Statistical Approach to Develop High Mobility Road Network Plan for Sri Lanka

Sumudu Weththasinghe[1] and Saman Bandara[2]

Abstract

Transportation among major commercial and socio-economic hubs will play a vital role in the economy during the next decade. Therefore, it is essential to look forward to developing a road network with high mobility among major hubs (can be considered as nodes) taking into account the existing and under construction expressway network.

Since administrative districts and its capitals have already defined, initially nodes to be served are defined as capitals of each district. Population, commercial activities, special tourist/pilgrims attractions are considered a major trip generating and attracting factors. Transport activity level and the population can be considered as directly proportional to above. Existing travel time and existing allowable speed or average speed between the nodes are the other essential initial data collected for identification of critical paths to access all nodes. In addition to 25 district capitals, other major road intersections (such as Dambulla) and expressway interchanges were also considered as nodes when defining the initial road network. During analyzing stage, development of minimum distance paths (which can be used to identify the level of service between two critical nodes) and minimum spanning tree (which is used to identify the most feasible network for the economy) to access all nodes was considered to identify bottlenecks and additional nodes required. Google data and data from other valid sources were used to develop origin-destination matrices with respect to travel time, distance, and vehicular average speed. With the effective use of tools such as SPSS as well as several online tools developed based on Dijkstra's algorithm, minimum distance path and the minimum spanning tree were developed to identify the feasible behaviour of the existing network. Adding new links to the expressway networks and improvements to other main roads are done using network analysis tools. To identify the optimum network, two criteria; minimizing overall link length and achieving desired average speed levels were considered. A logical criterion to be developed to identify the links to be added or improved such that overall mobility level of the country is improved.

Hambanthota, Rathnapura were identified as critical nodes due to influence from expressways (functioning & proposed). Dambulla was identified as a critical node which influences the mobility of northern and eastern nodes. Nodes and links located in the central region were

identified as bottlenecks of the entire network due to geographical barriers (terrain & landslide issues)

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Author Details

1. Civil Engineer, State Development & Construction Corporation, Suranga19900211@gmail.com
2. Senior Professor, Department of Civil Engineering University of Moratuwa, samanjbandara@gmail.com