Accessibility Analysis of Social Infrastructure

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***Abstract*— As per Census 2011, Rural – Urban population distribution: 68.84% & 31.16%. Out of total population of 1210 million about 377 million Indians lives in urban areas spread across the length and breadth of the country. This comprises 31% of its population, in sharp contrast to only 60 million (15%) who lived in urban areas in 1947 when the country became Independent. So the villages of the country needs attention to reduce migration towards urban areas and make villages sustainable and self-sufficient. Analysis of accessibility of facility provision (Social Infrastructure) is extremely useful for long term planning as they support the allocation and reservation of land for various uses including open space and facilities within a planning area, as well as being a firm guide when communicating with private developers and other tiers of government regarding local planning needs. Therefore Geographic Information System (GIS) may be used to estimate centroidal distance from production to attraction centers.**

***Index Terms*—Accessibility Analysis, Geographic Information System, Social Infrastructure.**

I. INTRODUCTION

Infrastructure is the basic physical and organizational structure needed for the operation of a society or enterprise, or the services and facilities necessary for an economy to function. Infrastructure facilitates the production of goods and services, and also the distribution of finished products to markets, as well as basic social services such as schools and hospitals. Social Infrastructure is a subset of the infrastructure sector and typically includes assets that accommodate social services. As set out in the table below, examples of Social Infrastructure Assets include schools, universities, hospitals, prisons and community housing.

The social infrastructure deals with the following aspects:

1. Health-care Facilities
2. Education Facilities
3. Socio-Cultural Facilities
4. Other Public-Semi-Public Facilities
   - i. Police
   - ii. Fire & Emergency Services
   - iii. Communication (Postal Facility)
5. Recreational Facilities & Open Spaces
6. Distributive Services
7. Miscellaneous Facilities.

Accessibility is concerned with the opportunity that an individual at a given location possesses to participate in a particular activity or set of activities. Basically accessibility represents the ease with which activities may be reached from a given location by means of a particular transportation system. It is usually measured in terms of travel distance, time or cost. Accessibility planning is defined as a structured process for the assessment of, and planning for, accessibility. It uses quantitative and qualitative data and employs tools such as geographical information systems to systematically assess a range of accessibility related information, including origins, the location and delivery of key activities and the transport links to and from them, and assist in the development of a set of accessibility indicators.

II. AIM

The aim of the research is to study the spatial distribution of various social infrastructures with main focus on Health care facility, Educational facility and Other Public & Semi-Public facility, using GIS tool and give recommendation & proposal for future development.

III. OBJECTIVES

- To find the location of the existing social infrastructure facilities.
- To analyze the social factor affecting the provision of social infrastructure and measure the accessibility to the nearest existing social infrastructure.
- To evaluate the present condition for provision of accessibility to social infrastructure for the study area.
- To give recommendation & prepare planning proposal for future development.

IV. SCOPE AND LIMITATIONS

- The study area is the administrative boundary of Union Territory Dadra & Nagar Haveli.
- The study carries out for social infrastructures like health and education.

V. METHODOLOGY

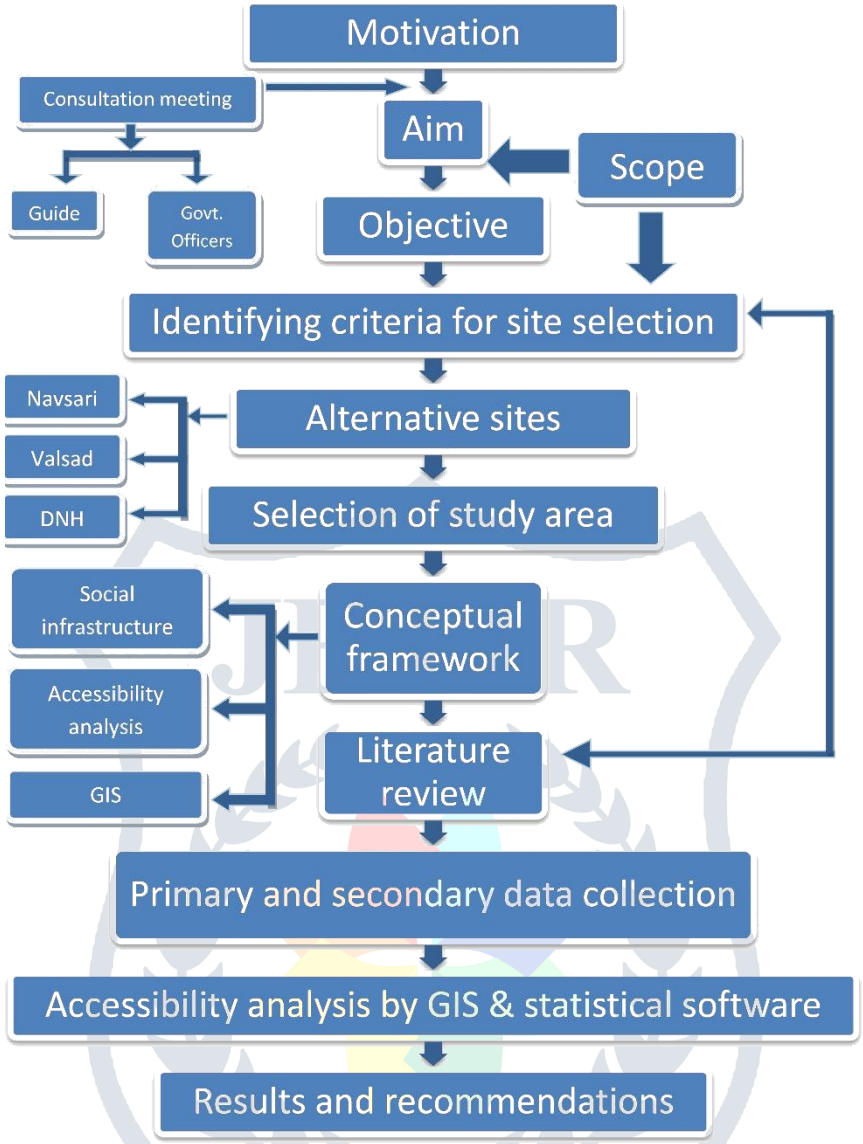

Figure 1 Methodology

VI. STUDY AREA JUSTIFICATION

As per Census 2011, Dadra and Nagar Haveli has population of 3.44 Lakhs, an increase from figure of 2.20 Lakh in 2001 census. Total population of Dadra and Nagar Haveli as per 2011 census is 343,709 of which male and female are 193,760 and 149,949 respectively. In 2001, total population was 220,490 in which males were 121,666 while females were 98,824. Sex Ratio in Dadra and Nagar Haveli is 774 which is below national average of 940 as per census 2011. Of the total population of Dadra and Nagar Haveli state, around 53.28 percent live in the villages of rural areas which is tribal population. As per Census 2011, Rural – Urban population distribution: 68.84% & 31.16%. Hence this area is selected as majority of population is in rural areas.

Figure 2 Location of D&NH with reference to Railway

VII. RESEARCH PAPERS & CASE STUDY REVIEW

1. **ILHAMDANIAH, Talat MUNSHI and Sherif AMER, "Evaluating the planning of social infrastructures in Ahmedabad, India", Paper 125, 2004**

This paper describes how simple analytical GIS techniques can be used to support the planning of social infrastructure in Ahmedabad city, India. The planning context in Ahmedabad consists of a micro and a macro level. The social infrastructure is planned for in the context of Town Planning Schemes (TPS) which are micro level land use/land allocation plans for relatively small, mostly peri-urban, areas. At the macro level, the urban development of Ahmedabad is guided by a Development Plan. The study demonstrates how simple GIS techniques like accessibility and allocation analysis combined with allocation models like Greedy Model can be used to better allocated and plan social infrastructure facilities. It also demonstrates that such measures can be applied to improve the existing land use and land allocation plans.

2. **Juan Carlos Martin and Bert Van Wee, "What can we learn from accessibility modelling?", EJTIR, Issue 11(4), September 2011, pp. 346-349.**

In this paper the author talks about the concept of accessibility. In Hansen's words, accessibility is "the potential of opportunities for interaction". The authors also reviews other relevant research papers of authors Van Wee and Geurs (2011), Haugen (2011), Con deco-Montis, Martin and Gutierrez (2011), de Montis, Caschili and Chessa (2011). The individual component is analysed in the paper by Haugen (2011), where the method is based on a survey made at the individual level. In this case, it was possible to analyse how satisfaction with residential location is affected by individual characteristics. As some authors have pointed out, in some cases, accessibility is more sensitive to individual activity patterns than to aggregate land-use components of areas unit of analysis (Miller, 2005; Kwan, 1998). Finally, de Montis, Caschili and Chessa (2011) analyse commuting accessibility in the municipalities of Sardinia, in Italy. They calculate two commuter accessibility indicators which are constructed according to two different approaches based, respectively, on a travel cost and a spatial interaction model with an impedance function calibrated in both exponential and power form. They conclude that the travel-cost-based accessibility indicator has a municipal spatial distribution strongly influenced by the transport system.

3. **Steve Abley and Derek Halden, "The New Zealand accessibility analysis methodology", NZ Transport Agency research report 512, 2013, pp. 1-40.**

This research considers land use and transport accessibility drawing on international practice from the UK, Europe, USA and Australia. An objective of the research was to define accessibility and propose a methodology for how accessibility could be measured and quantified in New Zealand, both at a neighbourhood or a wider area such as a suburb, city or region. The result of the research was an understanding of other countries' experiences developing and setting accessibility policy and the success of those approaches. A second result of the research was the development of a new methodology for calculating accessibility that draws on overseas and improved practice. Accessibility indicators need to include expressed, social, stated and show comparative need. Different indicators will be practical at national and local levels. A national New Zealand approach could include defining a set of destinations for which accessibility measurements are needed and then calculate the travel time from each house address point to the nearest destination of that type using defined modes and combinations of modes. Management and audit frameworks should be clarified to ensure the analysis requirements directly support the administrative structures.

4. **Sama'ila Saleh, "Geographical Information System (GIS) as a Tool for Urban Traffic Network Analysis (A Case Study of Federal Capital City, Abuja)", Journal of Traffic and Logistics Engineering, Vol, 1, No. 1, June 2013.**

GIS is a natural tool for handling most of these data as it can ease the work process and improve the quality control. The research used ArcInfo to carry out urban traffic network analysis of Abuja, the Federal Capital City of Nigeria. The research covers the following tasks: Choosing and developing the source workspace, identifying the sources and the role they will play in the network, modeling the connectivity, defining attributes and determining their values. In addition, it also highlighted the following analyses: finding the best route, finding the closest facility, finding the service area and creating the O-D cost matrix. The aim of this research is to develop a GIS-base urban traffic network analysis of Abuja, the Federal Capital City of Nigeria. The primary data source involves direct collection of information on the field, using GPS (Global Positioning System), oral interview and observations. The database was then structured in a format for implementation in a software environment, using the application of Arc GIS 9.3 for digitizing the topographical map and the images. The analyses will ease decision making processes significantly by providing useful information to the motorists, other road users, government, transport operators, other stake holder of transports and the entire general public.

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