Research Paper

Adressing the Impact of Urban Form on Liveability
A Critical Review

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Abstract

The large-scale complexity of urban agglomerations and human-centered urbanity in the current context of increasing urbanization is a scientific, planning, and policy issue that necessitates suitable analytical techniques and efficient policymaking. Expectations of sustainability, ethical production and sense of well-being contributing to the overall livability are on the rise in cities. Further, mobility, age-friendliness, access to facilities and services gathering higher importance as globalisation influences rapid urbanisation. The term "liveability" refers to the general standard of urban environments with respect to the physical, social, psychological, and emotional needs, demands, and expectations of their inhabitants. Since it is comprehended as the quality of the human–environment relationship, urban form is a key element in the conceptual structure of liveability. Further, spatial arrangement of urban components; blocks, streets, buildings, etc. affect the quality of urban spaces, accounting for livability. This paper is a critical literature review of existing liveability approaches in the context to urban studies specifically to India. It provides a perspective to urban livability approaches and indicators focusing on urban form, at various levels. Current trends, key concepts and frameworks, and evidences from global case studies are also compared to establish the existing gap and limitations, and the need for policies and alternative methodologies for indexing spatial patterns for liveability. Conclusive results from this study will benefit future urban planning for better liveability.

Keywords

Urban Enviornment, Liveability, indexing, urban forms, wellbeing

1. Introduction

The problem of human-scale urbanity and large-scale urban agglomerations is a critical scientific and policy concern in the burgeoning "urban century," necessitating innovative analytical methods and successful policy measures (Jan Gehl, 2010; Kourtit, Osth and Nijkamp, 2020; Glaesar, Kourtit and Nijkamp, 2021). Ethnic division, land-use segregation, separation of employment and residence, neighbourhood deterioration, frequent traffic jams, social and economic irregularities, and unequal access to resources and opportunities are just a few of the issues that most large cities deal with. It may impact the health and safety of residents, non-acceptable living conditions and compromised social values (Kuddus, Tynan and McBryde, 2020). Sustainable development has drawn a lot of attention in recent decades. as a collective urban interest, accelerated from the inception of the UN Sustainable Development Goals (SDGs) (United Nations, 2016). With regard to a higher standard of living, community cohesion, less urban isolation, and easier access to facilities and services, expectations for sustainability, ethical production, and a sense of wellbeing are rising in Indian cities, particularly in metropolitan areas. The "Global Youth Letter Report,"

which polled over 8,000 individuals between the ages of 18 and 35 from 23 nations, found that younger generations are reflecting this. (Bhatiani *et al.*, 2022).

Since modern dense spatial settlements have the capacity to improve place quality and create an inclusive and sustainable future for everyone, cities and urban agglomerations are acknowledged as major players in addressing sustainability concerns. With the diverse fabric of Indian cities having unpredictability, there is a need to transform urban environments into sustainable, resilient, and equity ensured for all (SDG, 2016; Paul and Sen, 2018). Numerous strategies have been put out to address the aforementioned problems, including livability, sustainability, and quality of life (Ellis and Roberts, 2016; Ali and Akbari, 2017). Quality of life and livability have assumed a prominent place on the human well-being ladder. Urban livability is the ability of urban spaces to fulfil the expectations of its users and inhabitants for wellbeing and better quality of life (Martino, Girling and Lu, 2021). Therefore, identification of factors that determines the livability of cities is a major concern of the contemporary world (Kourtit *et al.*, 2022).

The totality of safe, appealing, socially cohesive, and inclusive neighborhoods is known as urban livability. Additionally, they are ecologically sustainable, offering reasonably priced and varied housing that is easily accessible by public transportation, bicycles, and pedestrians to places of work, education, public parks, local stores, health care, and other community services, as well as recreational and cultural activities (Higgs *et al.*, 2019). Contemporary Asian cities are witnessing high-rise and compact urban development, which requires better understanding of the physical living environment; *both built and unbuilt,* and urban quality is necessary to deal with multifaceted issues of urbanism (Lai *et al.*, 2018). Accessibility, travel distance, time, energy, social fairness, land-use efficiency, economic benefits, CO2 emission reduction, and liveliness are all impacted by urban form, either positively or negatively (Johnson, 2007). Thus, it is high time to study the dynamics of urban livability, and model relationship among urban form and other factors that contribute to better livability of a city (Williams, Burton and Jenks, 2000). This paper deals with current urban trends, key concepts, frameworks, and comparison of evidences from global case studies to establish the existing gap and limitations, alternative methodologies for indexing spatial patterns for liveability and appropriate policies from reports and journal papers.

2. Research Background

One of the main tenets of urban planning and governance is livability, whose definition and assessment have emerged as key areas of study (Liang, Liu and Qiu, 2020). Therefore, there is growing interest in measuring policy outcomes related in creating more liveable cities, with reduced inequalities. Since the elements of livability are subjective, the measures and approaches vary at individual, social, built environment and policy levels (Cox, Arnold and Tomás, 2010). In 1980s to 1990s, “livability” acquired popularity, demanding sociologists and planners to study the “shift in urban development patterns; from urban centres to rapidly growing suburbans. The definition of livability entails multiple ranges of aspects, mostly corresponding to human settlements, social, economic, environmental, and health-related features along with social inclusivity rather than the mere considerations of the “utilitarian view that reduces livability to primary considerations of public amenities and health” (Liang, Liu and Qiu, 2020; Çalışkan, 2022). However, a robust humanistic perspective achieving the interaction between city dwellers and the urban environment is desired. Livability cannot be better understood without studying the relationship among the behaviour, perception, and interactions of people and space (Pacione, 1990). Newman stated that livability is the “human requirement for social amenity, health, and wellbeing” which includes both “individual and community wellbeing” (Newman, 1999). In addition, livability consists of other two elements; *the city’s environment and the population that demands goods and services.* In general, these definitions emphasize the interaction between people and the environment (Ruth & Franklin, 2014).

2.1 Livability Measurement Tools

Livability index is a table that ranks cities, regions, or nations based on a combination of their quantitative and qualitative properties. These indices are often developed and produced for commercial and governmental interests. A wide range of constructs, indices and measurement tools constructed over a period of time are discussed and compared below.

Global Livability Index (EIU)

The Economist Intelligence Union (EIU)'s "Global Livability Ranking" is the most comprehensive and far-reaching of all livability ranking systems as on today. The ranking system assesses 170 cities for over 30 qualitative and quantitative factors that are grouped under five weighted categories namely "stability, healthcare, education, infrastructure, culture and environment" (EIU, 2021).

Mercer's Quality of Living Survey

The Mercer Quality of Living Survey measures quality of living in over 460 cities worldwide with the aim to help companies and expatriate professionals assess appropriate allowances and incentives for relocation. Quality of living is measured considering 39 descriptors that are grouped in 10 categories namely, "socio - political environment, economics, socio-cultural environment, health and environment, education, transportation, housing, and natural environment"(Mercer, 2020).

American Association of Retired Persons (AARP)

American Association of Retired Persons (AARP) Public Policy Institute supports the livable urban environment by developing 'AARP livability Index', an online instrument to quantify community livability on a scale of 0 to 100, under seven categories namely "affordable and accessible housing, accessible neighbourhood, work and play, safe and convenient transportation, environment with clean air and water, health, community engagement with civic, economic, social involvement, and inclusive and potential opportunities" (AARP, 2015).

OECD Better Life Index

OECD Better Life Index (BLI) is a tool that allows users to "compare the well-being of countries". It is a multi-dimensional framework covering 11 dimensions, that include "income and wealth, work and job quality, housing, health, knowledge and skills, environmental quality, work-life balance, social connections, civic engagement, safety and subjective well-being" (OECD, 2011).

Human Development Index

Human Development Index (HDI) is a "United Nations (UN) measurement system that evaluates a country's average human development in three areas; *health, knowledge and standard of living"*(UNDP, 2024) .

Ease of Living Index

Ease of Living Index (EoI) is a tool used by the Ministry of Housing and Urban Affairs (MoHUA), Govt. of India to "assess the quality of life and the impact of urban development initiatives". The index is based on four pillars; *Quality of life, Economic ability, Sustainability, and Citizens Perception Survey"*. These pillars are further divided into 14 categories and 49 indicators (MoHUA, 2020).

Overall Livability Index by IFC

Overall Livability Index by IFC-India is built upon eight core pillars namely "demographic, education, health and medical standards, socio-cultural, natural, environment, economic environment, safety, housing, and

planned environment". These pillars are sub-divided into 20 sub-pillars, which consist of indicators that map the factors quantitatively (CII, 2010).

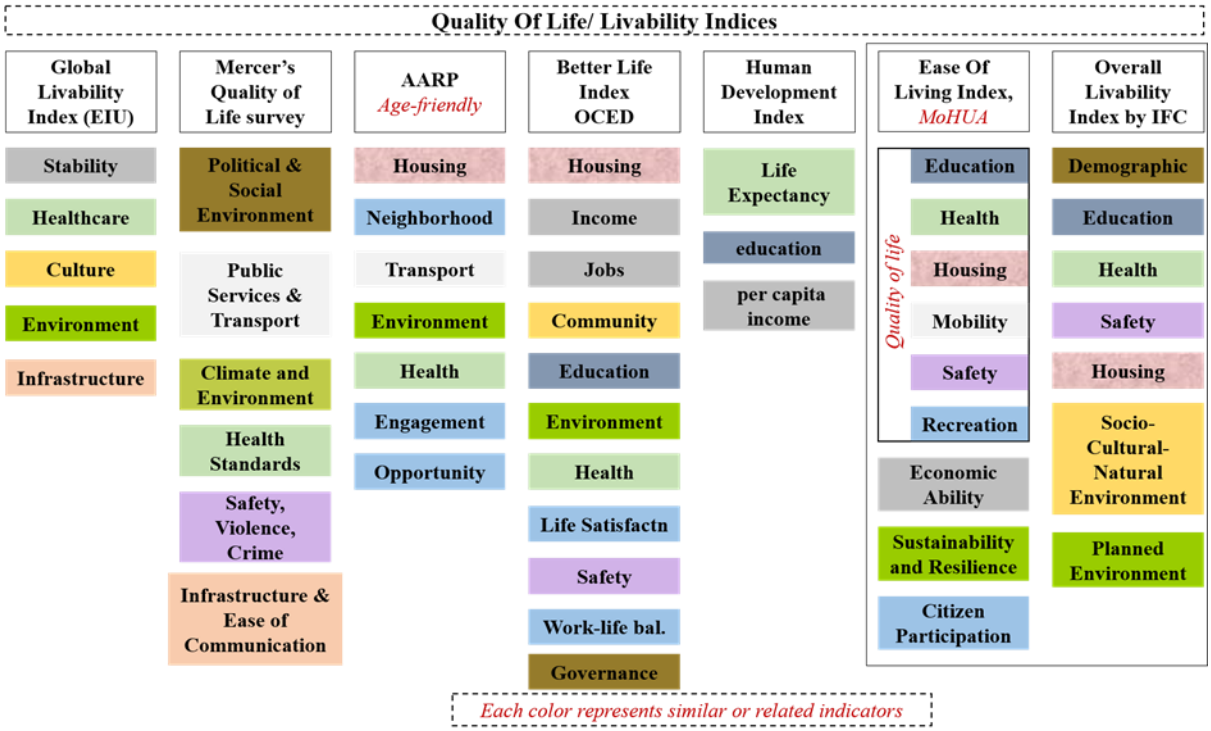


Figure 1: Livability dimensions used in various indices. Source: Authors

It has been observed that the methods and systems utilized to assess liveability only take into account a limited number of urban planning indicators related to businesses that provide a wide range of services to the general public, as shown in Table 1. These tools/indices measure the cities at different scales from neighbourhoods, districts and cities/regions. Our objective is to identity the most relevant aspects which relate to urban planning and analyse their evaluation methodologies in detail.

Table 1 Research Matrix for urban livability systems

Indications to Measure	Global	Mercer's QoL	AARP	Better Life	Human	EASE OF	Overall
Crime / Safety		✓		✓		✓	✓
Governance		✓		✓			✓
Economic Ability	✓		✓	✓	✓	✓	
Education		✓		✓	✓	✓	✓
Healthcare	✓	✓	✓	✓	✓	✓	✓
Environment	✓		✓	✓			✓
Infrastructure	✓	✓					
Culture	✓						✓
Public Participation						✓	
Community			✓	✓			✓
Universal Inclusivity			✓				
Ease of Communication	✓						
Housing			✓	✓		✓	✓
Recreation						✓	
Public Services/Transport		✓	✓			✓	
Life Satisfaction				✓			

2.2 Historical background and Global Initiatives

The 15-minute city

The "*15-minute city* is an urban planning tool, aimed at improving the quality of life for city-dwellers. It is an innovative idea, aimed at establishing hyper-proximity infrastructure, which is not new on the urbanism contours, specifically in the Indian context". Since public transportation in Paris occupies 66% of its public space, need for individual cars for mobility is preferred by 17% of the nation's population, Singapore's outstanding infrastructure and quality amenities makes accessibility easier and the city pedestrian-friendly. Making Indian cities more resilient requires incorporating walkability and accessibility into micro-level planning at the ward and neighbourhood levels. For example, the historic walled city of Jaipur, which was built 294 years ago, is a "15-minute city" because its essential services, recreational amenities, and workplaces are all within 15 minutes of housing. (Hastak, 2022).

Form Based Code

Form Based Code (FBC) is developed as an alternative to conventional zoning and building regulations with a focus on comprehensive development and economic, social and environmental sustainability with community participation. Relationships between buildings and streets, people and cars, public and private areas, and the size and kind of roadways and blocks in the urban area are emphasised. (Russell and Stanton, 2014)(NIUA, 2023). Redwood City, California which has a downtown that's more vibrant than it used to be in past decades, Cincinnati, Ohio, where the entire city is revamped and Nashville, Tennessee, where taxable value in the districts increased by 75 percent, are some of the examples of FBC which reduces crime rates considerably by extending activity throughout the day.

3. Livability and Urban Form

Ideal city models, from "Plato's *early utopia* to Garden city of Ebenezer Howard (Howard, 1902) and Pual and Percival Goodman (Percival and Paul, 1960)", embed an intrinsic search for livability in environment and community". The concept of urban form covers "location, shape, geometry, and relationships among the spatial elements like streets and roads, plots and buildings, public spaces, and green areas, within the built environment; at a variety of scales, from the building block to the urbanized region" (Hack, 2012). Urban elements' spatial relationships like *buildings, streets, and blocks* constantly interact with users and affect the perceived quality of urban spaces for better livability. Built environment's physical characteristics have a major impact on a place's long-term performance, it is pertinent to address liveability in relation to urban form (Southworth, 2013). It influences how people plan their lives, delineates or offers chances for the distribution of resources and facilities that promote human mobility and enhance social interaction, education, and pleasure (Hack, 2012). The study of urban form leads to objectively quantifying such relations and understand their dynamics.

3.1 Density

Healthy and thriving cities aren't just dense metropolises but they are vibrant ecosystems that welcome, support, and serve everyone. Further, the length and width of blocks and sidewalks respectively are designed for closer proximity to transit, healthcare, education, food, and open spaces that are critical to making it liveable. One important aspect of how cities operate is urban density. According to research, maintaining urban density as the only important indicator for assessing densification is crucial. On the other hand, adding spatial variety and network centrality metrics may promote more livable density (Martino, Girling and Lu, 2021). Many measures of density describe important urban phenomena. However, a mission-oriented public policy that measures its success with a single measure for the city at large is easier

to formulate, garner support, and implementation (Angel, Lamson-Hall and Blanco, 2021). Density can be measured and expressed in a variety of ways, each of which is useful in a distinct context. There is no consensus on how to quantify density and, thus, how to utilise density criteria in plans and policies. (Churchman, 1999; Banai and DePriest, 2014). In all circumstances, density is expressed as a ratio, with the numerator representing a quantity of human activity, people, jobs, or constructed form and the denominator representing a certain land base. Typically, density is stated as a single unit of land area, housing units per hectare, or population per square kilometre. Lack of proper regulations and required institutional framework for fulfilling the high demand for "compact and high density built areas" can lead to overcrowding, environmental degradation, lack of privacy, isolation and breakdown of identity (Kotharkar, Bahadure and Sarda, 2014; Ali and George, 2022). This makes urban form a key aspect of what can be considered a vibrant, safe and healthy neighbourhood.

3.2 Diversity

Diversity or the degree of diversity is an essential factor for livability, economic growth, and attractiveness of cities that finds its prominence in relation to physical form (Jacobs, 1961; Smith, Nelischer and Perkins, 1997; Sayyar, 2011). Social diversity is regarded as something that makes the world more liveable and attractive (Young, 1994; Ezati, 2023). Urban public spaces are crucial in maintaining the social life of a city, since they are intended to be enjoyable to use, and to create a lively city expressing their culture and traditions and welcomes social diversity. From the consideration of morphology to ideals of sustainable urbanism, diversity plays a major role in not only enhancing mixed-use development but also creating opportunity to attract industries, diverse backgrounds, and healthier communities (Sadeghi and Li, 2019) (Cheshmehzangi and Li, 2020). Land use diversity, in terms of mix of uses, can be used to assess the potential of livability of urban landscapes (Jacobs, 1961; Koster and Rouwendal, 2012) Mixed and multifunctional land uses are able to promote urban vibrancy and yield socio-economic benefits. However, fine-grained mixing of diverse uses creates vibrant and successful neighbourhoods (Jacobs, 1961). *Shannon entropy* is the most widely used for diversity measurement when examining mixed use, although it has been found to be inadequate in capturing the multidimensional aspects of mixed use. (Manaugh and Kreider, 2013; Yue *et al.*, 2016). Entropy generally quantifies homogeneity of land use in a given area (Bordoloia *et al.*, 2013). Diversity is composed of three dynamic attributes: *intensity, variability, and consistency,* (Batty, 2013) and examination of cities at appropriate scales and gain a better understanding of the city is required.

3.3 Accessibility

Through its "New Urban Agenda," the UN has called on cities to improve accessibility in order to meet the Sustainable Development Goals (SDGs). Well-connected infrastructure would allow people to come to public spaces, improve walkability, and create sustainable cities (United Nations, 2015). The study of accessibility can be viewed from two perspectives; *first one referring to distribution of public amenities, the second to the spatial configuration of the streets.* Although, measures of accessibility can be related to different aspects of transport infrastructure, its indicators can be used to measure pedestrians and cyclists as well as public and private transport. Proximity to the accessible places and locations, from an identified point in the study area is a key factor in organizational concept of a city system. Attractive and accessible locations are the ones with lowest distance and travel costs, with availability of frequent transport to other places (Batty, 2009). Although, accessibility studies focus mostly on one element "proximity" it should be expanded to affordability and equity, to understand the efficiency of transport infrastucture (Heerden *et al.*, 2022). "Transit-oriented development (TOD)" facilitates the development of dense urban forms (Lang *et al.*, 2020). However, "*development-oriented transit*" could be found in Indian context, which lowers the

livability, social integration; *both vertically and horizontally as in the case of metro rails.* Considering the multi-dimensional nature of the concept, three interacting input variables are used to calculate spatial accessibility; *supply, demand, and mobility* (Park and Goldberg, 2021). Accessibility, thus, is considered very influential in decision-making and policy formulations.

3.4 Affordability

Affordability is a central criterion of built environment in urban livability and vitality, apart from "density, land use mix, block size, building age, accessibility, and lack of border vacuums" (Singer, 2021; Tang *et al.*, 2022). Vitality in streets is a prerequisite to create liveable urban environments. Although economic vitality of community is not a new concept, lack of economic vitality would result in declining property values and quality of life. Affordability makes housing and other facilities financially affordable for the majority, and it is a significant issue in most big cities across the world (Martino, Girling and Lu, 2021; Singer, 2021). Urban form affects housing affordability stress through both productivity and living amenities (Jiuwen *et al.*, 2024). Researchers have found a significant correlation between the configuration of spatial networks and land price (Chiaradia *et al.*, 2013). Location affordability refers to the combined housing and transportation costs that has to be borne from a share of their income (Haas *et al.*, 2006). Studies have been using multiple spatial variables and machine learning models to predict housing prices based on transportation infrastructure and neighbourhood amenities (Yoo, Im and E.J., 2012; Chen *et al.*, 2017). The availability of high-frequency datasets facilitate the accurate assessment of housing costs and affordability (Boeing and Waddell, 2017). Decisions on affordability can be made "real-time" if sufficient real-time data is available, with the assistance of geographic information systems and upcoming artificial intelligence.

4. Comparative Critical Perspective

A definition and framework for the study of urban liveability are provided by earlier research (Mahmoudi et al., 2015). These studies do, however, still have certain shortcomings. "Overemphasis on the effects of economic expansion on the urban environment (Romao et al., 2018; Xiao et al., 2021) and lack of focus on physical pillar of liveability" (Paul, 2020). There is a need for a holistic concept of human-environment relationships, to integrate city form and social processes (Romice *et al.*, 2016; Dorado, 2023). There are studies on comprehensive evaluation of urban livability from multiple dimensions, and scanty related studies from the perspective of geographic space (Liang, Liu and Qiu, 2020; Fu and Zhang, 2023).
Indicators used in the current researches do not apply a "community-driven approach" but centered on 'top-down' approaches. It is a critical gap since the core of urban livability is people's interaction with urban environment, not just the availability of social spaces or merely score or rank by any system of assessment (Christy, Raissa and Sandhy, 2021). Although, factors of urban form such as density and diversity are considered crucial components of liveable cities, they are only the visible part of a much larger ecosystem. Thus, there is a need to research on micro level planning approaches (ORF, 2020), role of urban form and spatial structure on accessibility. Athough, researchers have identified the relevance of livability at the intersection of the urban environment and community, affordability and economics imply the overarching notion of quality of life in cities (Kamp et al., 2003; Loeiz et al., 2012It is clear that most research is focused on the evaluation of experience in rich countries, and there is a dearth of scientific analysis about urban liveability in developing or impoverished countries (Okulicz-Kozaryn, 2013).
In India, data availability is from limited source and sparse. Frequency of data updation is also a big question. Data collection is mostly done using statistical data and questionnaire surveys. However, studies in China, Hong Kong and other parts of the world shows the use of spatial big data (Leipnik, Ye and Gong, 2011; Zhu *et al.*, 2020; Yu and Fang, 2023). It is suggested that data acquired from web sources such as open street maps (OSM), point of interests (POI) and publicly accessible data on housing price, employment etc. will help in reflecting the spatial differences related to urban liveability better.

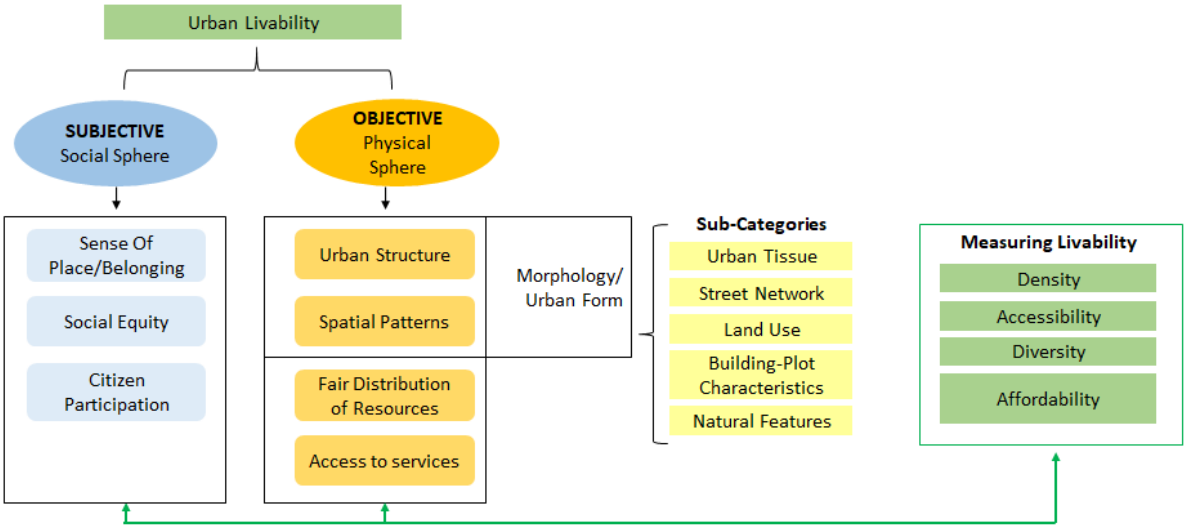


Figure 2 Urban form-based livability conceptual diagram. Source: Authors

5. Conclusion

Cities over the centuries have to deal with numerous problems, and resolving each requires specific strategies and techniques which are elucidated through this study. It is established that the connection between livability and urban form is complex in Indian context, which is influenced by rapid urbanization, population density, economic disparities, and diverse cultural landscapes. Addressing the well-being and quality of life of residents has become increasingly important as a result of the growth of industrial parks and special economic zones (SEZs), which draw commercial and industrial investments. The relationship between quality of living and urban form is multidimensional, with appropriate urban design playing a essential function in influencing the livability and sustainability. The paper reiterates the importance of quantification of relationship among density, accessibility, diversity, and affordability which provide a significant benefit to planners and decision makers. It is established that urban livability needs to consider the urban form; *shape and organisation*, to achieve an acceptable humane urban quality of life. Other pertinent stakeholders, including urban planning departments, may benefit from the study's findings.

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