Urban data application towards quality of life optimization in Indian cities

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Abstract. The study aims to explore the dynamics of neighbourhood quality of life in urban residential neighbourhoods in Indian cities. Large scale urban data on various facets of neighbourhood become major stakeholders in such an analysis. The study utilizes data on prioritization of neighbourhood attributes for establishing a framework for optimization of neighborhood Quality of life. Qualitative research tools such as literature review and analysis is utilized initially to establish a theoretical framework for evaluation of quality of life at the neighbourhood level. A major chunk of the study relies on empirical studies with primary data collection to construct an empirical framework in conjunction with the theoretical base established earlier using SPSS software and Microsoft Excel for data visualization and analysis. Artificial neural networks analysis is used to decode the multivariate data and establish a predictive model towards neighbourhood quality of life. Grassroots level urban planning can be institutionalized using the framework along with crowd sourced data on resident's perception of their neighbourhoods.

Keywords: Quality of life, urban planning, artificial neural networks analysis

1. Quality of life in urban environments

According to the World Health Organization, Quality of Life(QoL) is defined as "an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns." WHO's conceptualization of Quality of life comes across as a broad ranging concept bearing complex relationships with the person's physical health, psychological state, personal beliefs, social relationships and their interactions with salient features of their environment. Research literature acknowledges that neighbourhoods are acceptable unit of analysis to efficiently measure the local conditions that impact various domains of human life. (Bardhan R 2011, Sawicki and Flynn 1996, Greenberg ,1999 and Meersman 2005). The neighbourhood is the building block of the city and can become the springing point for initiatives towards a bottom up approach in urban planning. In pragmatic terms, most urban planning schemes can at

best aspire for improvements at neighbourhood level to achieve a cumulative impact at the city level. Furthermore, opportunities to design cities from scratch are limited and it is improvement of existing cities through neighbourhood planning that becomes the primary task of the urban planner.

From a planning perspective, a neighbourhood can be defined as a composition of people, place and identity. Consequently, Quality of life for the neighbourhood should be composed of people's preferences, physical attributes which contribute to the place and community attributes which define the neighborhood's identity. There is a clear research gap when it comes to the scale, context and conceptual expanse of the concept quality of life when applied to urban residential neighbourhoods of a thriving Indian city. Research literature appears to be severely conflicted when it comes to a comprehensive formulation of the concept of quality of life at the neighbourhood level. Most studies present a piecemeal view whereby they cover only one aspect of the people-place-identity triad. Most importantly, we find that the indicators used in these studies can be best evaluated at the city level and efforts to measure them at the neighbourhood scale may often give inconclusive results. Lastly, most of the studies originate in the global north where the socio cultural and urban form constraints are vastly different from the global south. It will perhaps be erroneous to apply the same in the context of dense, bustling neighbourhoods in Indian cities.

Urban Planning literature has abundant references to terms like Urban Quality of life, Liveability, area attractiveness, Social sustainability, neighborhood satisfaction. Each term in its own way tries to measure the desirability of living conditions in a given area. The variables included within each concept differ with the scope and the overall bent of the study.

1.1 Review of literature on Quality of life in urban environments

Mulligan, Carruthers (2005) define QoL as the satisfaction that a person receives from surrounding human and physical conditions which are scale-dependent and can affect the behavior of individual people, groups such as households and economic units such as firms. Marans, Stimson (2011) stress upon the importance of QoL in estimating life satisfaction and happiness for individuals as well as communities. The broad based nature of QoL was further summed up by El Din, Serag, et al. (2013) where they termed QoL as a multi-dimensional, ambiguous, complex concept, represented by a reticular relationship between various dimensions. Man being a social animal, social Urban Quality of life is possibly the most direct translation of day to day life and user satisfaction in a residential area. This concept is often termed as social sustainability and is used interchangeably with the term social quality of life. Dempsey, Brown, Bramley (2012), Bramley, Power (2009) underline that concepts at the core of social sustainability are social equity issues (access to services, facilities, and opportunities) and issues to do with the sustainability of community itself. Satu, Shammi Akter (2014) defines liveability as a concept that points towards issues of quality of life that are important to the long-term well-being of people and communi-

ties. The term encompasses issues such as environmental quality, safety, health, affordability, neighborliness, convenience, and the presence of neighborhood facilities such as parks, open space, sidewalks, provisions stores and restaurants. Hence, it may be understood that Livability is directly related to the characteristics or quality of a place that individuals and communities enjoy.

1.1.1 Review of Indices and Indicators used for evaluation of quality of life

A review of literature related to the above three concepts suggest that though similar in overall intent there are significant differences between the concepts. While QoL is a broad based, multi dimensional concept, it is not necessarily place based. Liveability, on the other hand is an entirely place based concept which is usually employed for large urban areas. Liveability takes into account a large number of diverse indicators many of which may be slightly beyond the realm of urban planning itself. Social sustainability appears to be a community based concept which looks at both physical as well as social components of community life. A large number of diverse indicators have been suggested for measuring social sustainability and liveability in research literature.

1.1.2 Review of Methods to measure quality of life

There is an equal amount of confusion and contradictions when it comes to quantitative measurement of QoL and its allied concepts. The following table highlights some of the main methods specified in literature to quantify these concepts. The indicator approach seems to be the most popular amongst researchers where the broader concept is broken down into a series of quantifiable indicators (Marans S, 2011, Andelman r et al, 1998, Burnell & Galster, 1992).

Table 1: Methods of measuring Quality of life from review of literature

Burnell & Galster(1992)- Liveability comparisons versus market/resident approach	
The liveability comparisons approach which focuses on comparing different urban areas according to a number of objective indicators assumed to reflect quality of life. Ad hoc weighting schemes were employed.	The market/resident approach in which housing price and/or wage differentials are theorized to compensate for quality-of-life differences between urban areas. Theoretical weighting based on resident's preferences were used.
Andelman et al. (1998)- Objective versus subjective approach	
The objective approach which is most typically confined to the analysis and reporting of secondary data – usually aggregate data at different geographic or spatial scales – that are available mainly	The subjective approach which is specifically designed to collect primary data at the disaggregate or individual level using social survey methods where the focus is on the peoples' be-

from official governmental data collections, including the census. This is an approach that is often associated with social indicators research.	haviors and assessments, or evaluations of aspects of QOL.
Marans, Stimson (2011)- Indicator based versus modeling approach	
Monitoring QOL/QOUL through a set of indicators –usually over time – derived from aggregated spatial data using official sources, such as the census, that are said to be related to perceived QOL	Modeling relationships between characteristics of the urban environment and measures of peoples' subjective assessments of QOL domains, including their satisfaction with specific phenomena and with life as a whole. This approach typically involves data collected through survey research methods and analyzed using techniques such as regression analysis or structural equation models.
Blečić, Ivan, Talu. (2013)- Countability versus capability approach	
Countability approach: based on inputs or outputs	Capability approach: actual possibility every person has to 'use' the city.

1.2 Linking neighbourhood attributes to quality of life

Several researchers have tried to assess the quality of life offered by urban residential neighbourhoods. Research literature suggests that the neighbourhood attributes that ascertain preference for one neighborhood above other branch out into distinct categories. Social features such as community satisfaction (Sirgy,M J & Cornwell T,2002) and social integration (Connerly, CE & Marans, R W, 1985) are seen to be important for assessing the quality of the neighborhood. In addition, several studies emphasize on the role of accessibility factors (Jun H.J. & Morrow-Jones, H A, 2011) in determining neighborhood QoL and residential location choice.

The multitudes of attributes which determine the character of a neighbourhood have been well documented in literature. Galster, G. (2001) portrays a neighbourhood as a bundle of spatially based attributes associated with clusters of residences, sometimes in conjunction with other land uses.

Table **2**. Spatially based attributes of a neighbourhood. SOURCE: Galster, G. (2001)

Spatially based attributes of a neighbourhood	
Structural characteristics	Type, scale, materials, design, state of repair, density, landscaping, etc. in the neighbourhood
Infrastructural characteristics	Roads, sidewalks, streetscaping, utility services, etc.
Demographic	Age distribution, family composition, racial, ethnic, and

characteristics	religious types, etc. Of the resident population:
Class status characteristics	Income, occupation and education composition of the resident population
Tax/public service package characteristics	The quality of safety forces, public schools, public administration, parks and recreation, etc., in relation to the local taxes assessed
Environmental characteristics	Degree of land, air, water and noise pollution, topographical features, views, etc.
Proximity characteristics	Access to major destinations of employment, entertainment, shopping, etc., as influenced by both distance and transport infrastructure.
Political characteristics	The degree to which local political networks are mobilised, residents exert influence in local affairs through spatially rooted channels or elected representatives
Social-interactive characteristics	Local friend and kin networks, degree of inter household familiarity, type and quality of interpersonal associations, residents' perceived commonality, participation in locally based voluntary associations, strength of socialisation and social control forces, etc.
Sentimental characteristics	Residents' sense of identification with place, historical significance of buildings or district, etc.

With the exception of demographic, class status and political and sentimental characteristics, all other categories in the table shown above, fall into the realm of Urban Planning. However, when viewed at the neighbourhood scale we find that Environmental and Proximity characteristics are inconclusive since these are macro operators which depend on city scale and structure. Of the remaining characteristics, Infrastructural and Tax/public service (to a large extent) characteristics are mostly dependent on the whims of the government, often constrained by monetary considerations in the Indian scenario even though ideally they should be under control of the urban planner. Overall, the structural, socio interactive and infrastructural characteristics continue to be the areas of intervention from the point of view of urban planning in the context of existing urban residential neighbourhoods. An assessment of quality of life at the neighbourhood level necessitates an investigation of the above attributes along with their components and sub components.

Table **3**. Neighbourhood attributes selected for study. SOURCE-author

	Neighbourhood attributes	**Components**	**Sub components**
1	Structural characteristics	Housing characteristics	Condition of census houses used as residence, Predominant material of the roof, wall and floor, Type of structure of census houses, Number of dwelling rooms , Occupancy rate,

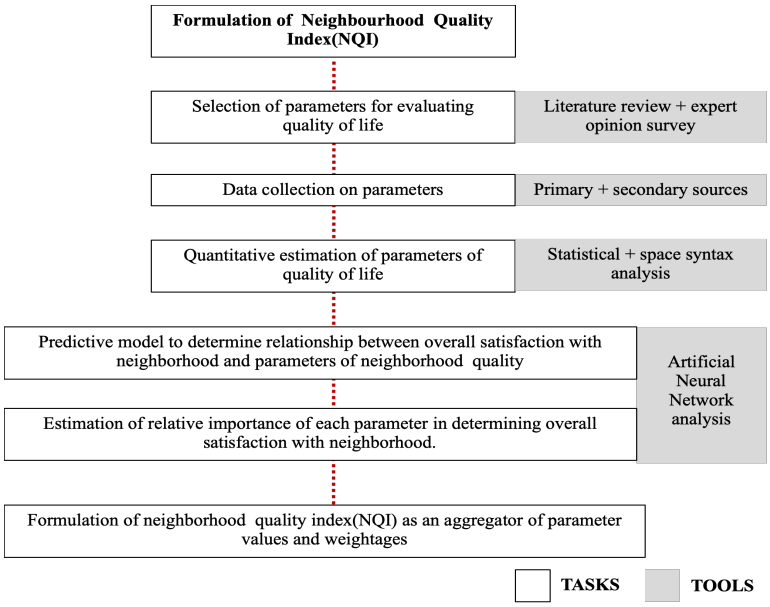
			dwelling unit size etc.
			Housing typology
		Urban form	Spatial character
			Density
			Development controls
			Visual character
2	Infrastructural characteristics	Physical infrastructure	Roads, water supply, drainage, sewage systems, solid waste management systems, public transit stops etc.
		Social Infrastructure	Parks, Playgrounds, schools, health facilities, small retail, chemist shop etc.
3	Socio Interactive characteristics	Place based	Quality and quantity of public space
		People based	Community interaction

2. Neighbourhood quality of life- establishing a theoretical framework for evaluation

A glance at the neighbourhood attributes and their multiple relationships with quality of life in the neighbourhood shows that there is a need for a clear empirical framework to evaluate QoL. Though we cannot undermine the impact of qualitative attributes, it is the quantitative attributes which can be directly included in the master planning process. It is clear from the review of literature that Housing characteristics, spatial character, Density, development controls; Infrastructural characteristics and socio interactive characteristics are necessary ingredients in formulation of any framework to evaluate QoL at the neighbourhood level. Density appears to be a dominant factor and though it has clear links with QoL, the exact nature of the relationship (whether positive or negative) is inconclusive in literature. Density also finds itself as a backdrop for most QoL studies because it is in stressed conditions that QoL studies find their real relevance. The findings suggest that perhaps High density environments would be the best context to carry out Quality of life studies in the urban setting. Visual character and housing typology are often the perceptual and physical manifestations of density. Hence these can also be treated as context for carrying out QoL studies. Of the remaining attributes, the infrastructural (social) and socio interactive attributes need a tool for empirical evaluation and quantification. Overall we can conclude that, Quality of life at the neighborhood level may be expressed as an aggregate of the impact of structural, infrastructural (social) and socio interactive characteristics. Overall satisfaction with the neighbourhood as reported by the residents may be treated as a surrogate for the overall quality of life offered by the neighbourhood.

Neighbourhood Quality of life	=	**Structural Characteristics**			+	**Infrastructural Characteristics**		+	**Socio Interactive Characteristics**	
In High density environments categorized by specific visual character and typology		Housing Characteristics	Typology	Urban Form		Social	Physical		People based	Place Based
		✓	-	✓		✓	-		✓	✓
		Structural Quality of Life				Social Quality of Life				

Fig 1. Method and Tools employed for Formulation of NQI. SOURCE: Author



Bringing back our initial conceptualization of neighbourhood quality in terms of people, place and identity, we find that spatial character and development control impacts give a true representation of the *place*. The *identity/community* aspect is more or less revealed in the socio interactive characteristics and the access to social infrastructure. An examination of most of these attributes from the resident's opinion facilitates the fulfilment of the *people* aspect. Most of the studies in literature attempt to visualize neighbourhood quality of life using either one or two of the people-place-identity triad. An attempt at consolidating all the attributes mentioned above into an empirical framework can be a significant contribution of this study.

2.1 Neighbourhood Quality Index

Neighbourhood Quality Index is proposed as a composite index that aggregates the structural, social infrastructural and socio interactive characteristics of the neighbourhood.

Neighbourhood Quality Index= $\sum$ (Pi X Wi).....Eq. 4.1

Where, Pi- Normalized value of neighbourhood quality parameter

Wi- Normalized weightage of neighbourhood Quality parameters based on its relative contribution towards overall satisfaction with neighbourhood.

The following indicators were identified for evaluating neighbourhood social quality after review of literature-

Table 4. List of neighbourhood attributes and their indicators. SOURCE Author

Neighbourhood attribute	**Indicator for social quality of life**	**Units**
Diversity in housing choice	Mix of available housing types	%
	Perceived satisfaction with living space within DU	Yes/no
Occupancy/ Amount of living space	Avg. Floor area(Sq.m) per person	Average BUA(sq.m) and HH size(no of ppl)
Housing quality	Age and quality	No of years
Access to natural light & ventilation	Average plot size or DU size(Sq.m)	Sq.m/person
	Average ground coverage of buildings (%)	%
	Average height of building	No of storeys
	Average setback	Meters
Architectural diversity	Variety of architectural styles	
Safe, comfortable, interesting streets and squares for the pedestrian.	Street pattern, connectivity, integration	
Mixed use		
Neighbourhood as a place to live in	Perceived satisfaction with neighborhood	Rating by residents
	Perceived reputation of neighborhood	Rating by residents
	Perception of convenience in the neighborhood	Rating by residents
	Perception of area attractiveness	Rating by residents
	Tenure type	Rented/owned/govt

Crowding	Footfall at public places	No. Of people/ Sq.m
	Perception of crowding	Yes/no or rating
Social Diversity	Income groups mix	% of HIG, MIG, LIG, EWS
Access to education	No of primary schools in neighborhood	No.
	Travel distance to nearest primary school	Minutes
Access to health care	Travel time to health care/ chemist shop	Minutes
Access to play space	No of playgrounds	No.
	No of parks	No.
	Area of play spaces and quality	Sq.m/person
	Travel time to nearest play space	Minutes
	Private open space within home	Yes/no
Access to shopping	Travel time to nearest small retail	Minutes
Access to Public transit	Travel time to transit stops(bus/ metro)	Minutes
	Frequency of use of public transit	Frequency
Preserving and facilitating social network	No of social contacts in the neighborhood	No.
Sense of belongings on community / stability	No of years of living in the neighborhood	No. of years
	Participation in community activities in past year	Yes/no
	Desire to move out of the neighborhood	Yes/no
Amount of neighbouring	Frequency of meeting neighbours	Frequency
Safety and security	Vandalism/ theft cases in the locality	No. of cases/year
	No of accidents in the locality	No.of cases/year
	Perceived safety within neighborhood- day/ night	Rating by residents

2.1.1 Selection of Indicators for NQI

These indicators formed the basis for preparation of structured questionnaires for an expert opinion survey (EOS). The EOS questionnaire asked the experts to rate the listed given indicators on a scale of 1 to 5 based on the importance of the given indicator in determining the social quality of an urban residential neighborhood. A total of 52 surveys were conducted each with ratings for a set of 38 indicators. In order to make the sample variable ratio more focused for further analysis, an initial screening of the indicators was carried out on the basis of mean values of importance ratings as

given by the experts. Indicators which scored less than 3.5 as mean importance rating were removed from the matrix put forward for further analysis. Furthermore indicators related to travel times to social infrastructure were excluded in favor of indicators which judged the qualitative aspects of the social infrastructure.

Four High density neighbourhoods in Bangalore namely Mattikere, Mahalakshmipuram, Gurappanapalya and Kammanahalli were selected as case study areas for data collection regarding the individual indicators. These 4 neighbourhoods have several common characteristics in terms of homogeneity in population density, area, plotted development(non slum) and primarily residential landuse. A reconnaissance survey during the initial stages of the research had shown that despite their commonalities the neighbourhoods offered varying quality of life to its residents. A total of 270 household surveys were conducted using random sampling to collect data regarding the shortlisted neighbourhood attributes. The final data set with 8 indicators (52 X 8=416 data points) was further put through SPSS for statistical data reduction through factor analysis.

Fig 2. Factor Analysis results generated in SPSS

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.550
Bartlett's Test of Sphericity	Approx. Chi-Square	126.650
	df	28
	Sig.	.000

Rotated Component Matrix

	Component		
	1	2	3
VAR00001			.922
VAR00010	.922		
VAR00011			.878
VAR00015		.653	
VAR00016	-.485		
VAR00017		.824	
VAR00018	.896		
VAR00020		.757	

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
Rotation converged in 4 iterations.

Total Variance Explained

Component	Initial Eigen values			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.552	31.903	31.903	2.552	31.903	31.903	2.005	25.061	25.061
2	1.669	20.860	52.763	1.669	20.860	52.763	1.785	22.310	47.371
3	1.348	16.849	69.612	1.348	16.849	69.612	1.779	22.242	69.612
4	.816	10.206	79.818						
5	.644	8.052	87.870						
6	.554	6.927	94.797						
7	.250	3.127	97.924						
8	.166	2.076	100.000						

Extraction Method: Principal Component Analysis.

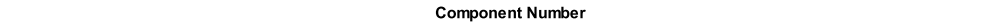


Figure 3. Scree plot showing factors generated in SPSS

SPSS was used to generate a correlation matrix where it was seen that several correlations in the matrix were above the minimal thumb rule value of ±0.3 and above. The results of KMO and Bartlett test for sampling adequacy revealed a KMO measure of 0.55 and significance <0.05 which verified the adequacy of the data for proceeding with factor analysis (William B, Onsman & Brown, T, 2010). Factor analysis was further carried out using the principal components analysis method.

Table 5. Rotated component Matrix generated in SPSS. SOURCE- Author

Rotated Component Matrix				
		Component		
		1	2	3
Street pattern	VAR00001			.922
Access to play spaces	VAR00010	.922		
Built open relationship	VAR00011			.878
No of social contacts in the area	VAR00015		.653	
Average floor area per person	VAR00016	-.485		
% Of mixed use	VAR00017		.824	
Neighborhood as a place to live in	VAR00018	.896		
Participation in community activities	VAR00020		.757	

Table 6. Neighbourhood quality parameters generated through factor analysis

Factor 1	Factor 2	Factor 3
Access to space	**Community linkage**	**Urban form**
Access to play spaces	No of social contacts in the area	Street pattern
Living space (Average floor area per person)	Participation in community activities	Built open relationship(Average ground coverage)
Neighborhood as a place to live in	% of Mixed use	

The analysis revealed that a total of 3 factors (components) account for around 69.612% of variance in the data. The above factor analysis gave us the indicators which are deemed necessary for defining neighborhood quality. Based on the authors' understanding each of the factors has been allocated a name viz. Access to Space, Community Linkage, Urban Form. To reduce the multitudes of components into a list of prioritized components and allocate weightages to each component, the procedure shown in Table 8 has been followed. The structural validity for the index has been further reinforced on the basis of artificial neural networks based modeling.

2.1.2 Artificial Neural networks analysis

A neural network is a powerful computational data model that is able to capture and represent complex input/output relationships. The motivation for the development of neural network technology stemmed from the desire to develop an artificial system that could perform "intelligent" tasks similar to those performed by the human brain such as:

1. A neural network acquires knowledge through learning.
2. A neural network's knowledge is stored within inter-neuron connection strengths known as synaptic weights.

The true power and advantage of neural networks lies in their ability to represent both linear and non-linear relationships and in their ability to learn these relationships directly from the data being modeled. The most common neural network model is the Multilayer Perceptron (MLP). This type of neural network is known as a supervised network because it requires a desired output in order to learn. The goal of this type of network is to create a model that correctly maps the input to the output using historical data so that the model can then be used to produce the output when the desired output is unknown.

Artificial Neural networks analysis has been used to generate a Predictive model that determines the relationship between overall satisfaction with neighborhood and parameters of neighborhood quality. The ANN analysis also helps in Estimation of relative importance of each parameter in determining overall satisfaction with neighborhood.

2.2 Predictive modeling of overall satisfaction with neighborhood and parameters of neighborhood quality

The neighbourhood quality parameters selected through statistical analysis on expert opinion survey data manifest themselves in the neighbourhood in form of overall satisfaction with the neighbourhood. The parameters selected are a hybrid mix of physical and social components of neighbourhood quality of life. In order to assess the selected parameters and their relative contribution towards overall satisfaction drawn from the neighbourhood we need to carry out multivariate analysis and data modeling. The model proposes that *Overall satisfaction with neighbourhood is a function of the neighbourhood quality parameters*. Here, the Dependent variable is Overall satisfaction with neighbourhood derived from household survey data. Neighbourhood quality parameters from Household survey data constitute the Independent variables. A 3-layer feed forward Artificial Neural networks analysis employed to verify the validity of the proposed model. The ANN analysis studies the underlying data structure and derives the structural relationship for use in predictive modeling. A total of 239 x 7=1673 data points were input the neighbourhood quality parameters. The ANN analysis is a two stage analysis where it was reported that the model was able to predict with an accuracy of 84.8% in the training phase. In the testing phase, the model achieved an accuracy of prediction amounting to 76.7%. The ANN analysis also generates normalized importance for the independent parameters based on their relative contribution towards the Dependent variable. These values may be used as weightages for formation of Neighbourhood Quality Index.

Table 7. ANN Analysis Results generated in SPSS

Case Processing Summary						
		N	Percent		Cross Entropy Error	79.590
Sample	Training	164	69.2%	Training	Percent Incorrect Predictions	15.2%
	Testing	73	30.8%		Stopping Rule Used	1 consecutive step(s) with no decrease in error
Valid		237	100.0%		Training Time	0:00:00.106
Excluded		2		Testing	Cross Entropy Error	47.914
Total		239			Percent Incorrect Predictions	23.3%

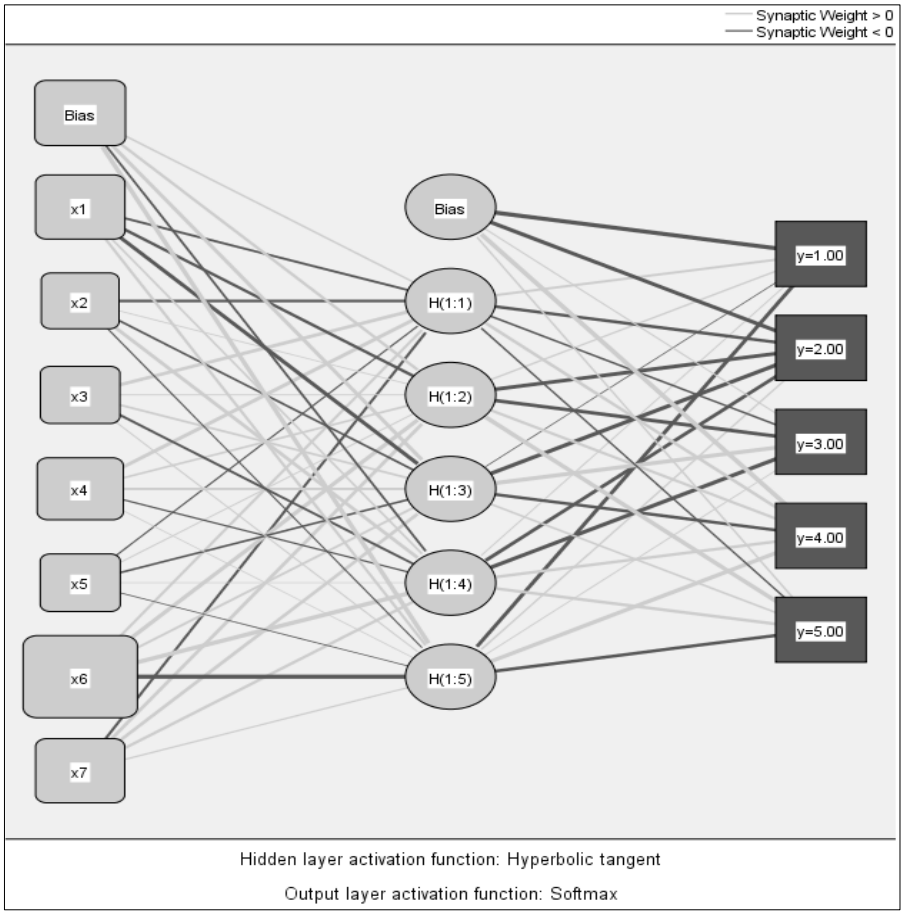


Figure 4. ANN analysis hidden layers generated in SPSS

Table 8. Normalized importance for parameters generated through ANN analysis in SPSS

Independent Variable Importance			Parameters
	Importance	Normalized Importance	
x1	0.152	47.6%	no of social contacts
x2	0.074	23.3%	participation in community activities
x3	0.086	26.9%	access to play spaces
x4	0.130	40.7%	average ground coverage
x5	0.090	28.1%	living space (average floor area per person)
x6	0.319	100.0%	perception of neighborhood convenience
x7	0.151	47.3%	perception of neighborhood attractiveness

Table 9. Weightages of Neighbourhood Quality parameters derived from ANN analysis in SPSS

	Parameter (p_i)	Weightage from ANN (w_i)
P1	No of social contacts	0.152
P2	Participation in community activities	0.074
P3	Access to play spaces	0.086
P4	Average ground coverage	0.130
P5	Living space -average floor area per person	0.090
P6	Perception of neighborhood convenience	0.319
P7	Perception of neighborhood attractiveness	0.151

The study contributes in a twofold way to the knowledge and practice of urban planning. On the theoretical level, the major contributions of the study would be to propose a new paradigm for evaluation of quality of life offered by a neighbourhood in the context of Indian cities. A neighbourhood is composed of people, place and social life within the place. An evaluation of each of these components is necessary in order to present a holistic picture of the quality of life offered by the neighbourhood. The study introduces a new paradigm for the same, namely- Neighbourhood Quality. The concept of neighbourhood quality aims at an empirical formulation of an otherwise subjective concept. The second contribution of the study is towards the practice of urban planning at the neighbourhood as well as city level. Quantification of neighbourhood quality and its various sub components can then be used as a guiding tool towards optimization of quality of life in the city. The urban planning guidelines which emerge out of the study can be active contributors towards ensuring well being and quality of life at the neighbourhood level despite rapid intensification in population and building. The Neighborhood Quality concept described here can become an active tool for micro level planning and allocation of city resources towards targeted development of the disadvantaged neighbourhoods.

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