

Abstract

Title: A Geospatial Analysis of Road Transport Network of Siliguri City, Darjeeling District, West Bengal

An understanding of the potential traffic effects associated with the development of a well-managed transportation system is typically provided by a transportation network analysis, which contributes to overall urban development. The transportation system in Siliguri City includes both roads and railroads; however, roads are the predominate means for carrying a significant amount of the traffic produced in the city. Rapid urban transportation systems like the metro and local trains are not an option in the city. Because commuters are unable to use alternative modes of transportation, the city becomes extremely congested, reducing both human and technological productivity. The current study examines the condition of the Road Transport Network in Siliguri City of Darjeeling District (West Bengal), using both primary and secondary data and information. Some of the methodologies adopted are: descriptive statistics, Wilcoxon signed rank test, Kolmogorov-Smirnov and Shapiro-Wilk test, segment delay, delay rate, relative delay rate, delay ratio, average travel speed, density of vehicles, graph theoretic measures, volume of traffic/hour, PCUs/hour, day-of-week variability pattern, Single factor ANOVA, composite score, and Spearman's rank correlation. The study area includes the entire Siliguri Municipal Corporation, covering an area of 41.9 square kilometres and 47 wards. Four objectives are met in order to examine the current conditions of the city's major roads, such as,

Physical and functional characteristics of the major arterial roads; examining the degree of accessibility and connectivity of the major roadway network; analysis of the traffic flow along the major arterial roads and the relationship between road transport and various service facilities of Siliguri city.

As the city has already begun to experience intense and protracted traffic congestion at key intersections, causing the average travel time to multiply within a few years, Siliguri urgently needs to pay attention to its urban road and traffic management. By examining the connection between road development and urban services, the study considers the road transport system from both a geographical and an overall developmental perspective. Additionally, the study aims to offer some suggestions and recommendations for addressing Siliguri's traffic issues in a methodical and effective manner. There are a number of findings established from both the qualitative and quantitative analysis in the previous chapters. Following are the major findings made from the analyses:

Hill Cart Road is the busiest and most important road in Siliguri, holding the maximum share of daily PCUs per hour. The primary mode of transportation is private two-wheelers or motor cycles. The proportion of slow moving vehicles, consisting of e-rickshaws, bicycles, and rickshaws, is the second-highest mode of commutation, resulting in traffic

congestion along the arterial road sections. Except for AH 2 (30-45 km/h) and the Eastern Bypass Road (> 45 km/h), the average travel speed remains below 30 km/h on most arterial roads. Throughout the day, vehicle density on Hill Cart Road between Safdar Hasmi Chowk and Gurunanak Chowk remains high (> 11000 vehicles per hour or kilometre). Considering the alpha index, which is used for checking the network connectivity, it is seen that ward no 11 has the highest index value i.e. 0.33, Ward 28 has an index value of 0.29 and Ward 12 has 0.2. Other than these three wards all the other 44 wards in the city have alpha index value '0' (table 4.3). Beta index has been calculated for the road networks in the city, according to the different existing wards (47 in number). It is seen that ward 20 and 23 has the lowest beta index value, '0' and the highest value is in ward number 28, i.e. 1.17. Ward 11 and 12 have a similar beta index value i.e. 1. Whereas gamma index calculated shows that wards 13, 16, 19, 20,21, 22, 23, 30,36, 37 have the lowest index value, i.e. 0, the highest index value can be seen in wards 5,9, 11,29, 25,39 And 44. In case of the eta index calculated Ward Number 20 and 23 have the lowest value 0. Whereas the ward 42 of the city has the highest value 1.39. Like the other indices that have been calculated and discussed prior to this. We see in case of the pi index calculated, Ward 20 has the lowest value and ward 11 the highest. Road density in terms of major roads is maximum in the Ward Number 14 whereas road density is highest in Ward Number 18 considering all major and local roads. Nodal density is also highest in Ward Number 18. Ward Number 8 and 18 recorded with highest composite connectivity score whereas the low zone of connectivity includes 55.32 % of the 47 wards. Out of 41.9 square kilometres area, 11.65 square kilometres falls in most accessible physical zone of accessibility. In terms of total accessibility Safdar Hasmi Chowk and Mahabirasthan placed first position with more than 280000 scores representing most accessible nodes of the city.

Inadequate transportation could also be responsible for traffic jams, congestion, travel delays, environmental degradation, and loss of productivity. Arterial roads are very few in Siliguri, the total length of arterials is 28.68 kilometres out of 547.81 kilometres of total length. An effective plan has to be made by the authority for balanced distribution in order to improve overall connectivity and accessibility. Siliguri has become one of the fastest growing cities in India because of its geographical significance and is the gateway to the north eastern states of India and the Eastern Himalayan region. Despite having a number of arterial roads that have been widened and facilitated with road dividers, Hill Cart Road holds the maximum share of overall traffic.