Research Paper

A Place-Based Analysis of Socio-Spatial Causes of Urban Decline and their Impacts on Residents' Quality of Life

A case of Dighalipukhuri, Guwahati, India

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Abstract

The unprecedented urban growth has resulted in various socio-spatial problems apart from economic and environmental issues that are often evident in the deteriorating physical form of cities. This growing pressure on the spatial environment due to population expansion has significantly reduced the urban quality of life. There often exists a gap in policy interventions as there is a lack of place-based spatio-temporal assessment of underlying factors that govern the urban dynamics in developing nations. Therefore, this research outlines a place-based method for empirically analysing the socio-spatial causes of urban decline and their associated impact on residents' quality of life. Reconnaissance surveys, focus group discussions and expert opinion surveys were conducted and cognitive mapping techniques were used to identify the underlying socio-spatial factors contributing to urban decline and poor residents' quality of life. The research findings suggest that Social Structure has the highest significant role in determining urban decline and residents' quality of life followed by Infrastructure Presence, Morphology, Environmental Quality, Economic Condition, Built Form and Functionality and Service Availability. This research provides a clear directive to urban practitioners as to which factors are to be prioritized in order to uplift the residents' quality of life in blighted areas.

Keywords

Urban Decline, Quality of Life, Fuzzy Cognitive Mapping, Built Form, Morphology

1. Introduction

Over the last few decades, the urban population has increased more than four-fold from 0.8 billion in 1950 to 4.2 billion in 2018 (United Nations, 2018). Urbanization being a highly dynamic process affects the urban residents in unprecedented ways. In light of rapid urbanization, the constantly evolving spatial environment can either uplift or downgrade residents' quality of life (QOL). The third Sustainable Development Goal revolves around this concept of quality of life, which has been defined as a measure of people's happiness (McCall, 1975) and calls for "ensuring healthy lives and promoting well-being for all" (United Nations, 2015). The urban QOL is largely determined by two primary aspects namely, psychological and environmental (Massam, 2002). The psychological aspect considers the emotional and perceptual dimensions of individuals and groups whereas, the environmental aspect focuses on the innate characteristic of the surroundings (Serag El Din *et al.*, 2013). The physical, environmental, social

and economic dimensions have a direct bearing on QOL (Lotfi and Solaimani, 2009). Thus, good neighbourhood planning has the potential of improving the QOL of residents (Pollock and Barry, 2003).

However, the rapid development of cities often hides a multitude of issues like poverty, disorder and decay (Pinto *et al.*, 2021). The urban residents are not unfamiliar with the phenomenon known as "urban decline" which has been defined as "a process that includes population loss" and proliferation of social, economic and environmental issues like unemployment, poverty, deterioration of housing and public infrastructure(Donnelly, 2008). The term is often used synonymously with other terms like "urban decay", "urban blight" and "urban distress". Urban Decline is mostly used in the context of urban planning to indicate real estate properties and neighbourhood areas that have reached a depreciating stage in their functionality and social values beyond which their existing condition, liveability and use are considered unacceptable as per communities' standard (Breger, 1967). Such substandard living conditions often lead to devaluation of degraded properties accompanied by overgrowth, litter, abandoned vehicles on the streets, trash-filled alleys, poor maintenance or absence of street amenities (Haney, 2007). The degraded conditions reduce business investments and increase unemployment, which gives rise to anti-social issues like drugs, human trafficking, diseases etc. It is well understood that the consequences of decline affect the spatial environment as well as the residents' perception of safety, security and sense of belonging and thereby, hinder community interaction and bonding. As QOL concerns both subjective and objective components, urban decline can severely lower urban QOL. Therefore, it is imperative to understand the impact of the urban decline factors on residents' QOL to pave way for concrete actions directed to eliminate its ill effects on the urban environments and its residents.

Although many exhaustive studies have already been conducted on urban decline, yet "there is a general agreement that there is still room for further development in this field" (Faria *et al.*, 2018). This research builds upon the work of Faria *et al.*, 2018 and Lousada *et al.*, 2021 who employed cognitive mapping techniques "to evaluate the quality of life in urban environments" and "elucidate causes of urban blight and obtain more information about the cause-and-effect relationships of these determinants" respectively. However, both of these studies are idiosyncratic and highly contextual and devoid of any real-life case study. To overcome the limitation and enhance the applicability of their model, this research developed a place-based model for empirically analysing the socio-spatial causes of urban decline and highlighted their associated impact on residents' quality of life.

The remainder of the paper has been structured as follows: Section 2 presents a brief overview of the existing literature on QOL and urban decline. Section 3 explains the methodology and site setting for the research followed by section 4 which presents the research result. Section 5 and 6 present the discussion of the research outcome and the final conclusion. The Multi-Dimensional Decision Analysis (MCDA) technique of Fuzzy Cognitive Map have been adopted for this research, which will allow the socio-spatial blight variables to be weighted and structured. For the purpose of this research, we have used the term "urban decline" and "urban blight" interchangeably. This research is a novel attempt to emperically analyse residents' quality of life in blighted areas in the context of Class I[i] city in India.

2. Literature Review

The concept of Quality of Life (QOL) encompasses several perspectives. As mentioned earlier QOL is a multi-dimensional concept that entails both subjective and objective parameters. As such it can both be described using qualitative factors that concern "introspective and personal experience based factors" and/or can be quantified with the help of indicators or direct observations (Das, 2009). Shin (1979) proposed an objective composite index that considered health, income, safety and security, housing,

education, work, leisure and recreation, index of love, freedom and equality as determinants of QOL. It is evident that urban QOL is largely determined by two primary aspects namely, psychological and environmental (Massam, 2002) that revolve around social and physical conditions respectively. It is believed that objective quality of the life highly influences the subjective quality of life (Das, 2009). Population expansion is another vital factor that affects QOL. Thus, it can be understood that the old city areas that often bear the brunt of population expansion have a risk of encountering poor quality of life. Moreover, the old city areas often show signs of urban blight owing to ageing buildings and dilapidated living conditions.

The term "Urban blight" was coined by Darling in 1943 who described it as an area of inadequate and substandard housing with an insufficient amount of open space, light or air (Lousada *et al.*, 2021). Blighted areas are characterised by properties with inhabitable conditions which are either left vacant or housed by people from the poor sections of the society. Similarly, (Sun *et al.*, 2019) described urban blight as "abandoned or poorly maintained real estate properties, often characterised by overgrowth, litter, abandoned vehicles, junk and dumping". Breger (1967) on the other hand took into account the functional as well as social depreciation of a real estate property. The occurrence of urban decline lowers the urban QOL of those residing inside the blighted properties as well as those of the neighbourhood areas. It leads to proliferation of several socio-cultural, economic and environmental issues like crime (Spelman, 1993), drug trafficking (Debra *et al.*, 2010), loss of investments and job opportunities (Garvin *et al.*, 2013), unhygienic environment due to piling of garbage and degrading conditions of sewers etc. The perception of safety and security of those living in blighted areas are severely compromised and thus, affects people's outdoor activity patterns. An unsafe neighbourhood creates behavioural changes in residents who withdraw from outdoor social activities and community engagement (Garvin *et al.*, 2013). This in turn "destabilises communities and results in an exodus from the affected areas" (Picard, 1939). Although the effects of urban decline can be easily observed and identified, it is a challenging task for urban practitioners to ascertain its causes. This difficulty can be attributed to the subjectivity associated with the occurrence of blight. Previous research suggests that the causes of urban decline can be categorised into one of the three groups: (i) planning defects that cause inadequate street networks, small and irregular plots, the lacuna in zoning ordinances and inefficient management of overcrowding and congestion; (ii) common characteristics of blight like lack of structural repairs, tax delinquency and high mortgage foreclosure that leads to the manifestation of crime, diseases and other anti-social activities; and (iii) undesirable intrusion into neighbourhoods leading to discontentment and agitation (Ferreira *et al.*, 2018).

Urban decline has been significantly researched in the near past. However, there is a general consensus that most of the previous literature has certain limitations (Lousada *et al.*, 2021) as they have mostly resorted to statistical models which require data pertaining to scaling properties and thus, limit their flexibility. Since the consequences of urban decline are so multi-faceted, *this research outlines a place-based model for empirically analysing the socio-spatial causes of urban decline and their associated impact on residents' quality of life*. The cognitive mapping technique used in this research is a useful tool that helps to model, structure and visualise complex relationships between various concepts by using network diagrams (Bakhtavar *et al.*, 2021). Cognitive maps "facilitate the representation and communication, support the identification and interpretation of information while facilitating consultation and codification, and stimulate mental association" (Gavrilova and Lazazzera, 2006). Thus, by using cognitive maps, the specific causes of urban decline can be identified, which will help urban practitioners to formulate strategic blight response initiatives to "revitalise struggling communities and generate positive externalities that help to turn declining neighbourhoods around" (Freedman and Owens, 2011).

3. Methodology

The methodology of the research consists of two parts: data collection and the construction of a cognitive map. For the data collection, firstly a reconnaissance survey was carried out by the authors to identify the commonly observable causes of urban decline in the study area. Following this, a focus group discussion was conducted with the residents of the area that helped in identifying the latent causes that are specific to those living in blighted conditions. The motive of the focus group discussion was to gather information regarding user activities, behaviours, and perceptions associated with the place and built environment characteristics pertaining to urban blight and quality of life. An expert opinion survey was then conducted with a panel consisting of 8 members, who were academicians from the field of urban planning and urban design practitioners. A presentation was organised for the panel members to explain the objectives of the discussion and salient features of Fuzzy Cognitive Maps (FCM). Figure 1. represents a typical FCM, where C_i represents criterion i and W_{ij} stand for the degree of influence between criteria i and j. Negative causality appears when ($W_{ij} < 0$), where an increase in the value of C_i leads to a decrease in the value of C_j and vice-versa ; (2) null causality when ($W_{ij} = 0$), which takes place when there is no relationship between C_i and C_j; and (3) positive causality when ($W_{ij} > 0$), where an increase in the value of C_i leads to an increase in the value of C_j and vice-versa.

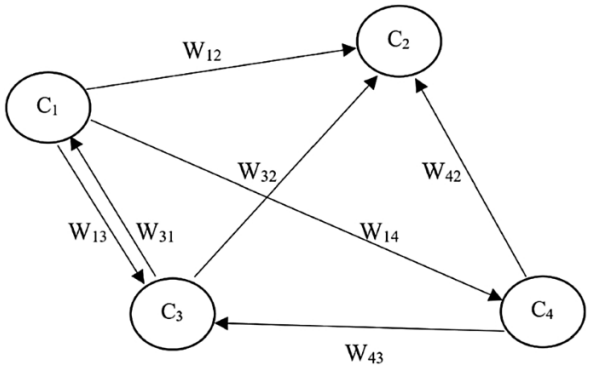

Figure 1: Typical Diagram of a Fuzzy Cognitive Map. Source: Bakhtavar et al., 2021

Next, the experts were presented with on-site photographs of the selected study area and the list of variables identified during the reconnaissance survey and focus group discussion, which helped in initiating discussion among the experts. The expert opinion survey was conducted in three steps:

Step 1: Concepts (variables) of socio-spatial causes of urban decline were written in separate post-its and placed on a whiteboard for others to see. Following intense discussion, a consensus was reached among the experts who decided on the concepts that were to be retained, omitted and any other concepts to be added.

Step 2: The concepts were assigned to separate clusters i.e areas of concern and were arranged accordingly on the whiteboard. The clusters (areas of concern) were then ranked by the experts from most important causation factor to least followed by the ranking of concepts (variables) within those clusters.

Step 3: Finally, the experts were asked to assign a degree and direction of influence to each of these clusters. This helped in determining the strength of the causation that these clusters exert on the urban decline and residents' quality of life. Similarly, the concepts were also assigned a degree and direction of influence that they impart on their specific area of concern. This value followed the fuzzy logic and ranged between [-1,1]. This step culminated in the construction of the fuzzy matrix, which was the

average of the values given by the experts. The matrix was finalised based on mutual agreement between the experts.

The experts identified 7 clusters or areas of concern namely *Social Structure, Economic Condition, Built Form and Functionality, Morphology, Environmental Quality, Infrastructure Presence and Service Availability* which best describes the 96 concepts i.e. the socio-spatial causes of urban decline. Table 1 presents the list of the identified clusters and the total number of concepts identified. The final causal model and fuzzy matrix were developed using FCMapper (http://www.fcmappers.net) and the visualisation of the fuzzy cognitive map was done in Pajek software (http://pajek.imfm.si/doku.php).

Clusters (Area of Concern)	Number of concepts
Social Structure	23
Infrastructure Presence	16
Morphology	11
Environmental Quality	11
Economic Condition	16
Built Form and Functionality	13
Service Availability	6

Table 1: The Expert Identified Clusters . Source: Author

4. Study Area

The selected study area is in the Guwahati city, Assam, India. The city of Guwahati is popularly known as the gateway of Northeast India and is located on the Southern banks of the river Brahmaputra. The neighbouring areas of Dighalipukhuri and Uzaan Bazar, which were selected as the study area, is part of the earliest settlement of the Guwahati city that came up during the period of 4th century to 12th century. During that time it served as a port and facilitated easy movement between the Northern and Southern banks of Brahmaputra via boats. According to folklore, the lake was created by digging a canal from the Brahmaputra River. The lake was initially built to function as a naval yard for the Ahoms[ii]. During the Colonial times, the direct access between the river and the lake was filled up to construct the circuit house. Later on, the Guwahati High Court was also built in the reclaimed land, thus making the area strategically important for the city. Figure 2 presents the location of the study area.

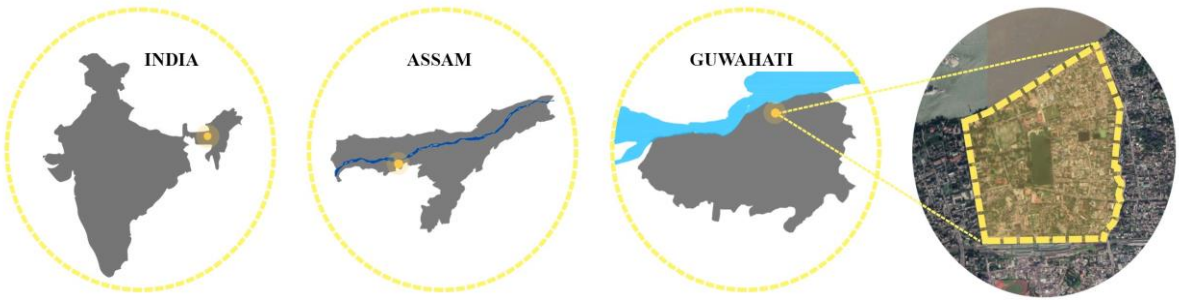

Figure 2: Location of the Study Area. Source: Author

The total area under the study area is 0.10 sq. km. This Class I city is the 48th most populous city in India, with a population of 962,334 (DCHB, 2011) and is listed as a Smart City[iii]. The Master Plan of Guwahati has estimated that the Guwahati Metropolitan District will house 2.8 million residents by the year 2025 (GMDA, 2009). The city is ranked 85th out of 111 cities in the Ease of Liveability Index[iv] with a score of 29.03 out of 100 and therefore, making it one of the poor-performing cities in the country in terms of liveability (MoHUA, 2019). Under the Guwahati Development Intensity Zones, the study area falls under the Moderate Intensity Zone, where the permissible floor area ratio ranges from 100 to 225. Figure 3 and Figure 4 illustrate the site context and the present condition of the study area.

Figure 3: Site Context and Important Landmarks of the Study Area. Source: Author

Figure 4: Present Condition of the Study Area. Source: Author

5. Key Findings

The fuzzy matrix and cognitive map have helped in identifying the relationship between and within the clusters. This relationship followed a fuzzy logic, i.e. the direction of the causal relationships was represented by positive or negative signs and an associated degree of influence, which ranged between (-1) to (+1). Figure 5 presents the final Fuzzy Cognitive Map.

Table 2 presents the Fuzzy Matrix for the clusters, which highlights the degree and direction of influence the clusters exert on the urban decline and residents' quality of life. The associated impact of these concepts (variables) on residents' quality of life has also been highlighted in the form of fuzzy logic ranging between [-1,1]. It is evident from the matrix that *Urban Blight* has a strong negative causality on residents' quality of life followed by *Built Form and Functionality, Morphology, Environmental Quality and Infrastructure Presence*. However, it should be noted that these clusters represent the concepts leading to urban blight and therefore, separate investigation can be made for determining causal variables of residents' quality of life that are not influenced by urban blight. Similarly, strong negative causality of urban blight has been found for *Morphology* and *Built Form and Functionality*.

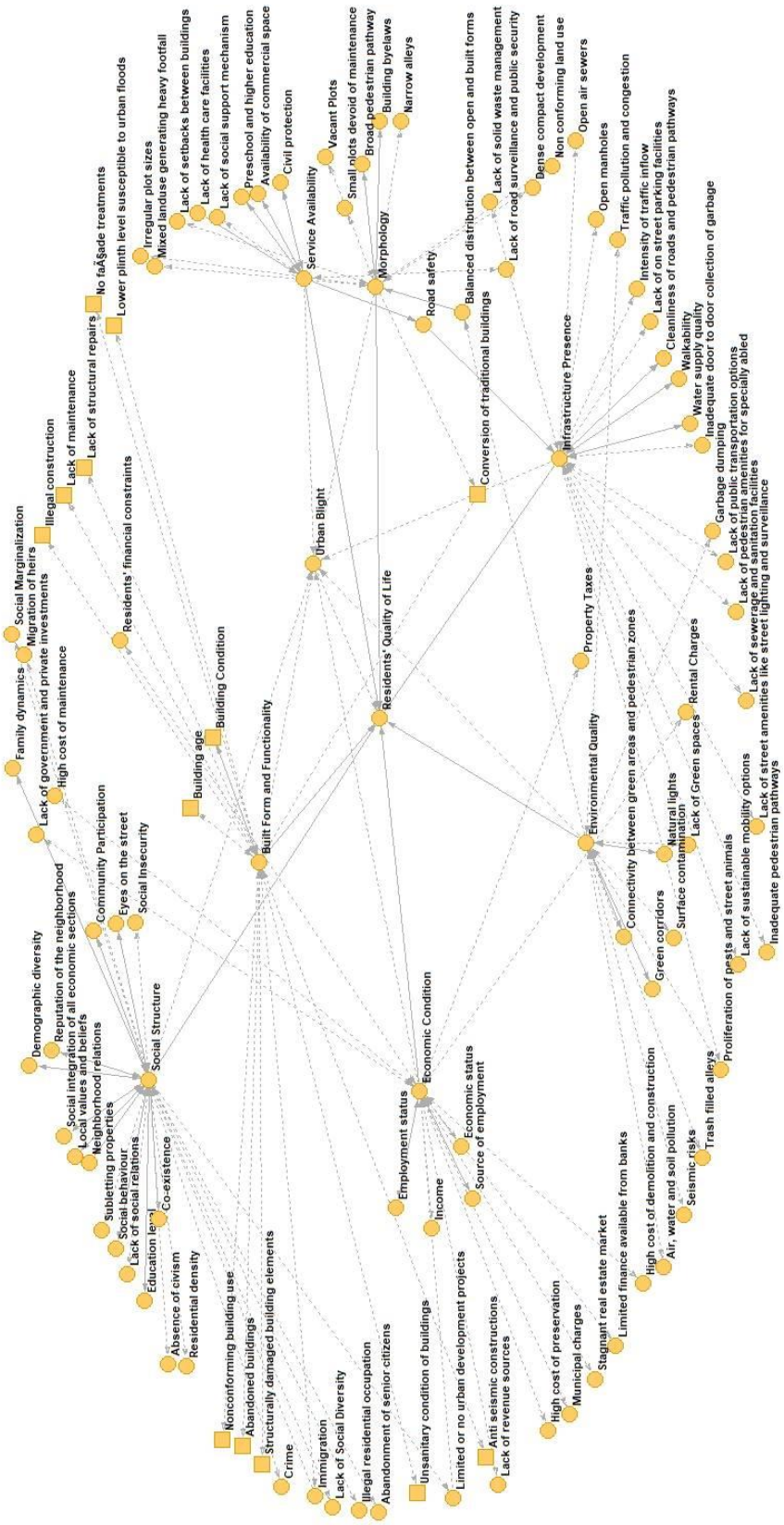

Figure 5: Fuzzy Cognitive Map showing the Socio-Spatial Causes. Source: Author

Clusters (Area of Concern)	A1	B1	C1	D1	E1	F1	G1	H1	I1
Residents' Quality of Life (A1)	0.00	-1.00	0.50	0.65	0.75	0.50	0.75	0.75	0.50
Urban Blight (B1)	-1.00	0.00	-0.50	-0.75	-0.95	-0.85	-0.65	-0.75	-0.65
Economic Condition (C1)	0.50	-0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Social Structure (D1)	0.65	-0.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Built Form and Functionality (E1)	0.75	-0.95	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Morphology (F1)	0.50	-0.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Environmental Quality (G1)	0.75	-0.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Infrastructure Presence (H1)	0.75	-0.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Service Availability (I1)	0.50	-0.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 2: Fuzzy Matrix. Source: Author

Table 3 presents the Index of Influence calculated using FCMapper (http://www.fcmappers.net). Since the Index consists of 96 concepts and 7 clusters, therefore only those with the highest values of centrality have been presented here. Centrality value highlights the strength of direct connections of a node (i.e. clusters and concepts) with other nodes in the Fuzzy Cognitive Map. The index of influence suggests that *Social Structure* has the highest significant role in determining urban decline and residents' quality of life followed by *Infrastructure Presence*, *Morphology*, *Environmental Quality*, *Economic Condition*, *Built Form and Functionality* and *Service Availability*.

Clusters	Number of concepts	Outdegree	Indegree	Centrality
Social Structure	23	19.35	17.95	37.30
Infrastructure Presence	16	12.85	11.35	24.20
Morphology	11	11.05	9.70	20.75
Environmental Quality	11	10.55	9.15	19.70
Economic Condition	16	9.50	8.75	18.25
Built Form and Functionality	13	9.80	8.10	17.90
Service Availability	6	5.60	4.45	10.05

Table 3: Index of Influence. Source: Author

The research findings highlight that variables like crime, lack of social relations, community participation, subletting properties, illegal occupation of residence and social insecurity are the most significant *Social Structure* determinants of urban decline and residents' quality of life. Among *Infrastructure Presence*, the key determinant is the sewerage system while broad pedestrian pathways, narrow alleys, plot conditions and building bye-laws are the major determinants within the *Morphology* cluster. Similarly, in the *Environmental Quality* cluster, the research pointed out that surface contamination, green spaces and connectivity between green areas and pedestrian zones are the major determinants. Among the remaining clusters of *Economic Condition, Built Form and Functionality and Service Availability*, the determinants playing a significant role are economic status, employment status, income, source of employment, building age, building condition and civic protection respectively.

6. Discussion

The research findings suggest that social structure, urban infrastructure, urban morphology and environmental conditions including the availability of open public spaces and neighbourhood attributes like integrated and safe street network, mixed land-use, moderate density and compact urban forms with walkable neighbourhoods are the tangible spatial factors that are significant determinants of urban decline and quality of life. Whereas, community participation, social relations, social security, income, employment opportunities, and access to services like health and education are the social factors that have a direct impact on the urban decline and quality of life. The focus group discussion revealed that neighbourhoods that have come up in the last three decades have displayed considerably better residents' satisfaction concerning their quality of life and show minimal signs of urban decline while the satisfaction of residents in the traditional neighbourhood is comparatively less with respect to their physical living conditions. This may be attributed to the better level of infrastructure and higher serviceability of newer neighbourhoods.

This research focused on both the subjective and objective causes focusing primarily on socio-spatial aspects of urban blight and the residents' quality of life. Unlike past research that adopted multi-criteria decision making process mostly using expert opinion surveys and are seldom top-down; this research adopted a bottom-up approach by integrating reconnaissance and focus group surveys. This bottom-up approach enhanced the participatory element of the fuzzy cognitive mapping technique by involving multiple stakeholders across neighbourhood, administrative and academic levels. The fuzzy cognitive map developed gives a clear picture depicting the interconnection and the direction of influence both between and within the clusters. Additionally, by referring to the fuzzy matrix and index of influence strategic solutions can be devised and their implementation can be prioritized accordingly.

In order to effectively address urban blight and the quality of life therein, urban practitioners need a paradigm shift that would integrate the understanding between "the various facets of change that we seek, the context of the place where the change would take place and the process that would facilitate the change" (Markusen and Gadwa, 2010). A place-based approach should carefully address the evolution of any place across multiple time scales, respect its historic and cultural backdrop and understand the social, economic and infrastructural aspiration of all the stakeholders associated with that place. Since the social structure of the place holds great significance in determining urban blight, there is a need to invest in the social capital of the place to encourage equitable community development. Investments in physical and social infrastructure help in promoting economic development. Developments that are close to open spaces, recreational areas and various types of public amenities attract buyers and investors and simultaneously increase property values and generate employment opportunities (Eberts, 1986). Therefore, it is imperative to adopt quality welfare planning that would enhance overall residents' well-being by fulfilling their physical, psychological and social needs and help sustain local economy, social and environmental capital.

7. Conclusion

Research on urban blight and decline has considerably increased in the last few decades. Similarly, studies on urban quality of life have also been conducted in ample amount. However, there is limited research that addressed the residents' quality of life in blighted areas. Both of these concepts are highly subjective and thus, understanding residents' quality of life in the light of urban blight is a highly challenging task. To address the subjectivity and contextual nature, this research adopted a bottom-up multi-stakeholder approach to empirically investigate the place-based socio-spatial causes of urban blight and their associated impact on residents' quality of life. Stakeholder involvement at the neighbourhood

level has helped to highlight the underlying causes of urban blight that often go unnoticed. The bottom-up approach of this research can be implemented at various administrative levels to aid in the decision-making process in successfully identifying and addressing the causes of urban blight. The fuzzy cognitive map and the index of influence presented in this research provide a clear directive to urban practitioners as to which factors are to be prioritized in order to uplift the residents' quality of life in blighted areas over and above the mere cosmetic treatment of blighted areas. This research can be extended further for future studies by (i) integrating the methodology of this research with structural equation modelling to check if the concepts are true representative of the clusters, (ii) conducting a comparative analysis between the finding of this research and others of similar nature and (iii) conducting similar place-based enquiry using other Multi-Criteria Decision Analysis. The methodology of this research will provide helpful insights in formulating strategic policies for context-specific treatment of urban decline and prove to be beneficial for conducting further place-based studies using empirical methodologies.

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[i] According to Urban and Regional Development Plans Formulation and Implementation Guidelines (URDPFI), 2014, Ministry of Urban Development, India, cities with more than 1 lakh population have been classified as Class I; of which cities with more than 10 lakh population are known as million plus cities.

[ii] The Ahom is an indigenous group of people from the Indian Eastern state of Assam. They belong to the Ahom Kingdom, which was a late medieval kingdom established in 1228 in the Brahmaputra Valley of Assam.

[iii] In 2015, the Smart Cities Mission was launched by Government of India to identify cities for investments to promote sustainable and inclusive cities. The objective was to develop core infrastructure, improve quality of life and provide a clean and sustainable environment by means of 'Smart' solutions (Ministry of Housing and Urban Affairs).

iv Ease of Liveability Index has been developed by Ministry of Housing and Urban Affairs, India, as a framework to assess wellbeing of citizens within a city. The index has 3 pillars namely Quality of Life, Economic Ability and Sustainability to measure liveability of cities.