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Relationships of Urban Design Elements and Social Sustainability in the Indian Context

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Abstract

The built environment is continuously changing, and so is the socio-cultural scenario because of the rapid urbanization and technological developments. Researchers and thinkers have been working toward conserving the resources and finally came up with sustainable development. The concept can be interpreted in three spheres; social, economic, and environmental. The indicators of social sustainability are often neglected. This negligence causes a rise to serious issues like lack of identity, belongingness, improper land use, unhygienic conditions, increased stress level, and unsafe society. This research paper aims at analyzing the indicators of social sustainability and urban design elements, thereby exploring the priorities amongst them in the present context. This study applies qualitative and quantitative methods to collect information from different sections of Indian society. The study highlights that urban design elements have a positive impact on social well-being. The elements are architectural elements and the driving element that make a community strong and more livable, which is the ultimate sustainable development target. However, the study also identifies certain indicators, which seem to be neglected, and suggests some recommendations based on exploratory research.

Disciplinary: Urban Design & Architectural Science, Urban Sustainable Development.

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1 Introduction

The countries entered into treaties to resolve disputes, among themselves, after the world wars. The United Nations (UN) was formed in 1945 to encourage international conflicts without war and maintain worldwide peace and security. After this incident, countries all over the globe started developing their nations by all possible means. Industrialization and market policies gave rise to urbanization that resulted in the overuse of resources. It compelled the governments to rethink the use of resources. In 1987, the Brundtland Commission report, "*Our Common Future*", defines sustainability as "development that meets the need of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987). The concept can be interpreted in three spheres, social, economic, and environmental, placed in harmony (Kuhlman & Farrington, 2010).

Environmental objectives focus on creating superior environmental quality residues, using fewer construction materials, recycling building materials, recycling wastewater, and eliminating emissions. The economic objective focuses on creating outstanding values, reducing ongoing costs, reducing energy consumption, providing perfect solutions, easy methods of production, and prospective solutions. The social objective focuses on security, adaptability, recruiting quality, eliminate insulation, flexible programs, life with health, home care, and permanent training (Kefayati & Moztarzadeh, 2015). Further, the UN Agenda for Development defines "*Development is a multidimensional undertaking to achieve a higher quality of life for all people. Economic Development, social development, and environmental protection are interdependent and mutually reinforcing components of sustainable development*" (Kuhlman & Farrington, 2010).

Out of the three pillars mentioned, environmental and economic issues gained a lot of attention, but the social problem of sustainability is still lagging. Social sustainability still lacks a clear and coherent study, which resulted in many debates and political agendas. In the last two decades, researchers started working in this area to improve the quality of life as it is getting worse even after developing, especially in urban areas. Rapid urbanization and migration resulted in the overcrowding of metros. The crime rate and other social evils are growing at an alarming rate in the fast and competitive life of cities. Technology is advancing rapidly, but there is a dire need to rethink whether it is justified with public satisfaction or the public is being forced to adopt it. Cities will keep on growing, and more buildings will be required to meet the growing demands. Presently, a lot of concern is shown towards the construction of buildings and creating a built environment that is more sustainable and economical. The question arises; "Whether the built environment can be designed in such a way to enhance social sustainability also?". There is a need to explore the urban design elements that can help create a built environment, with the ability to act as a catalyst to well-being and promote social sustainability.

2 Literature Review

2.1 Social Sustainability and Its Indicators

Interpretation of social sustainability is a condition and process within the community that fulfil the basic human needs, the principles of social justice, equity, homogeneity, cohesion, integration, diversity, sense of place, social amenity, and social security for the present future generations (Rasouli & Kumarasuriyar, 2016). Researchers discovered parameters for establishing sustainability in society, and many of them have derived two fundamental components of social sustainability; basic needs and equity (Ahman, 2013). Dempsey et al. (2009) identified the contributory factors based on earlier researches (Chan & Lee, 2008; Hopwood et al., 2005; Eizenberg & Jabareen, 2017) in two groups: physical and non-physical factors. Physical factors (urbanity, decent housing, local environment quality, and amenity, accessibility, sustainable urban design, neighborhood, walkable neighborhood, and pedestrian-friendly), and non-physical factors (social order and cohesion, social networks, community cohesion, safety, mixed tenure, social interaction, cultural traditions, health and quality of life, participation and local democracy, social inclusion, education level, sense of community, and belonging, etc.) (Dempsey et al., 2009).

Table 1: Indicators of social sustainability

Researcher	Indicators of social sustainability
Spangenberg (2004)	Macro-level: distribution of income and assets Micro-level: education, training, income, social contacts, communication and participation, and social security
Bramley et al. (2006)	Five common points observed as indicators are; a) social interaction, b) participation, c) community stability, d) sense of pride, e) safety and security.
Dempsey et al. (2009)	Five dimensions as interrelated aspects of a sustainable community are: a) social interaction, b) participation, c) community, d) stability, e) pride, f) safety & security.
Vallance et al. (2011)	Three phases of social sustainability are development, bridge, and maintenance, emphasizing the changing behavior of society.
Baffoe & Mutisya (2015)	Three categories observed are; (1) representation, i.e. participation in the decision-making process, (2) collective Status, i.e. groups, trusts, families, (3) individual access, i.e. job, housing, food, education, health.
Eizenberg & Jabareen (2017)	Four interrelated parameters are; a) urban form, i.e. compactness, land use, diversity, clean energy, sustainable transport, greening; b) safety, i.e. measures to cope up with risk and uncertainties, urban vulnerability; c) equity, i.e. recognition, redistribution, participation, d)eco-presumption, i.e. to reduce the future risk and help to develop mitigation measures.
Jabreen et al. (2017)	The physical factors like sprawl or compactness, land use, services, and transport means

The non-physical factors are grouped under the scheme as promoters of the well-being of society, whereas the physical factors act as controllers for non-physical factors. A framework has been suggested that integrates the physical and non-physical aspects of social sustainability. It is based on the concept of social sustainability of four interrelated parameters; a) urban Form, b) safety, c) equity, d) eco-presumption (Eizenberg & Jabareen, 2017). Similarly, Dempsey et al. (2009) suggested that the sustainability of a community relates to different aspects of social life. Agyeman and Evans (2004) defined sustainability as "the need to ensure a better quality of life for all, now and into the future, in a just and equitable manner, while living within the limits of supporting

ecosystems (Agyeman & Evans, 2004). Baffoe et al. (2015) observed that the current understanding of social sustainability is in the conceptual stage to date. Miller (2007) and Axelsson et al. (2013) had explored this issue, and they found that the indicators for social sustainability remain unattempted (Baffoe & Mutisya, 2015). Some researchers perceived sustainability indicators and came up with more or less the same results (Table 1).

2.2 The Elements of Urban Design

Every place has an identity, and its topographical features identify even barren land. Similarly, a city is recognized by its inhabitants and the built environment that includes buildings, parks, roads, towers, etc. Urban design involves designing and coordinating all the elements that constitute a city or town. It majorly covers buildings, public spaces, streets, transport facilities, and landscapes. The objective of good urban design lies in developing a coherent and organized combination. The elements not only fulfil the functional requirements of the inhabitants but also create a sense of imageability. A city's functional behavior has many indicators like density, compact form or sprawl, land use, etc. These elements together constitute the urban form of a city, which is often associated with urban metabolism. A lot of empirical database results are obtained in the context of energy issues. In the last few decades, the sustainable performance of the cities has been discussed with a focus on urban form as a major contributor to environmental issues. Approaches have been identified and framed at different levels, i.e. at regional levels, city levels, community levels, and building levels, to resolve the drawbacks of the existing system (Jabareen, 2006).

This section of the study aims to resolve and present a set of urban design elements that focus on imageability and the urban form of a city collectively. The imageability of a city was best described by American planner Kevin Lynch several decades ago in his work "The image of a city". His theories have been a source of inspiration and further research by many planners in the present day context (Carmona et al., 2003). Lynch (1960) has defined imageability as a quality in any physical object that gives it a strong image in the mind of a user. Hospers (2010), based on Lynch's work, identified these elements as lines of movement, transition zone, distinctive city section, strategic meeting points, and singular objects. He applied the elements in present-day cities and concluded that Lynch's work still shows relevance. The elements of urban design have been summarized in Table 2.

Table 2: Elements of urban design

Researcher	Elements of urban design
Kevin Lynch (1960)	Five elements identified as imageability elements of a city are; a) paths, b) edges, c) districts, d) nodes, and e) landmarks.
Bramley et al. (2006)	Six elements are; a) density, b) location, c) gardens, d) type of dwellings (large, small, flats, high-rise), e) accessibility, and f) transport.
Jabareen (2006)	Seven elements to check the sustainable behavior of an urban area are; a) compactness, b) transport, c) density, d) mixed-land use, e) diversity, f) passive solar design, g) greening.
Hospers (2010)	Five elements identified are; lines of movements, transition zones, distinctive city sections, strategic meeting points, and singular objects.

3 Methodology

3.1 The Conceptual Framework

It is analyzed that if happiness can be equated with "well-being", then, in that case, well-being refers to the objective conditions that promote happiness in people. The well-being should incorporate intangible needs such as; freedom, education, security, democracy, and justice (Kuhlman & Farrington, 2010). Work, relationships, and interactions within a society help in promoting social sustainability and also implicate the relationship between nature and society. Social quality can also be interpreted as social sustainability (Littig & Griessler, 2005).

Since all the development is meant to improve the quality of living, well-being, and happiness index of a society, it is worthwhile to examine the development in social sustainability. Such action should be targeted to improve people's living conditions and help them live a happy life because a successful life without happiness will convert the being into a machine. It is commonly found that people living in rural areas with less technological advancement live a happier and more content life than people living in urban areas with all technological developments. It is essential to examine the factors that make a difference and identify why lies in the level of social bonding they inherit. It is also mandatory to enquire whether the urban population is more concerned about security issues.

The set of urban design elements were shortlisted from the literature review, and these were further examined. The analysis was based on the criteria of their performance concerning the set of indicators of social sustainability. Every element of urban design was reviewed with the help of a questionnaire that is likely to affect social sustainability. The physical indicators were identified as; path, edges, districts, nodes, and landmarks. The non-physical indicators include; compactness, transport, density, mixed land use, and open spaces. The research questions were framed, and finally, a set of four statements (in each category) were presented in the questionnaire for data collection (Table 3).

3.2 Data Collection

3.2.1 Demographic Profile of Respondents

The study was based on the assessment of the satisfaction level of the end-user of the city. An online survey was conducted and received 107 responses. The respondents were randomly selected and were requested to forward the questionnaire further. Based on data collection, 44.2 percent of respondents belonged to the age group of 18-28 years, 51 percent of respondents were of age group 29-49 years, and 4.8 percent were of age group between 50-70 years. However, the low-income group was 7.8 percent, and the high-income group was 8.7 percent among the respondents. The majority of responses were received from the middle-income groups that are 84.5 percent. The male respondents were 56.3 percent, and female respondents were 43.7 percent.

Table 3: The research questions

Elements	Research Questions
Path	Do the residents recognize their local road as an extension of houses? How often do the children play in the local street? Do elders get together to chat frequently? Do the residents' visit/share the celebrations/events in their local streets? How do the residents feel about neighboring streets? How often does an issue arise among the members of the same street and with those of neighboring streets? What is the difference in reaction when the matter of a dispute is there compared to other streets? Do the streets have a common element? Are narrow and dark lanes avoided to suppress illegal activities?
Edges	Do people from different areas have good relations? Do they enjoy their functions/events together? Do they visit each other? Do they share some common areas? Do the different colonies get together for a common cause? Do they exchange items/goods? Do they visit each other at night hours?
Districts	Are the district centers well connected with all areas, and are they equidistant? Do the district centers serve the needs of the surrounding public? Do the districts have frequent gathering opportunities for meetings and celebrations? Do seasonal fairs and events take place successfully? Are eating joints, open restaurants, and street food outlets crowded? Do people opt to visit the district centers and children enjoy it there?
Nodes	What is your feeling about the corners at the intersection of the streets? Do the daily need shops at the corners act as meeting places? Do they provide a checkpoint/view of the incoming/outgoing people? Do the view from all ends and all the houses of the lane provide an eye meeting point?
Landmarks	Do the inhabitants have a sense of pride/identification? What type of landmarks exists? Does the statue of some political figure/religious leader, revolutionist, clock tower, water tank, etc., exist? Do they inspire a sense of unity among the public residing there or passers-by? Do they reflect the development of the society or the historical aspect that brings a sense of pride and unity among residents?
Compactness	How frequently do you meet each other unintentionally? How updated are you with the whereabouts of others in your area? Does the feeling of compactness force you to do something commonly? Is the use of motor vehicles reduced, and you prefer to walk to meet your daily needs? How quickly do you return to your place or home and spend time in your locality? How much are you familiar with the area and persons living in the area?
Transport	How much do you travel on a shared basis? How frequently do you meet acquaintances and talk to them while commuting? What is the provision of bus/taxi/tempo stands? How safe do you feel while commuting? What percentage of teenagers and older persons travel on a shared basis?
Density	How much time do you spend in balconies/entry gates, talking to neighbors? With how many families can you can interact directly from your house? How far can you keep a watch in your locality from your house/gates/balconies? How safe do you feel about theft? How often do you casually meet others? Do children play together in the lanes, and do senior citizens meet each other daily?
Mixed Land Use	Does it facilitate the work done and help in stress reduction? Does it help eradicate the social gap/among people and build social cohesion by receiving help from others or helping others at the time of need? Do children of different groups interact with each other and develop bonding?
Open Spaces	Do they provide a better place for interaction? Does it increase the view of neighbors? Does it help to build a community feeling? Does it help make the environment healthy and tolls away from the negative ideas/crime in the society as visibility increases (theft/red zones)?

4 Results and Discussion

4.1 Analysis

The responses regarding indicators were collected and analyzed for social sustainability in the present context, in the hierarchy of decreasing order of their importance (Table 4). The physical and non-physical factors are represented in Figures 1 and 2, respectively. Most respondents agreed that the design elements positively impact creating a socially sustainable society, as the Mean is more than 60 in all the indicators. It is observed that A/DA >2 in each case, which adds to the positivity of the indicator being strong (Table 4).

Table 4: The summary of responses collected

Elements	Priority (Based on A*)	Mean- A* (%)	Mean- DA** (%)	Mean- CS*** (%)
Physical indicators impact				
Edges	1	92.5	16.5	5
Path	2	69	28.5	4.5
Landmarks	3	67	20.75	12.75
Districts	4	65.75	16.25	20
Nodes	5	63.5	25.25	12
Non-physical indicators impact				
Open Spaces	1	85.5	8.2	6.25
Mixed Land Use	2	82.2	10.0	8.25
Density	3	70.0	23.5	5.75
Compactness	4	63.2	26.0	11.75
Transport	5	54.5	32.0	12.25

*A = Agree response, **DA = Disagree response, ***CS = Cannot say response

4.1.1 Physical Indicators

On assigning the priority among the urban design elements in this category, it was observed that there is a strong opinion about the importance of edges in building up social sustainability. The response could be a result of the development that has taken place nowadays along the edges. Most people gather around the edges because the daily need shops and departmental stores have emerged along the edges. People meet each other and exchange greetings while walking along the path. However, all other indicators are in the same range of importance.

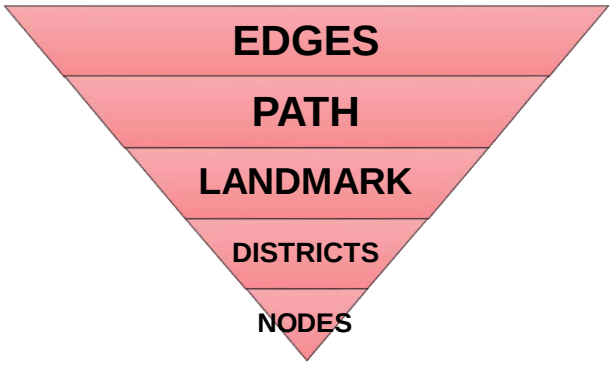

Figure 1: The priority for physical factors.

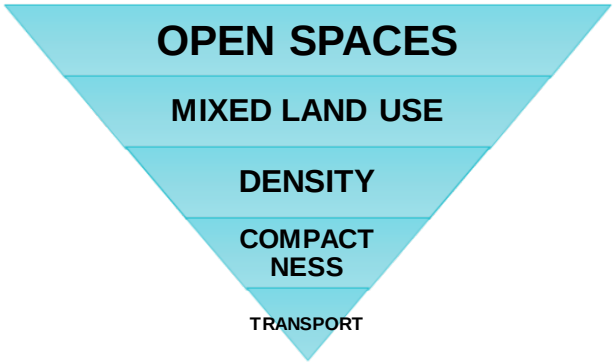

Figure 2: The priority for non-physical factors

4.1.2 Non-Physical Indicators

Among the non-physical indicators, open spaces and mixed land use are at the highest priority. Open spaces create junctions of interaction for people of different age groups at different time slots. They would come together and meet each other in parks and playgrounds. Mixed land

use helps them get services rendered and works related to the routine that can be managed easily because of acquaintance.

5 Conclusion

The urban design elements have been assessed as important parameters because of the positive responses as their presence can enhance social sustainability. The CS category indicates that the importance of certain urban design elements is missing from society to some extent. The districts and landmarks (physical indicators) and compactness and transport (the non-physical indicator) are placed at the lowest priority, implying that their significance is not fully realized in society. Certain recommendations for the promotion of social sustainability can be made based on the study conducted. First is creating interactive spaces at junctions such as streetscapes include seating areas, better lighting facilities, and open spaces that can enhance social sustainability. Second is nodes that can be located such that they provide space for public meetings and act as checkpoints for visitors in the locality. Such nodes can enhance social sustainability when integrated with daily needs. In addition, proper planning of community facilities/district centers for interactive programs, which can be held occasionally and mark events (national and festive), can also promote social sustainability. Besides, accessibility to various facilities in the community is essential. A compact planning can stimulate social sustainability by providing amenities for people of all age groups, within their reach, through design elements. Finally, emphasis is required on designing design elements to build up social sustainability through transportation considerations. Urban design elements govern access to public transport. Paved well-lit pathways, seating/interactive spaces, and essential shops along the walkway are necessary to access points that add to social security. Future studies can be conducted to identify the priorities in specific localities to identify the shortcomings and lead to rectification and retrofitting.

6 Data Availability Statement

The data for this study can be available upon a request made to the corresponding author.

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