International Journal of Architectural, Civil and Construction Sciences
ISSN: 2415-1734
Vol:11, No:1, 2017

Identifying Factors for Evaluating Livability Potential within a Metropolis: A Case of Kolkata

Arpan Paul, Joy Sen

***Abstract*—**Livability is a holistic concept whose factors include many complex characteristics and levels of interrelationships among them. It has been considered as people's need for public amenities and is recognized as a major element to create social welfare. The concept and principles of livability are essential for recognizing the significance of community well-being. The attributes and dimensions of livability are also important aspects to measure the overall quality of environment. Livability potential is mainly considered as the capacity to develop into the overall well-being of an urban area in future. The intent of the present study is to identify the prime factors to evaluate livability potential within a metropolis. For ground level case study, the paper has selected Kolkata Metropolitan Area (KMA) as it has wide physical, social, and economic variations within it. The initial part of the study deals with detailed literature review on livability and its significance of evaluating its potential within a metropolis. The next segment is dedicated for identifying the primary factors which would evaluate livability potential within a metropolis. In pursuit of identifying primary factors, which have a direct impact on urban livability, this study delineates the metropolitan area into various clusters, having their distinct livability potential. As a final outcome of the study, variations of livability potential of those selected clusters are highlighted to explain the complexity of the metropolitan development.

***Keywords*—**Livability potential, metropolis, Kolkata Metropolitan Area (KMA), well-being.

I. Introduction

TILL 1970, the term livability was non-existent in the domain of urban planning [1]. The decade of 1980s has shown growing interest of livability in cities because of the rising theme of urban sustainability [1], [2]. Improving the livability and socio-economic equity of residents and reducing environmental impacts of various urban activities became the primary agenda of urban sustainability [3], [4]. Several advocacy groups, individual researchers, and policy makers suggested sustainable urban reform approach to promote livability [5]-[7].

During late 1980s the growing interests on population growth and its impact on urban environment focuses on the concern for future of cities and the overall wellbeing of the citizens by the policy makers and various researchers [6].

In this context, livability can be interpreted as a concern with the degree of interactions between citizens and their surroundings [6] or the degree to which a city can satisfies the physical and psychological needs and wants of its residents [8].

Fig. 1 'Future of cities' approach

The concept of livability became one of the most important argument to draw the attention of individual researchers, policy makers and various development organizations as a substitute tool for decision making [9].

II. Review of Literature

Although livability doesn't have any specific definition, various studies in different contexts have indicated possible aspects which might constitute its definition [7]. In many instances, livability is studied under the social dimensions of sustainability [10]. In this instance, it takes an "ensemble concept" [11] whose factors include many complex characteristics and circumstances. Livability confines broad human needs from place making approach to socioeconomic wellness [12]. It has been considered as people's desire for public amenities and is recognized as a major element to create social welfare [13].

The concept of livability has a direct association with an urban community's welfare [14]. This attempts to motivate urban areas towards an ideal level and is applied in three aspects of the community: environmental quality, neighbourhood amenity, and individual well-being (Fig. 2) [15].

The dimensions of livability have been debated by various researchers and they have extracted different measures to identify them [13]. In 2010, Kevin Lynch had augment five components of livability namely, vitality, sense, fit, access, and control [15]. On the other hand, in 2000, Douglass had argued that the realisation of a livable city could be achieved through increasing the overall well-being of the existing communities [15], [16]. As per his opinion, livability is based on the following four pillars,

i. Direct investment in talent and well-being.
ii. Access to meaningful work and livelihood opportunities.

Arpan Paul is with the Research Scholar at IIT Kharagpur, India (e-mail: arpan.paul@iitkgp.ac.in).
Joy Sen, Professor, is with the Department of Architecture & Regional Planning; Head, Ranbir and Chitra Gupta School of Infrastructure Design and Management, IIT Kharagpur, India (e-mail: joysen@arp.iitkgp.ernet.in).

iii. Having a safe and clean environment.
iv. Establishing good governance.

Fig. 2 Dimensions of livability

The concept and principles of livability are important to recognise the significance of community wellbeing [13]. The attributes and dimensions of livability are also important aspects to measure the overall prosperity of that place [17]. Livability potential is mainly the capacity to develop into the overall well-being of an urban area in the future [15].

Jean Gottman's coinage of the term 'megalopolis' to describe the urbanized area stretching from Boston to Washington, DC in 1964 had further inspired the contemporary use of the term metropolitan [18], [19]. In this section, this study evaluates the livability potential within a metropolis.

Based on the review of literature, Table I lists a comparative analysis of few case studies where livability potential has been evaluated through various socio-economic factors.

In general, the key dimensions of livability tend to be converted into a much more specific set of factors that can be used for evaluation [11]. Factors have long been used by planners, policy makers and public managers [10]. They also have tried to identify the procedure to measure and track livability [11].

TABLE I
COMPARISONS OF EVALUATION OF LIVABILITY POTENTIALS BETWEEN VARIOUS CASE STUDIES

Metropolitan areas	Factors for evaluating livability potential	Remarks	Studies
Cascadia (USA)	Transit Facilities Employment Generation Efficient land use	Identify Cascadia's livability in terms of its scale namely regional scale to community	[18], [20]
Washington D.C (USA)	Transportation	Try to shape out the physical and social dimensions of a livable neighbourhood	[11], [21], [1],
Bristol (UK)	Health People Economy Prosperity Open spaces Transportation	Evaluates social and economic impact of metropolitan livability	[22], [23], [16]
Macau (China)	Health Safety living Standard Community connectedness Future security	Identify the way to people perceive their lives and general living conditions in Macau.	[24], [25]

III. MATERIALS AND METHODS

This study is based on detailed literature review on assessment of livability potential within a metropolis. From various studies, eight sets of indicators have been identified, namely housing, employment & income, educational facilities, health and social services, public open space, transportation facilities, leisure and culture, and crime and safety. The detail set of indicators and their associated factors are given in the Table II.

After identifying the set of indicators and their associated factors, the next step of this study is to identify the prime factors to evaluate livability potential within a metropolis. For this segment KMA has been identified as a ground level case study for the following considerations.

- It is one of the largest urban agglomerations in India [26].
- KMA has a continuous stretch of conurbation along the both sides of the river Hooghly in a linear form [27].
- KMA, has continuously expanded and is formally administered by 4 Municipal Corporations, including Kolkata Municipal Corporation (KMC), Howrah Municipal Corporation (HMC), Chandannagar Municipal Corporation (CMC) and Bidhan Nagar Municipal Corporation (BMC). Inclusive of that, it has 37 Municipalities, 72 towns and 527 villages, spread across six districts namely, Kolkata, Howrah, Hooghly, Nadia, South-24 and south-24 Parganas respectively [28].
- As a primate city, Kolkata has the largest conurbation surrounding it, which fabricates into sub-regional variations on the basis of various socio-economic aspects [27].

To understand the impact of these selected set of indicators and their associated factors on the metropolitan livability, a detailed questionnaire-based survey was conducted with 67 samples selected from various strata within KMA. For an appropriate survey purpose, this study has classified KMA into two clusters, namely east bank and west bank (on the perspective of river Hooghly). All the samples have been collected from these two clusters. The respondents were asked to highlight the impact of selected set of factors on their livability domain. This study asked about the following:

1) Basic information (for each set of indicators) in day to day life.
2) Overall satisfaction for various facilities and amenities for each selected set of indicators.
3) Impact of the selected factors on the livability domain.

After the detailed livability assessment survey, this study has applied ordinal logit regression [29] to augment the prime factor to evaluate livability within a metropolis (Table II). Through this statistical analysis, this study tries to ascertain the important factors which create a profound impact on the metropolitan livability.

TABLE II
SELECTED SET OF INDICATORS AND THEIR ASSOCIATED FACTORS

Set of Indicators	Factors	Set of Indicators	Factors
Housing	Neighborhood as a place for living Density of housing quality of government services Regular maintenance Variety in landscape	Transportation facilities	Accessible and convenient public transportation Affordable public transportation Well-maintained public transportation Reliable public transportation Safe public transportation stops Well-maintained streets Public parking lots, spaces and areas to park Affordable public parking Audio/visual pedestrian crossings
Employment & Income	A range of flexible job opportunities Job training opportunities Jobs that are adapted to meet the needs of people with disabilities Tendencies to shift another place for better job purpose	Leisure and culture	Conveniently located venues for entertainment Activities specifically geared to Children Activities specifically geared to older adults Activities that are affordable to all residents Activities involving young and older people Accurate and widely publicized information about social activities Social clubs such as for books, gardening, crafts or hobbies Availability of multiplexes Availability of restaurants/cafes Availability of shopping complexes Availability of theatre Availability of amusement park
Educational facilities	Overall educational facilities Accessibility to public schools Accessibility to private schools Accessibility to colleges Availability of education facilities for backward families Availability of education facilities for slum population/street children Availability of education facilities for old people	Crime and safety	Feel safe to roam at evening Fear in crime Safety for children Safety at home Safety in neighborhood Police protection Level of violent crime Level of petty crime Alcohol-related disorder Personal safety
Health and social services	Availability of health and wellness programs and classes Conveniently located health Conveniently located emergency care centers Home care facilities Affordable home health care facilities Facilities in govt. hospitals Facilities in private health care	Public open space	Well-maintained and safe parks that are within walking distance of your home Sidewalks that are in good condition, free from obstruction and are safe for pedestrian Well-maintained public buildings Separate pathways for bicyclists and pedestrians Well-maintained public restrooms Presence of vegetation

Fig. 3 Kolkata Metropolitan Area (KMA)

In Table III, the above-mentioned factors have been identified from a pool of factors, selected from extensive literature review. From ordinal logit regression [30], 'T' value for every selected factors have been calculated, and the 'T' value of those factors which have satisfied the value at 95% of confidence level (in this case it is 1.684) have considered as the most important factors to evaluate livability potential. At a conclusion, the above-mentioned factors (Table III) are the prime factors through which livability potential can be measured within a metropolitan scale.

IV. RESULTS AND DISCUSSION

A. General Information

- 68.7% of the respondents have graduation and more educational degrees. The percentage is quite high within the female population. And the level of educational qualification is increasing not only within the core city but it also high in the outskirts.
- 40.1% respondents engaged as full time employed in various public and private organizations.
- 16.4% respondents are engaged themselves in various business oriented activities.

- 72.7% of the respondents within KMA stays in nuclear families with a household size of three to five. But in few cases the presence of joint families has been found, where more than six members of the same household are living together. This trend has mostly found around the outskirts of both the banks.
- On the west bank of KMA, few places namely Kamarhati, Panihati etc. where around 64.5% of the respondents were migrated from Bangladesh. During independence era, they came and settled over these places. In these localities, several refugee colonies have been found, where the level of basic infrastructure are very poor. On the other hand, along the east bank 70.7% respondents are staying for more than 45 years.

TABLE III
FACTORS TO EVALUATE LIVABILITY POTENTIAL WITHIN KMA

Set of Indicators	Factors	T value
Housing	Density of housing in your neighborhood.	2.372
	quality of government services	2.628
	Regular maintenance in your neighborhood.	1.754
Employment & Income	A range of flexible job opportunities	4.946
	Job training opportunities	1.797
Educational facilities	Accessibility to public schools	2.993
	Accessibility to private schools	1.908
	Accessibility to colleges	2.388
	Availability of education facilities for slum/street children	1.967
Health and social services	Availability of health and wellness programs and classes	2.768
	Conveniently located health and social services	1.939
	Home care services	1.919
Public open space	Well-maintained public buildings and facilities that are accessible to people	3.155
	Well-maintained public restrooms that are accessible to people of different physical abilities	1.754
	Sidewalks that are in good condition, free from obstruction and are safe for pedestrian	3.696
Transportation	Affordable public transportation	2.593
	Well-maintained public transportation	1.767
	Reliable public transportation	1.677
	Safe public transportation stops	1.867
	Well-maintained streets	1.478
	Public parking spaces	1.754
Leisure and culture	Conveniently located venues for entertainment	1.167
	Activities specifically geared to Children	2.783
	Activities that are affordable to all residents	2.667
	Social clubs	1.890
	Availability of shopping complexes	2.272
	Availability of theatre	2.783
Crime and safety	Feel safe to roam at evening	1.911
	Safety for children	4.946
	Safety at home	3.035
	Police protection	3.946
	Personal safety	2.256

- 16.4% of the respondents within KMA move to the present neighborhood after marriage, 23.9% have moved to their respective vicinities, to desire a livable environment. 4.5% of respondents moved to the existing domain because they couldn't afford the daily expenses of their previous domains.

B. Existing Livability Pattern within KMA

- To understand the present standard level of wealth, comfort, material goods and necessities available to a certain socioeconomic class in a particular domain, this research attempts to understand the relationship between employment status of the respondents and their housing affordability within KMA (as shown in Fig. 4).

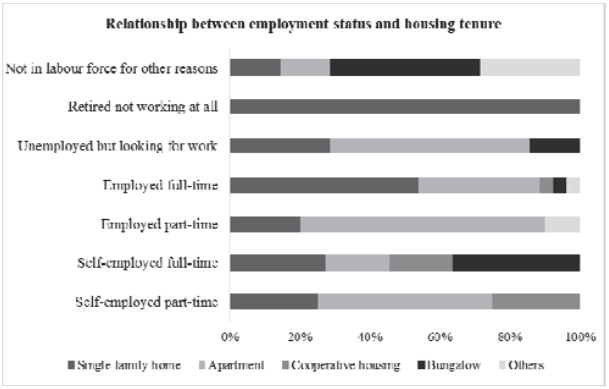

Fig. 4 Relationship between employment status and housing tenure

- Within KMA, most of the respondents prefer to live in self-owned properties, because of their sentimental aspirations. But most of the cases, they generally prefer to stay in rental houses (within Kolkata), because of their low affordability some respondents have shifted to the city (mainly KMC, BMC, west bank of KMA) for job purpose. So, they are willing to prefer rented properties. So, the demand for rental housing are much more within KMC, BMC. 37.3% respondents prefer to live in apartments (mostly in 2BHK for preferable housing affordability) at the west bank. But the scenario is little different along the east bank. Here most of the respondents are aspiring to have an own house to stay.
- In case of educational facilities, both the banks have several private schools, with good infrastructures. But dependency on public school has much higher at the east bank.
- In west bank the presence of renowned degree and diploma colleges have found. Most of the cases respondents from both the east and west banks mostly depends on theses colleges.
- In terms of health care and facilities, a large number of public and private hospital are there in the west bank (KMC). Most of the respondents from both the banks are depending on these health facilities. But at present the number of affordable home care facilities have found within both the banks.

- Public spaces mainly along the river Hooghly on both the banks are a significant feature. These are accessible to local residents, generally providing for recreation and also can provide an identity and a sense of place. But the public spaces on west bank of KMA has well conserved than the east bank.

Fig. 5 Public spaces along the west bank, KMA

Fig. 6 Public spaces along the east bank, KMA

- The respondents of both the banks are extremely satisfied with inter and intra connectivity of KMA. In the east bank of KMA Para transit connectivity have noticed within the neighborhood level. This features mostly found within the west bank of KMA, but limited within the outskirts at the east bank. Because of reliable and affordable public transit system within KMA, people from outskirts are daily communicate to Kolkata for various purposes.

III. Conclusion

A review of existing assessment process to evaluate livability potential within a metropolitan scale shows that most of the studies evaluate livability on the basis of affordable public transit system within the metropolis. But from the literature review, this study has identified that there are many other socioeconomic factors through which a proper livability evaluation process can be developed. This study has attempted to identify these factors and evaluate its impact on the metropolitan livability domain. But due to time constraints, the present study only focusses to identifying the factors and their impact on the livability within the metropolis. But in future various studies can be done to identify the dimensions of these factors to assessing livability within a metropolis.

References

[1] M. Kashef, "Urban livability across disciplinary and professional boundaries," *Front. Archit. Res.*, pp. 1–15, 2016.

[2] K. S.-T. Marketta Kyttä, Anna Broberg, Mohammed Haybatollahi, "Urban happiness: context-sensitive study of the social sustainability of urban settings," *Environ. Plan. B Plan. Des.*, vol. 47, pp. 1–24, 2015.

[3] C. C. Colby, "Centrifugal and Centripetal Forces in Urban Geography Author (s): Charles C . Colby Source : Annals of the Association of American Geographers , Vol . 23 , No . 1 (Mar ., 1933), pp . 1-20 Published by : Taylor & Francis , Ltd . on behalf of the Associ," *Ann. Assoc. Am. Geogr.*, vol. 23, no. 1, pp. 1–20, 2016.

[4] S. Chang, "Some Aspects of the Urban Geography of the Chinese Hsien Capital Author (s): Sen-Dou Chang Source : Annals of the Association of American Geographers , Vol . 51 , No . 1 (Mar ., 1961), pp . 23-Published by : Taylor & Francis , Ltd . on behalf of the," *Ann. Assoc. Am. Geogr.*, vol. 51, no. 1, pp. 23–45, 2016.

[5] M. Ruth and R. S. Franklin, "Livability for all? Conceptual limits and practical implications," *Appl. Geogr.*, vol. 49, pp. 18–23, 2014.

[6] M. Pacione, "Quality-Of-Life Research in Urban Geography," *Urban Geogr.*, vol. 24, no. 4, pp. 314–339, 2003.

[7] E. Chivot, *Livability and Sustainability in Large Urban Regions*. 2011.

[8] E. Lundberg, "Evaluation of Tourism Impacts - A Sustainable Development Perspective," *Dep. Bus. Adm. Sch. Business, Econ. Law*, vol. Licentiate, 2011.

[9] Y. Schomberg, K. Polakit, and D. Prosperi, "Spatial Partitioning of Livability Indices: South Florida Case Study," *REAL CORP 2011 Chang. Stab. Lifecycles Cities Reg.*, vol. 6, no. May, pp. 895–904, 2011.

[10] S. S. Akter, "An examination of the livability of dense urban neighborhoods in Dhaka : the impacts of urban planning," *J. Chem. Inf. Model.*, vol. 53, no. 9, pp. 1689–1699, 2013.

[11] Committee on Identifying Data Needs for Place-Based Decision Making, Committee on Geography, and National Research Council, *Community and Quality of Life: Data Needs for Informed Decision Making*. Washington, D.C., 2002.

[12] K. Ronita Bardhan, H. Kurisu, Kiyo & Hanaki, "Linking Urban Form & Quality of Life in Kolkata , India," *ISOCARP Congr.*, vol. 47, no. section 2, pp. 1–12, 2011.

[13] R. Kennedy and L. Buys, "Dimensions of Liveability : A Tool for Sustainable Cities," in *Sustainable building conference*, 2009, pp. 1–11.

[14] H. Badland *et al.*, "Urban liveability: Emerging lessons from Australia for exploring the potential for indicators to measure the social determinants of health," *Soc. Sci. Med.*, vol. 111, pp. 64–73, 2014.

[15] M. Javad, M. Tilaki, A. Abdullah, A. Bahauddin, and M. H. Marzbali, "The Necessity of Increasing Livability for George Town World Heritage Site : An Analytical Review," *Mod. Appl. Sci.*, vol. 8, no. 1, pp. 123–133, 2014.

[16] M. Uysal, R. Perdue, and M. Sirgy, *Handbook of tourism and quality-of-life research: enhancing the lives of tourists and residents of host communities*. USA: Springer, 2012.

[17] M. Jomehpour, "Assessing the Livability of the New and Old Parts of Tehran, Municipality Districts 22 and 10 of Tehran," *OIDA Int. J. Sustain. Dev. 0809*, 2015.

[18] T. S. of U. S. and Planning, "Livability in Cascadia," Portland, 2006.

[19] G. Richards, "Creativity and tourism. The state of the art," *Ann. Tour. Res.*, vol. 38, no. 4, pp. 1225–1253, 2011.

[20] T. A. Hutton, "Thinking Metropolis: From the 'Livable Region' to the 'Sustainable Metropolis' in Vancouver," *Int. Plan. Stud.*, vol. 16, no. 3, pp. 237–255, 2011.

[21] E. Morley, M. K. Winkler, and S. Zhang, "The Validating Arts & Livability Indicators (VALI) Study : Results and Recommendations Prepared by the Urban Institute for the National Endowment for the Arts," Washington, D.C., 2014.

[22] Bristol City Council, "Quality of life in Bristol: Survey results 2013," Bristol, 2014.

[23] B. H. Roberts, *Managing Systems of Secondary Cities: Policy Responses in International Development*. 2014.

[24] R. Rato and G. Davey, "Quality of Life in Macau, China," *Soc. Indic. Res.*, vol. 105, no. 1, pp. 93–108, 2012.

[25] P. F. Xie and K. Gu, "The changing urban morphology: Waterfront redevelopment and event tourism in New Zealand," *Tour. Manag. Perspect.*, vol. 15, pp. 105–114, 2015.

[26] P. T. P. K. Sarkar, "An approach to the development of sustainable urban transport system in Kolkata," *Curr. Sci.*, vol. 100, no. 9, pp. 1349–1361, 2011.

[27] Kolkata Metropolitan Development Authority, "Settlement Pattern in Future, Vision 2025." KMDA, Kolkata, 2000.

[28] U. Sengupta, "Inclusive development ? A state-led land development model in New Town , Kolkata," *Environ. Plan. C Gov. Policy*, vol. 31, no. 1, pp. 357–376, 2013.

[29] A. Kundu, *Trends and processes of urbanisation in India*, vol. 6, no. September. 2011.

[30] "An SPSS R -Menu for Ordinal Factor Analysis," *J. Stat. Softw.*, vol. 46, no. 4, pp. 1–29, 2012.

Arpan Paul is a Research Scholar from Department of Architecture & Regional Planning, Indian Institute of Technology (IIT) Kharagpur, West Bengal, India. He received Bachelor and Master of Science in Geography from Calcutta University and Master of Planning from Centre for Environmental Planning and Technology (CEPT) University, Ahmedabad. At present, he is conducting research on Metropolitan Livability Assessment.

Joy Sen is Professor at Department of Architecture & Regional Planning and Head, Ranbir and Chitra Gupta School of Infrastructure Design and Management. Indian Institute of Technology (IIT) Kharagpur, West Bengal, India. His core research areas are community and regional planning, history of Indian architecture, and Indology. He has authored several books on subjects ranging from India's contribution to Global systems of Sciences, Culture and Religion (2006), Principles of Indian Architecture (2009), Sustainable Urban Planning (TERI, 2012). He is the Principal Investigator for the interdisciplinary Project named SandHI – Science and Heritage Initiative at IIT Kharagpur (2014-17) funded by the Government of India.