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Suitability Analysis of Residential Location Choice Behavior for West Zone in Surat City

Yash Jariwala[1]

[1]*Student, Master of Town and Country Planning, Sarvajanik College of Engineering and Technology, Surat*

Abstract - *Urban growth inevitably decreases the sustainability of land use and the ecosystem. Thus, in any metropolitan territory, the residential location is a fundamental piece of urban planning. Residential location choice of households is core agents in the urban dynamic system. Determination of Residential area is an exceptionally intricate nature of every household of an urban area. Studies of residential location choice show that many factors contribute to the choice of a given location likes the characteristics of the housing unit, its location with respect to social and environmental amenities as well as access to jobs, services and other economic opportunities. Area decision change with city to city contingent upon above expressed variables and city qualities.*

This study aims to analyses the residential choice behavior of residents of west zone of Surat city. A questionnaire is designed considering various factors like environment, infrastructure facilities, cost, amenities, and work place location. Initially a pilot survey was conducted to finalize the revised draft of questionnaire. The residents were divided in various income groups. The study area is a quickly developing neighbourhood on the west side of the city. The land prices are also soaring, indicating its attraction attributes. For analysis of location choice Ranking and Weightage approach of multi criteria decision making is used.

Keywords: Urban growth, Residential location, Income groups, West zone, Surat city, multi criteria decision making.

1. INTRODUCTION

The single most valuable asset of an individual household is housing. One of the driving forces of urban dynamics is residential household placement. Jobs, economic growth, social structure, spatial segregation and the transport system are impacted by this. Housing is a long-term avenue for savings and is the principal investment of money and lifetime achievement of individuals. For human beings, housing is not only an important property, but it is also necessary for comfortable living.

A high-involvement acquisition is the purchase of a residential property and the buyer goes through a complicated decision-making process for the purchase. The buyer goes for comprehensive knowledge search from multiple sources in a complex purchasing decision-making, and almost all family members participate in purchasing decisions and the time taken for final decision-making is also high. One's own house is a crucial human need.

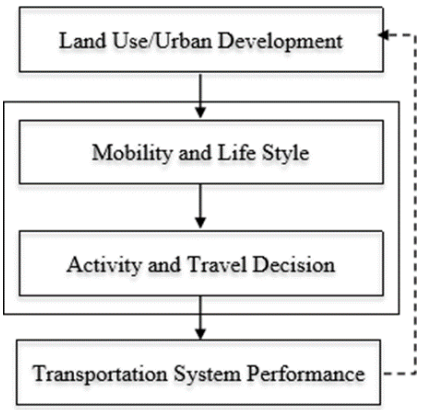

Fig -1: Urban system modelling framework

The factors influencing buyer behavior in relation to residential property are now very important to research. It will enable developers of residential properties to meet the needs of residential real estate customers. In real-estate goods, there is a high acceptance of the need to research customer behavior. It is necessary to consider the purchasing decision-making process, as the demand determines the value of the residential property.

Aim: To perform to analyze suitable locations for Residential Land Parcel for selected of West zone of Surat City using AHP tool.

2. STUDY AREA

Surat is a city located on the western part of India in the state of Gujarat. It is one of the most dynamic cities of India with one of the fastest growth rates due to immigration from various part of Gujarat and other states of India.

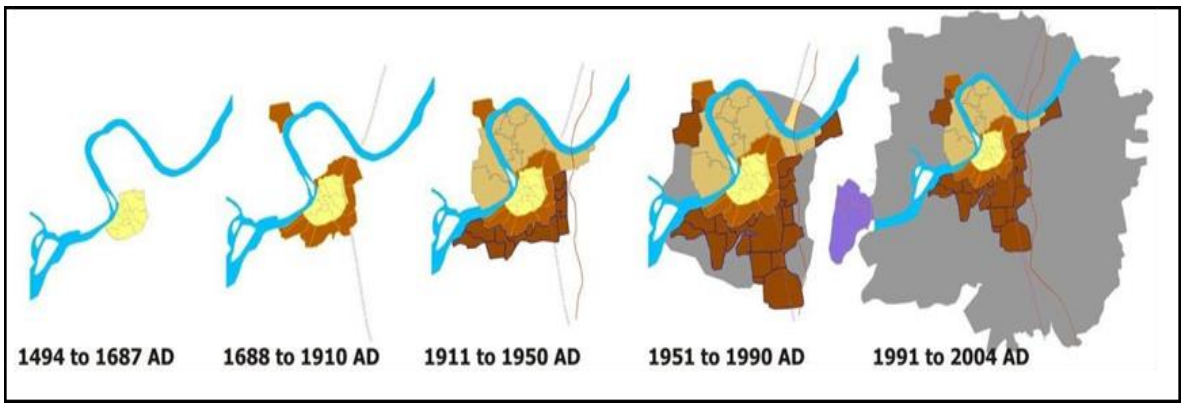

Fig -2: Evolution of Surat city
(Source: History, Surat Municipal Corporation)

2.1. Location of Study Area

Surat city is situated at latitude 21o12' N and longitude 72 o 52'E on bank of river Tapi having coastline of Arabian Sea on its West. It is 13m above mean sea level. It is located in well-developed south Gujarat region.

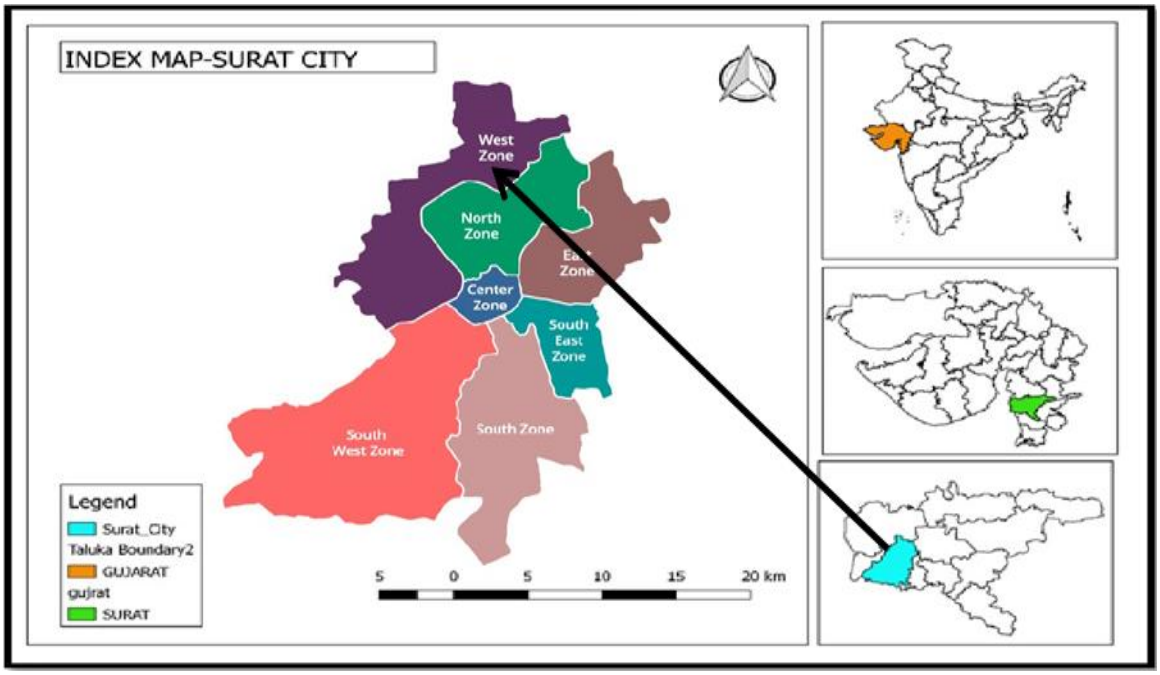

Fig -3: Location of Surat City

An official demographic data of Surat city are taken. Total Estimated population up to 2041 is shown in above table.

Table 1: Population Estimate of Surat City

Year	1991	2001	2011	2021	2031	2041
Population	14,98,817	24,33,835	44,66,826	59,50,831	74,34,835	89,18,840

(Source: Mid-year Population Estimates, SMC)

No.	**Zone**	**Area (Sq. km)**	**Population**	
			2001	**2011**
1	Central	8.18	4,13,641	4,08,760
2	South West	111.912	2,42,466	3,47,447
3	South	61.764	4,07,980	6,95,028
4	South East	19.492	3,97,257	7,48,304
5	East	37.525	7,11,516	11,37,138
6	North	36.363	4,16,370	7,05,163
7	**West**	**51.279**	**2,87,144**	**4,24,986**

(Source: Mid-year Population Estimates, SMC)

3. METHOD OF ANALYSIS: ANALYTIC HIERARCHY PROCESS (AHP)

An The Analytic Hierarchy Process (AHP) is a method for organizing and analyzing complex decisions, using math and psychology.

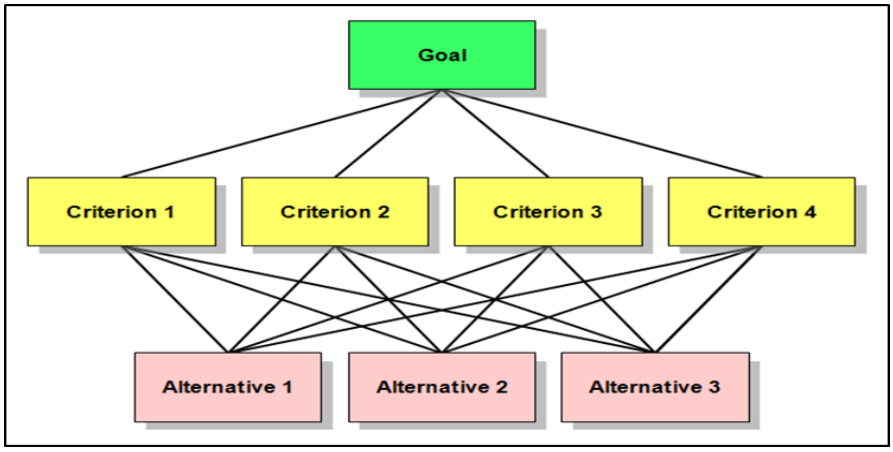

Fig -4: Analytic Hierarchy Process (AHP)

It was developed by Thomas L. Saaty in the 1970s and has been refined since then. It contains three parts: the ultimate goal or problem you're trying to solve, all of the possible solutions, called alternatives, and the criteria you will judge the alternatives on. AHP provides a rational framework for a needed decision by quantifying its criteria and alternative options, and for relating

those elements to the overall goal. Stakeholders compare the importance of criteria, two at a time, through pair-wise comparisons. In the final step of the process, numerical priorities are calculated for each of the alternative options. These numbers represent the most desired solutions, based on all users' values.

4. DATA COLLECTION

There are different types of surveys that are carried out to determine two primary components of the conduct of residential location choice. The first is known through the inventory search and the second is through the field survey.

4.1. Inventory Studies

The inventory data of west zone is collected from various recourses as listed below.

1. Surat Municipal Corporation (SMC)
2. Surat Urban Development Authority (SUDA)
3. Website of census of India
4. Population details urbanization data and other relevant data

4.2. Total Wards and Town Planning Schemes of West Zone, Surat City

Table 3: Total Wards and Town Planning Schemes

Sr. No	Wards	Town Planning Scheme	Status
1	69 Variav	T.P. Scheme 83 (Variav – Kosad)	**Draft**
		T.P. Scheme 66 (Kosad – Variav	**Draft**
		T.P. Scheme 37 (Variav)	Sanctioned Final
		T.P. Scheme 38 (Variav)	**Draft**
		T.P. Scheme 36 (Variav)	Sanctioned Final
		T.P. Scheme 39 (Variav)	**Draft**
2	63 Jahangirabad	T.P. Scheme 42 (Jahangirabad)	**Draft**
		T.P. Scheme 43 (Jahangirabad)	**Draft**
		T.P. Scheme 44 (Jahangirabad)	**Draft**
3	67 Pal	T.P. Scheme 16 (Pal)	Sanctioned Final
		T.P. Scheme 74(Pal)	Draft
		T.P. Scheme 10 (Pal)	Sanctioned Final
		T.P. Scheme 14 (Pal)	Sanctioned Final
		T.P. Scheme 15 (Pal)	**Draft**
4	68 Palanpore	T.P. Scheme 9 (Palanpore – Bhesan)	Sanctioned Final

		T.P. Scheme 8 (Palanpore)	Sanctioned Preliminary
		T.P. Scheme 10 (Pal)	Sanctioned Final
5	25 Rander	T.P. Scheme 29 (Rander)	Sanctioned Preliminary
6	26 Rander	T.P. Scheme 23 (Rander)	Sanctioned Final
		T.P. Scheme 14 (Rander - Adajan)	Sanctioned Final
		T.P. Scheme 30 (Rander)	Sanctioned Final
7	27 Adajan	T.P. Scheme 31 (Rander)	Sanctioned Final
		T.P. Scheme 32 (Rander)	Sanctioned Final
		T.P. Scheme 10 (Rander)	Sanctioned Final
		T.P. Scheme 12 (Rander)	Sanctioned Final
		T.P. Scheme 11 (Rander)	Sanctioned Final
		T.P. Scheme 13 (Rander)	Sanctioned Final
8	64 Jahangirpura	T.P. Scheme 13 (Jahangirpura)	**Draft**
9	65 Pisad	T.P. Scheme 45 (Jahangirpura - Pisad)	Sanctioned Final

(Source: Town Planning Department, SMC (2020))

4.3. Population Projection

Unlike the component method, mathematical methods are with a simpler base to project population size on the basis of past growth. These methods are usually less reliable than component method. Mathematical methods are used in situations when only limited data on population size is available for the past periods. Different types are Arithmetical Increase Method (AIM), Geometrical Increase Method (or Geometrical progression method) (GIM), Incremental Increase Method (IIM), Graphical Method, Comparative graphical method, Master Plan Method, Logistic Curve Method.

1) Arithmetical Increase Method (AIM)

This method is suitable for large and old city with considerable development. If it is used for small, average or comparatively new cities, it will give low result than actual value. In this method the average increase in population per decade is calculated from the past census reports. This increase is added to the present population to find out the population of the next decade. Thus, it is assumed that the population is increasing at constant rate.

Hence, dip/dt = C i.e. rate of change of population with respect to time is constant. Therefore, Population after nth decade will be $P_n = P + n.C$

Where, P_n is the population after n decade and P is present population.

2) Incremental Increase Method (IIM)

This method is modification of arithmetical increase method and it is suitable for an average size town under normal condition where the growth rate is found to be in increasing order. While adopting this method the increase in increment is considered for calculating future population. The incremental increase is determined for each decade from the past population and the average value is added to the present population along with the average rate of increase.

Hence, population after nth decade is $P_n = P + n.X + \{n (n+1)/2\}.Y$

Where, P_n = Population after nth decade

X = Average increase

Y = Incremental increase

Past Development Plans of Surat suggest that projection of Surat is prepared using either the AIM or IIM. Here, the average projection of both methods is used for forecasting population of ward and west zone. There is 24.28%, 46.65% and 47.51% population increase in 2021, 2031 and 2041 respectively.

Table 4: Population projection

No	Ward	2001	2011	Average of AIM & IIM		
				2021	2031	2041
1	Rander	86,047	1,14,632	1,43,218	1,72,846	2,03,518
2	Adajan	1,52,274	1,96,970	2,41,666	3,63,883	2,63,621
3	Jahangirabad	9,288	27,813	46,338	71,146	1,02,237
4	Jahangirpura	1,120	2,165	3,210	4,731	6,728
5	Pal	11,165	36,107	61,049	95,109	1,37,787
6	Palanpor	11,496	23,514	35,532	48,667	62,919
7	Vriyav	14,003	19,728	25,453	31,287	20,779
8	Pisad	1,751	4,057	4,863	9,068.5	12,174
	West zone	2,87,144	4,24,986	**5,61,329**	**7,96,738**	**8,09,763**

AIM - Arithmetical Increase Method

IIM - Incremental Increase Method

4.4. Details of Main factors & Sub parameters Residential Location Choice

Table 5: Main factors & Sub parameters

MAIN CRITERIA	SUB CRITERIA
Environmental parameters	Pollution
	Gardens
	Open space
Infrastructural Facilities	Water quality
	Sewerage collection
	Solid waste collection
	Strom water discharge
Amenities	Health facilities
	Market facilities
	Educational facilities
	Social security
	Entertainment facilities
Cost of home/ property	
Transportation connectivity to work place	

5. RECOMMENDATION

- This type of exercise can be performed for the different zones or whole of Surat city.
- It can help to perform better planning practice considering the Residential spaces within the urban pockets.
- The integrated method of GIS Based AHP can be used to find Suitable locations

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