Critical Appraisal on Urban Transportation Planning Using Soft-Computing Technique

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Abstract: Road network system is important for any city as it provides the means for people movement transportation of goods and other emergency services like ambulances. Inefficient road network system will disrupt the transportation movement, environment and affect human movement and quality of life. A good road network system can generate economic growth, physical transformation and improved system of strategic connections. Godhra is Municipality in Panchmahal district in Indian state of Gujarat. It is the administrative headquarters of the Panchmahal district requiring detailed network analysis for the development of communication system including roads connecting within the district and with other area. The area is generally flat occupied by mainly three types of soil alluvial, well-drained calcareous and coarse loam. Network analysis is being carried out to solve the problems pertaining to spatial networks including the most efficient travel route, generating travel directions, locating the closest facility, and defining service areas based on travel time and distance covered using geo-informatics technology.

1. Introduction

1.1 Overview

Transport is one of the most important sectors of the universal development in advance countries of the world. Planning transport within the cities is multi-aspects issue viewed as an integral part of the urban transport planning process. Godhra is the main city in panchmahal district and even it is a academic, finical and socially center of panchmahal district, though it is center of district it is not well planned meaning by transport network it is always filled with crowd, noise and air pollution especially when traffic at its peak hour, there is lack of good transport network by providing cycle track, private transport, public transport we can improve a transport network by reducing deficiencies and developing facility in this research paper we showed the introduction, literature of urban transport planning and with the help of Geo-graphical Information System(GIS). Urban transportation planning is the process that leads to decisions on transportation policies and programs. In this process, planners develop information about the impacts of implementing alternative courses of action involving transportation services, such as new highways, introduction of new modes of public transport etc, or parking restrictions. The fundamental objective of transportation is to provide efficient and safe levels of mobility required to support a wide spectrum of human needs for a heterogeneous variety of societal groups. Because these needs, goals, and objectives are continuously changing, transportation planning is also an ever-evolving process. The important steps of the transportation planning process are as given below:

- Step 1: Forecasting target year population and economic growth for the subject metropolitan area.
- Step 2: allocation of land use and socio-economic projections individual analysis zones according to land availability, local zoning and related public policies.
- Step 3: specification of alternative transportation plans partly based on the result of Step 1 and Step 2.
- Step 4: calculation of the capital and maintenance costs of each alternative plan.
- Step 5: application of calibrated demand forecasting models to predict target year equilibrium flows expected to use each alternative, given the land use and socio-economic projection of Step 2 and the characteristics of the transportation alternatives (Step 3).
- Step 6: conversion of equilibrium flows to direct user benefits, such as savings in travel time and travel cost attributable to the proposed plan.
- Step 7: comparative evaluation and selection of the best of the alternatives analyzed based on estimated costs (Step 3) and benefits (Step 6).

This information is used to help decision-makers (elected officials or their representatives) in their selection of transportation policies and programs.
1.2 Solution Generation and Analysis
Based on problem definition, transportation planners have to identify various alternatives and make choice about-
Various modes like roadway (DA/PT), railway, waterways or airways.
The technological aspect such as high speed train, raised monorails underground transit system, driver information system.
Traffic engineering aspect such as changing or improving flow pattern by making certain road one way, reducing delay on Arterial Street by improving signalization or grade separated intersection, disallowing certain movement at intersection
Regulatory aspect such as reserving land for only high occupancy vehicles, disallowing high polluting vehicles, imposing speed limit.
For example, to travel from Kanpur to Delhi following alternatives can be worked out:
Facilitate train leaving Kanpur at 6:30 am and reaching Delhi at 10:30 am and again leaving Delhi at 5:30pm and reaching Kanpur at 10:30pm.
Developing existing airport at Kanpur for small commercial flight, Improve the existing road facilities providing operating speed 120 kmph.

1.3 Transportation network
Undirected networks, Edge on a network may have a direction assigned to it, the person or resource being transported is free to decide the direction, speed, and destination of traversal. Fig 1 shows the person in a car travelling on street.

1.4 Functions of GIS
General-purpose GIS software performs six major tasks such as:
- Input
- Manipulation
- Management
- query and analysis
- Visualization.

2 Study Area:
Godhra is Municipality in Panchmahal district in Indian state of Gujarat. It is the administrative headquarters of the Panchmahal district and it is located at a 22.777266_N_73.620253_E. It has an average elevation of 73 m (240 ft). This has mainly
three types of soil alluvial, well-drained calcareous
and coarse loam. Soils of hilly plains and interfluves
occur in the northern part. Fig 4 shows the location
of Godhra town.

Fig 4 Google image of study area

3 Literature Review

Aman Arora and Manish kumar pandey
analyzed that Network Analysis aims at finding
solutions to routing problems related to traversibility,
rate of flow, and network connectivity. It helps in
identifying optimum locations for services to be
provided. The current work basically a pilot project
and only free Google data, of not very good
accuracy, has been used for this study. In the present
study, distribution of ATMs of different banks and
Hospitals of a part of South West Delhi Area has
been selected for network Analysis. This kind of
study is very uncommon for even highly developed
metropolitan cities of India like Delhi, Mumbai etc.
During field survey noticed that SBI (State Bank of
India) and Axis Bank ATMs are well distributed
while that of PNB (Punjab Bank) are poorly
distributed. There are 5 hospitals in the area and are
well distributed, within 3 accessibility. The road
network and connectivity in the study area is of
appreciable standard. For the area with very high
resolution data of fine accuracy level and
supplemented with extensive field surveys costly
enterprise, the study can be of immense applicability
to Public Transport Corporations, Health service
providers, Emergency Response agencies as well as
under the jurisdiction of home ministry.

SudarsanamPadam and Sanjay Kumar Singh
founded on the basis of his study suggested that for
example, while the scale of urban change is
unprecedented and the nature and direction of urban
change is more dependent on the global economy
than ever before, many aspects of the traditional
distinction between urban and rural are becoming
redundant. He provided a broad overview of the
available evidence on patterns and trends in urban
growth in developing countries, highlighting regional
differences where appropriate. The paper also

examines the quality of past urban population
projections and finds that there has been considerable
diversity in their quality by geographic region, level
of development, and size of country.

He discussed about the impact of urbanization on
environment and quality of life. The provision of
infrastructural facilities required to support such
large concentration of population is lagging far
behind the pace of urbanization. As a consequence,
the urban environment, particularly in large cities, is
deteriorating very rapidly. All cities have severe
shortage of water supply, sewerage, developed land,
housing, transportation and other facilities. The level,
quality and distribution of services have been very
poor. Several cities have indicated large segments of
urban population don’t have access to drinking
water, sanitation, basic 31 health services and
education. These deficiencies have serious health
impacts particularly affecting the urban poor.

He highlighted the need for a cogent urban transport
policy without which there will be ad hoc interventions. Such interventions, apart from not
adding up to a comprehensive approach, will result
in greater confusion. Furthermore, it emphasizes that
if there is no worthwhile public transport, it will still
need to be reinvented to promote a better quality of
life. The need of the hour is formulation of an urban
transport strategy that is both pragmatic and holistic
in its approach.

Praveen Kumar Rai and V. K. Kumra worked on
Urbanization is an index of transformation from
traditional rural economies to modern industrial one.
It is a progressive concentration of population in
urban unit. During the last fifty years the population
of India has grown two and a half times, but urban
India has increased nearly five times.

Sreelekha.M.G., Krishnamurthy.K., Anjaneeyulu.
M.V.L.R. concluded on Road network is considered
to be one of the keys to regional development of a
region.
They analyze the road network connectivity and
spatial pattern existing in Calicut city in India, and
hence to determine if the network connectivity can
explain significant variance in the spatial pattern of
the network structure.
A network is a framework of links, connected within
nodes. Several network based indicators have been
developed to analyze the transport network since
1960 and these indicators can be classified as
connectivity, cyclic property, efficiency measures,
and developed graph theory measures to quantify the
spatial structure of road network and to verify their
relationship with regional economic characteristics.
Traditional interest in understanding network
structure has been limited to geographers who view the spatial nature of the road network as a vital input to regional development. In recent years, there has been considerable interest to understand the topology of transport networks that connects points in geographic space. Investigated the potential application of proposed network measures namely, heterogeneity, connection patterns and continuity, in quantifying the structure of road networks. The proposed network measures were later applied to trace the changes in network characteristics over time. In short, various spatial metrics provide quantitative information for urban transport network analysis.

Mezyad Alterkawi his study relied on GIS to identify deficient facilities in the vital area within Riyadh’s ring road. The deficiency analysis process is utilized to highlight streets where demand exceeds capacity.

4 Conclusion

GIS technology has opened up new horizons in transportation planning and provides a means of communication that allows for an interactive understanding between the public and transportation professionals.

Further, incorporation of land use transportation models, network analysis, and simulation of urban activities to evaluate different urban development alternatives in the GIS framework needs to be explored for added advantage.

Meeting these challenges requires access to timely and reliable information that we created from ArcGIS.

These papers provide a concept of area public transport accessibility and find feasibility, optimization with the software ArcGIS.

5 References