- Parking facilities to be developed in the other urban cores

The other urban cores are in the developing stage, finding suitable area for parking in these cores will be a less daunting task. If good parking infrastructures are available in these urban cores, they are likely to attract more trips and increase the economic activity in the area. As we know, transportation facilities and land-use are like sides of the same coin. Thus, improving transportation in an area will automatically develop the area, i.e. land-use changes and vice-versa.

5. REFERENCES

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