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Distinct Population Patterns and Growth Trends: Evidence from Kerala

ASHRAF PULIKKAMATH*
TINY S PALATHARA**

ABSTRACT

Urbanisation is closely related to the three dimensions of development: economic, societal and environmental. There is a strong consensus that urbanisation is critically important to global development, but there is considerable confusion over what urbanisation actually is and how the ideas are to be conceived. Generally, urbanisation is tied up with economic and infrastructural advancement and thereby people preferred to stay at such places, resulting in large urban places, that we call metropolitan cities today. However, this idea need not hold true in all circumstances as there are other alternative models of urbanisation coming up. Kerala postulated a different model of urbanisation and it has now attracted the world by its urban agglomerations hitting the tag 'world fastest growing' in demographic terms. Therefore, the absence of polar urbanisation and the population-based urbanisation trend is the core of discussion in this paper. In addition, it compares the state patterns in urbanisation with those of metropolises in India.

Keywords: Urbanisation, Urban agglomeration, Census, Conurbation, Kerala

INTRODUCTION

India has been considered to be a major contributor to this urban explosion, because of both its large demographic weight and the dynamics of urbanisation. Several facts such as India's share of the projected world urban population increasing from the present 10 per cent to 14 per cent in 2050, and the increase in the number of 10 million-

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plus cities from zero in 1950 to three by the turn of the century have been cited as evidence of exceptional urban growth in India. (Mohan & Dasgupta, 2005).

Being the second most urbanised state in India (Census, 2011), Kerala shows distinct peculiarities in urbanisation patterns. Generally, an increase in the urban population growth rate is the result of the over-concentration of the population in the existing cities. However, in Kerala, the main reason for urban population growth is the increase in the number of urban areas as well as urbanisation of the peripheral areas of existing major urban centres. Kerala is very unique in settlement patterns also. In most of its parts, it is a continuous spread of occupancy without many open lands or fields separating habitations. So the settlement pattern itself gives scope for a pan state semi-urbanisation. Moreover, the infrastructural facilities available to the population, in general, do not vary much between rural and urban in the state, especially in the case of access to developmental institutions such as education and health care facilities. The socio-economic conditions and “better diffusion of urban features over space” has led to a neither rural nor urban” spatial pattern in Kerala (Sreekumar, 1990). It is in this context that the urbanisation trends of Kerala, with its unique settlement pattern and diverse socio-economic characteristics, stands out as a question before academicians.

This paper seeks to discuss the peculiar urbanisation pattern in Kerala in relation to regular and established urban places in India. It is indeed difficult to understand the urbanisation trend of Kerala since it shows some distinct features such as mushrooming urban agglomerations while no metropolitan concentration and the paper applies a comparative perspective to understand the scenario in the context of *The Economist's* report on the world's fastest-growing cities (2020). The urbanisation patterns in Kerala are explained in the context of development and demographic paradigms in Kerala over the years and possible and relevant comparisons are made to highlight the phenomenon. The report by *'The Economist'* throws light on these distinguished urbanisation patterns in the state. It is apparent that all the three in the top 10 world's fastest-growing Indian cities (2020) – Malappuram, Kozhikode and Kollam – are from Kerala which is neither the state capital (Thiruvananthapuram) nor the financial capital of the state (Ernakulam/ Cochin). Interestingly, two out of the three are from northern Kerala which seems to be less developed in regional disparity terms (Pulikkamath, 2017). Therefore, the paper attempts to map the distinguished trends in the urbanisation process in Kerala, which can be contrasted with the rest of India. In this background, discussing Kerala's development paradigm may shed some light on this distinct urbanisation pattern and for better comprehension.

THE BACKDROP : HISTORY OF DEVELOPMENT IN KERALA

The development history of the state of Kerala has completed 65 years as a state and also as a regional economy (2021). Kerala has been experiencing a two-fold pattern of development at economic and social fronts for the last six decades. Development as a process necessitates shifts from the primary sector to secondary and tertiary sectors or rurality to urbanisation (Todaro & Smith, 2014). Kerala postulates this shift in a unique way. In spite of stagnation of the secondary sector and prevalence of severe unemployment, it managed to catch-up with rapid urbanisation vis-a-vis development by cashing on in its higher human development. Certain demographic indicators such as migration and remittances have undue weight in the process of Kerala's development (Zachariah & Rajan, 2010) and the urbanisation process. In this context, the history of Kerala's development can be divided into three phases namely the first phase (1956-75), the second phase (1976-91) and the third phase (post-1991) (Prakash, 2005). The urbanisation of the state can also be overarched with these phases, but most of the radical urbanisation trends are visible in the later stages.

First Phase (1956-75)

Kerala remained a backward economy as it was a traditional primary sector that resulted in low productivity levels at the time of formation of the state in 1956. The state's major agricultural products were produced and sold as agricultural raw materials only. The agricultural operations were mostly uneconomic, labour-intensive industries like coir, cashew, handloom, etc. as the majority of the farmers had very small or marginal agricultural holdings. The two fundamental socio-economic problems faced by Kerala during this period were massive poverty and unemployment. However, the policies followed for industrial development, educational achievements and agricultural developments were sensible (Prakash, 2005).

With the above-said challenges for the newly formed state, the strategy of development pursued by Kerala during the first phase was a state-sponsored, state-funded development through planning and public expenditure with a focus on social welfare. The state neglected the importance of production, productivity, technological changes and the creation of more goods and services through a policy of non-prioritising productive sectors. Hence, the strategy has ignored the important role of the private investment of the people in accelerating the economic growth that may lead to the development process including urbanisation.

This phase shows a stunted urbanisation trend, as more than 80

per cent of the population remained in rural areas, essentially attached to primary sectors (Kerala Economic Reviews, 1960-76). The decadal urban population growth rate during this phase was 40 per cent (1951-61) 36 per cent (1961-71) and 38 per cent (1971-81). This growth rate was considerably low and regressive when compared to the earlier decade 1941-51 (53 per cent), in the wake of Indian Independence and state formation. The pace of urbanization during this phase was five per cent whereas the same was higher (6 per cent) at the national level. In the same fashion, the total number of towns (all types) in the state has nominally increased from 94 to 106, marking a sluggish growth during this period.

Second Phase (1976-91)

The gulf migration and the consequent economic boom is the highlight of this phase. Development in Kerala began to witness fast changes with the migration of Keralites to gulf countries for employment in the mid-1970s. The total stock of Keralite emigrants across the globe increased rapidly and so did the remittances received from the Keralite emigrants. It is evident that migration has helped migrant households to attain a higher level of income, consumption, acquisition of assets compared to non-migrant households (Zachariah & Rajan, 2010). Thus the migration and the consequences had a remarkable role in Kerala's economic growth and development with extraordinary economic changes pertaining to the labour market, consumption, saving, investment, poverty, income distribution and regional development.

The expected rural to urban transition in the development process (Todaro & Smith, 2014) has happened in Kerala in the form of outmigration due to the peculiarities of the economy, such as high human development coinciding with relatively less economic and physical development. Hence, urbanisation in the state can be perceived as a result of this social mobility induced large volumes of private investments also. This phase shows a gradual but nominal growth trend in the urbanisation process (Kerala Economic Reviews, 1976-91). The decadal urban population growth rate during this phase is 38 per cent (1971-81) and 61 per cent (1981-91). This growth rate is a notable progression when compared to the earlier phase, where it was regressive. The pace of urbanization during this phase was eight per cent whereas the same was lower (5 per cent) at the national level, which is a paradigm shift from the earlier phase. In the same fashion of growth rate, the total number of towns (all types) in the state got almost doubled from 106 to 197, marking a massive growth during this period.

Third Phase (Post 1991)

The third phase is obviously moulded on the foundations of the new economic policies of 1991 by India. Besides this, the third phase has been influenced by three other major factors, viz. the state policies and public expenditure, increase in investment, migration and flow of remittance (Prakash, 2019). With regard to neoliberal policies in 1991 and post that, the Congress led United Democratic Front (UDF) Government in Kerala during 1991 was proactive, but the successor Left Democratic Front (LDF) Government was totally against this structural reform. This created utter confusion in the development path of the state, at least for a decade (Kerala Development Report, 2008). Since then the state has witnessed an alternative choice between these two ideologies for each term as UDF and LDF have been coming to power alternatively (except 2021), the confusion between ideologies continue.

The Kerala Development Report (2008) observes that there was an absence of conscious effort towards promoting the industrial sector in the state, resulting in a negative economic development. Although the tertiary sector improved its growth, it was driven by producer services with limited linkages to the production sector in the state (Pillai & Shanta, 2005). The peculiar structural shift with an overconcentration of the service sector adversely affected the revenue earning capacity of the state, resulting in a revenue deficit. This has led to the undermining of the state's capability to undertake developmental expenditure (Mohan & Shyjan, 2005). On the other hand, this phase also demonstrates the 'gulf boom' effect in the state. As a result, the human development in the state upgraded well due to private investments in key areas such as education and health.

Consequently, the phase was marked by rapid urbanisation, earmarked with a twofold increase rate from 1991 to 2021. The decadal urban population growth rate during this phase is 92 per cent (1991-2011) and the growth rate is historically high when compared to the earlier phases. The pace of urbanization during this phase was also very high (21 per cent) when compared to the national trend (6 per cent). In the same fashion, the total number of towns (all types) in the state had drastically increased from 197 to 520, adding a wow factor to the arena.

DEMOGRAPHIC AND URBANISATION PARADIGMS IN KERALA

The state of Kerala has completed six decades of its existence as a state and it has also coined the renowned 'Kerala Model of Development' (CDS-UN Report, 1975) with its notable human development achievements in due course of time.

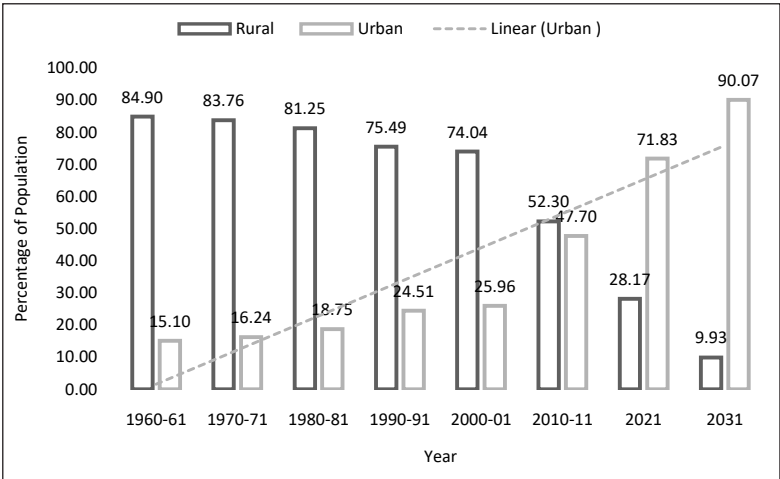
TABLE 1: GEOGRAPHIC AND DEMOGRAPHIC PROFILE OF KERALA (1960-2021)

Particulars		Years								
		Units		1960-61	1970-71	1980-81	1990-91	2000-01	2010-11	2019-20
Administrative Setup										
Geographical Area	000 Sq Km		38856.7	38864	38863	38863	38863	38863	38863	
Districts	Do		9	10	12	14	14	14	14	
Talukas	Do		55	56	58	61	63	63	75	
Villages	Do		NA	1326	1331	1364	1452	1532	1664	
Towns	Do		92	88	106	197	159	520	520	
Population as per Census										
Total (in 000s)	(in 000s)		16903.72	21347.38	25453.68	29098.51	31843.8	33406.06		2021
Male	Do		8361.93	10587.85	12608.74	14288.99	15468.61	16027.41		35,489
Female	Do		8541.89	10759.52	12885.08	14809.52	16372.76	17378.65		17,043
Density per sq km	Do		435	549	655	749	819	860		18,447
Literacy Rate (Percentage)	Do		55.08	60.42	70.42	89.81	90.9	94		860
Sex Ratio Females per 1000 males	Do		1022	1016	1032	1036	1058	1084		94
										1084

Source: Author. Compiled from Kerala Economic Review Reports (1960-2020), Census Reports (1951-2011) and Census of India 2011 Population Projections for India and States 2011-2036 Report (2020).

Table 1 exhibits a macro picture of the economic and demographic changes over time. There is a declining growth rate of population in the state except during the decade 1960-70, strongly backed by the successful awareness creation about family planning. This situation is in turn one of the results of universal education and social development in the state which paves a strong base of the Kerala Model development. Remarkably, the higher female to male sex ratio in the state is consistent across decades. Alongside, population density in the state is also increasing which could contribute to the less rural-urban disparity in population distribution in the state. However, the increase in the towns in the state is drastic; there is a five-fold increase in the number during the six decades.

Fig. 1: Temporal Transition of Urban-Rural Population in Kerala (1960-2031)



Source: Author. Compiled from *Kerala Economic Review Reports* (1960-2020), *Census Reports* (1951-2011) and *Census of India 2011 Population Projections for India and States 2011-2036 Report* (2020).

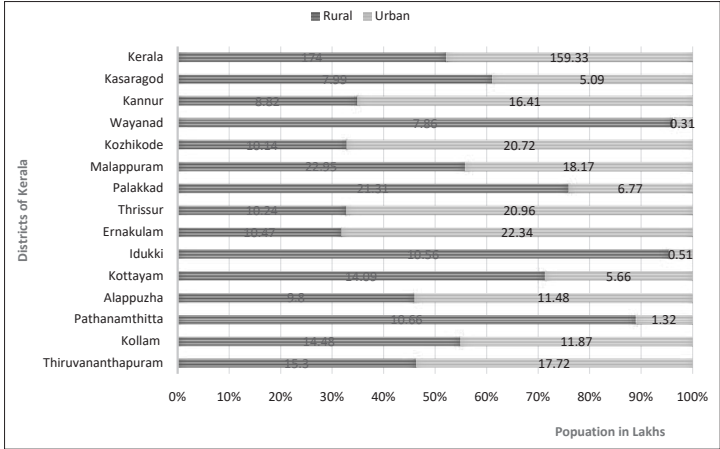
The gap between rural-urban population is drastically declining in the state and a convergence had happened in 2010-11. Further, it is projected that the urbanisation trend is going to be positive in the future. (Fig. 1). In another two decades from 2010-11, Kerala witnessed a scenario of more than 90 percent of its population living in urban places. The trendline of urbanisation shows that there is an evident positive and rapid temporal transition of rural to urban population. This is a reversal of the scenario in 1960-61 where close to 85 per cent of the population in the state lived in rural localities.

As there is no metro or megacities in the state like the rest of India,

it indicates that the state remains successful in nurturing infrastructure development which resulted in a pan Kerala semi-urban featured small cities or reduced the gap between villages and towns. According to the census data, Kerala has a phenomenon of mushrooming census towns besides administrative and political towns/municipalities in the state. It implies that the urbanisation or access to urban facilities are handy for rural people as well though they are not residing in an urban area.

There are fourteen districts in the state which were formed as a district mostly on the basis of geographical features or historic backgrounds, at different periods. As shown in Table 2, the differences in population are also huge between the districts, Malappuram district tops in population with 41 lakhs of people followed by Thiruvananthapuram (33 lakhs) and Ernakulam (32 lakhs) districts. Here it is again noteworthy that the populous districts are not necessarily those districts with major cities as in other states of India. The most populous district Malappuram has no major city and the district with the major city - Kochi - of Kerala (Ernakulam district) ranks at a third position only. However, Ernakulam district has a higher urban population (22 lakhs) followed by Thrissur and Kozhikode (21 lakhs) districts. Thiruvananthapuram and Alappuzha are the most population-dense districts (1500 per square km) followed by Kozhikode (1300 per square km) and all districts in the state except Palakkad (88 per cent) have a literacy rate over and above 90 per cent. Palakkad, Wayanad and Kasaragod districts are below 90 per cent in female literacy as well. Apparently, all of these three districts in northern Kerala have a less urban share of the population.

Fig. 2: Urban-Rural Population Distribution among Districts in Kerala (2020)



Source: Author. Compiled from *Kerala Economic Review Reports* (1960-2020) and *Census Reports* (1951-2011).

TABLE 2: GEOGRAPHIC AND DEMOGRAPHIC PROFILE OF DISTRICTS IN KERALA

Particulars	Thiruvananthapuram	Kollam	Pathanamthitta	Alappuzha	Kottayam	Idukki	Ernakulam	Thrissur	Palakkad	Malappuram	Kozhikode	Wayanad	Kannur	Kasaragod
Administrative Setup														
Geographical Area (000 sq km)	2192	2491	2637	1414	2208	4358	3068	3032	4480	3550	2344	2131	2966	1992
Talukas	4	5	5	6	5	4	7	5	5	6	3	3	3	2
Villages	100	98	68	92	97	65	119	234	152	128	106	49	123	122
Population as per Census														
Total (lakhs)	33.01	26.35	11.97	21.28	19.75	11.09	32.82	31.21	28.1	41.13	30.86	8.17	25.23	13.07
Density per sq km	1508	1061	5452	1504	895	255	1072	1031	627	1157	1316	384	852	657
Literacy Male	94.16	95.83	97.7	97.9	97.17	94.84	97.14	96.98	92.27	95.78	97.57	92.84	97.54	93.93
Literacy Female	90.89	91.95	96.26	94.8	95.67	89.59	94.27	93.85	84.99	91.55	93.16	85.94	93.57	86.13
Literacy Rate Percentage	92.52	93.89	96.98	96.35	96.42	92.21	95.70	95.41	88.63	93.66	95.36	89.39	95.55	90.03

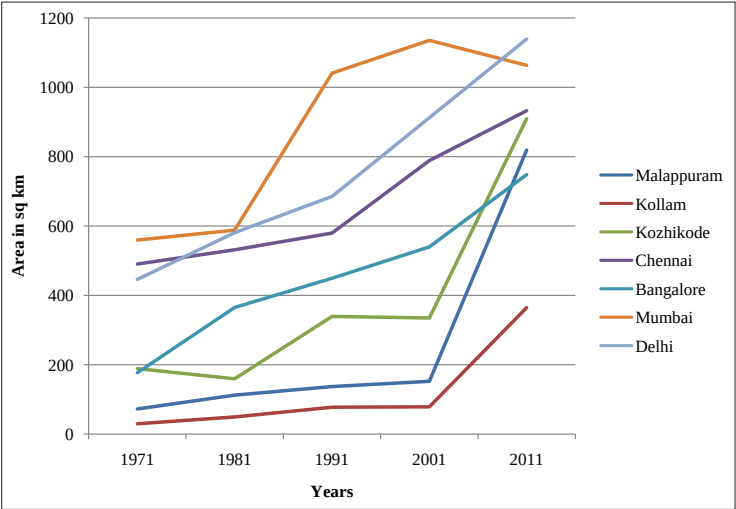
Source: Author. Compiled from *Kerala Economic Review Reports (1960-2020)* and *Census Reports (1951-2011)*.

The district-wise distribution of the rural-urban population in Kerala is illustrated in Figure 2. The districts of Kannur, Kozhikode, Thrissur, Ernakulam, Alappuzha and Thiruvananthapuram show a higher urban population while other districts have rural population as majority. Notably, all the major urbanised cities are included in the list. However, the rural-urban disparity is negligible in Kasaragod, Malappuram and Kollam, indicating a sooner convergence. As a whole, nine out of fourteen districts are in the rapid growth of urban population and the sustaining rural districts such as Wayanad and Idukki have their geographical constraints (hilly terrains) to have less human occupancy there. This in turn tells us a different pattern of urbanisation in Kerala that the otherwise rural districts are moving towards population induced urbanisation in Kerala.

Convergence of World’s Fastest-Growing Cities and Kerala’s Urban Agglomerations

According to *The Economist* (2020), three cities from Kerala were among the top ten fastest-growing urban areas across the world during 2015-2020. During this period, Kerala’s Malappuram had 44.1 per cent growth followed by Kozhikode (34.5 per cent) and Kollam (31.1 per cent). These are the cities from India to feature in the top ten rankings which again implies the peculiar urbanisation pattern in the state. In Kerala, urbanisation is driven by a shift from agriculture to other sectors which leads to change in rural areas or village’s census classification

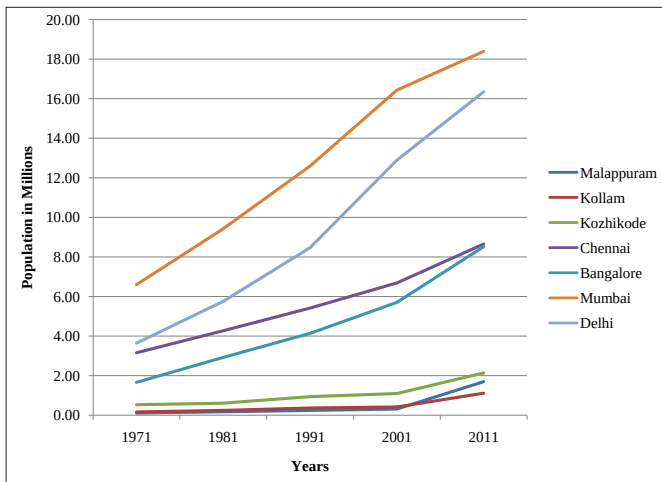
Fig. 3: Comparison of ‘Fastest-Growing Cities in the World’ with Indian Metropolises (Area)



Source: Author. Compiled from Census Reports (1951-2011).

status. This steady improvement in rural areas in Kerala paralleled by migration (both emigration and immigration) reinforces people to move from primary sectors, which changes the status of a village to a census town. Another distinct feature is that the total fertility rate (the number of children a woman is likely to have in the childbearing age of 15-49) in Kerala is 1.8 as per NITI Aayog data from 2016, which is below the replacement rate of 2.1. This implies that the increase in the population of Malappuram and other cities is not because of high fertility, rather more villages are being transformed into towns and city borders are expanding.

Fig. 4: Comparison of 'Fastest-Growing Cities in the World' with Indian Metropolises (Population)



Source: Author. Compiled from Census Reports (1951-2011).

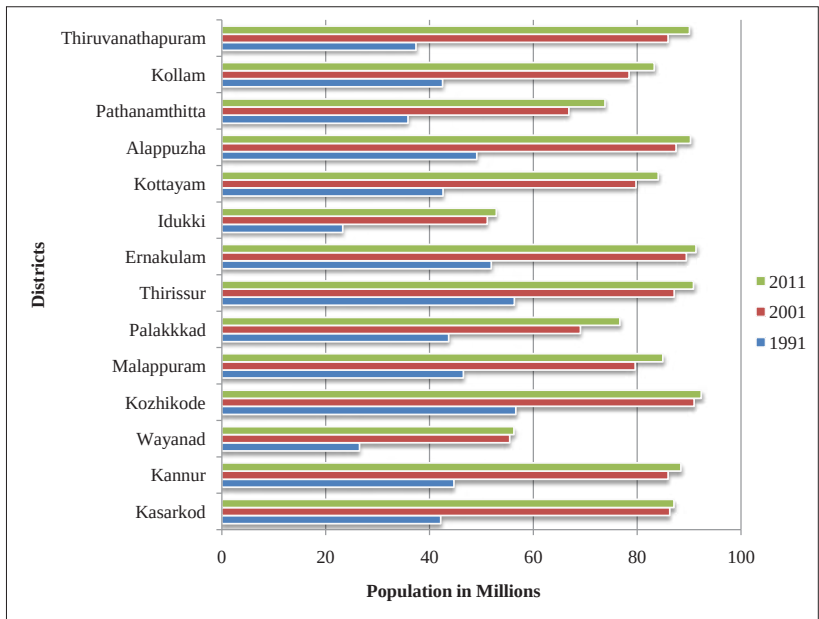
The growth in the area in square kilometres and population of Kerala Urban Agglomerations - Malappuram, Kozhikode and Kollam - in comparison with some of the metropolises in India like Mumbai, Chennai, Bangalore and Delhi are illustrated in Figure 3 and Figure 4 respectively. A pattern that stands out is that the Kerala Urban Agglomerations had a sudden increase in area and became comparable to Indian metropolises such as Bangalore and Chennai. However, comparing the population growth shows that these Kerala Urban Agglomerations have significantly lower populations compared to the metropolitan cities.

Distinct Features of Kerala's Urban Agglomerations

The previous section discussed the trend of urbanisation with respect to density and growth of population leading to the state of Kerala becoming

the second largest urbanised state by retaining distinct identity such as urban agglomeration. This section discusses the unique urbanisation pattern occurring in Kerala.

Fig. 5: Distribution of Non-Agricultural Labor Force in Kerala (in per cent)



Source: Author. Compiled from Primary Census Abstract for Kerala for the years 1991, 2001 and 2011.

Although the natural growth in population and increase in population density played a role in more areas getting classified as urban in the state, one another most important factor in Kerala’s context is the fast decline in agricultural employment in and around the existing Urban Agglomerations (Figure 5). Urbanisation is a finite process, a cycle through which a nation passes as they evolve from agrarian to industrial society (Davis, 1962). As demonstrated in Figure 5, a major shift from agricultural labour to non-agricultural labour happened during the 1990 to 2011 period. This has resulted in reclassifying several villages as towns in the state, thus leading to the birth of world’s fastest-growing cities. Those fastest-growing Urban Agglomerations from Kerala – Malappuram, Kozhikode and Kollam – also show a growth rate of non-agricultural labourers of about 83.95 per cent, 91.35 per cent and 82.3 per cent respectively.

Another important fact behind this increase was the increase

in the number of census towns that are not governed by urban local governments. Census has defined census towns as “places that satisfy three-fold criteria of a population of 5000, 75 per cent of the male main working population engaged in non-agricultural pursuits and density of 400 persons per sq. km.”. They can be easily defined as transitional urban areas at various levels of transition which is also known as ‘urbanisation by implosion’ (Qadeer, 2004) where the massive density of population, economic change and access to a good level of public services leads to urban growth.

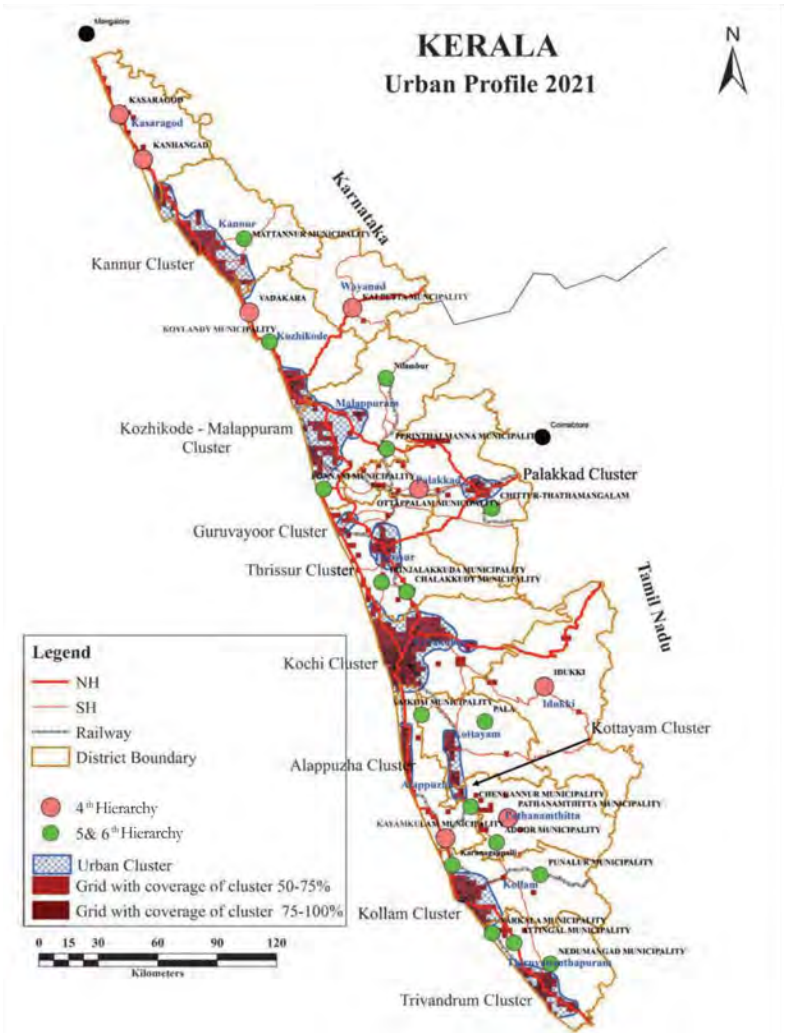
In the case of census towns in Kerala, a quantum jump by almost four times from 159 towns in 2001 to 520 towns in 2011 has occurred. It is noteworthy that, there has been an increase in Class III to class VI towns along with a decline in class I¹ and II² towns of Kerala. The class III³ towns that are borders of class I and class II towns have increased from 72 in 2001 to 254 in 2011. The number of class IV⁴ towns increased from 37 to 159 during the period of 2001-2011, which is again an unprecedented increase. Similar trend is observed in the case of class V⁵ towns (15 towns in 2001 to 61 in 2011) and class VI⁶ towns (1 town in 2001 to 8 towns in 2011) (*State Urbanisation Report-Kerala, 2012*). This indicates that the growing urbanisation in Kerala is also a result of amalgamation of surrounding areas in higher order towns showing the spreading nature of urbanisation pattern. The massive growth of lower- tier census towns in Kerala over the period 2001 and 2011 demonstrates this pattern (non-polar urbanisation) evidently and endorsement by international institutions such as *The Economist* may now ignite discussions in this line.

Figure 6 depicts the projected picture of urbanisation by implosion in Kerala. It is evident that the lower-tier urban centres are spatially spread across the state, however with certain pockets of concentration, resulting in urban agglomerations. Certain urban agglomerations projected in the past (*State Urbanisation Report-Kerala, 2012*) are now a reality (*The Economist, 2020*). The Kozhikode-Malappuram Cluster Urban Agglomeration is the best example in this regard. This cluster was projected to be the biggest Urban Agglomeration in the state by 2021, and that came true. This scenario further led to the discussions of spatial shift in the urbanisation of Kerala from south to north.

Figure 7 shows that there is an evident shift of spatial urbanisation in Kerala over the past five decades. In the earlier phase, the southern part of the state used to be more urbanised with higher concentration of population. The historical advantage of southern Kerala in development discourses has been widely acknowledged in development research (Pulikkamath, 2017). In the latter phase, northern Kerala including

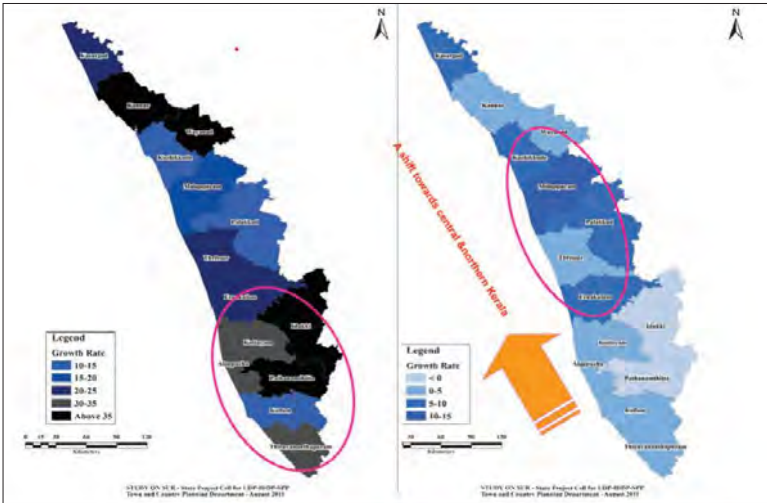
Malappuram and Kozhikode have been identified as the centre of urbanisation by 2010-11. This explains the demographic transition in the state and urbanisation by implosion in the state. In Kerala, the transformative force of high density for spatial urbanisation has been supported by other factors such as higher rates of literacy, higher wage rates and remittances from migrants to transform villages into active towns. Further, the private investments required for the new urbanisation by implosion in the northern Kerala can be attributed to higher number of Muslim migrants to gulf from this region.

Fig. 6: Projected Urbanisation Trend in Kerala - 2021



Source: State Urbanisation Report-Kerala (2012).

Fig. 7: Spatial Shift in the Urbanisation Trend in Kerala (1951-61 to 2001-11)



Source: *State Urbanisation Report-Kerala* (2012).

In Kerala, the growth of urbanisation in northern Kerala can also be attributed to the improvement of transport facilities, a massive decline of the male workforce in agriculture and related activities along a shift to the tertiary sector. A large portion of this process can be claimed by the extensive out migration from northern Kerala including Malappuram and Kozhikode. This is because, urbanisation by implosion refers to in-place population growth in rural areas which lead to expansion of villages, multiplication of homesteads and sprouting of homes amidst fields and barrens. In other words, this is a process of urban agglomeration through the densification of human settlements. Often, such urbanisation which is popularly prevalent in Kerala, especially due to private investments backed by migration, remained unrecognized or unacknowledged in the development discussion arenas.

CONCLUSION

A notable instance of rapid urbanisation is happening in Kerala, but not in a metro polarized way as in other parts of India. The state has recorded the highest increase in urban population growth rate than any other state in India from 2001 to 2011. For the first time in post-Independent India, the absolute increase in urban population is more than growth in rural population. The volume of the urban population grew a hundred per cent during the same period. Among the major states in India, Kerala has always occupied a unique position in many development indicators and set good models for others. Urbanisation

in Kerala is also coming in that line as it is not limited to the designated megacities and towns as in other states.

In the future, conurbation is bound to happen in the state. Conurbation refers to Kerala becoming one large urban continuum formed by the expansion of several independent cities or towns from one end to another end. By blurring the boundaries of western coast and the midland in the state, there is an established way to a rural-urban continuum (Vijayanunni, n.d.), which is a situation where “emerging spatial form is neither rural nor urban” (Sreekumar, 1990; Firoz, 2014). The newly proposed ‘Silver Line’ semi-speed rail corridor⁷ between Kasaragod to Thiruvananthapuram may accelerate conurbation in the state, by connecting the independent urban places in a single string, and considerably reducing the travel time. Further, there is a clear indication of spatial shift of urbanisation from south to north, explaining how population and private investments can induce unique urbanisation patterns. This may result in a paradigm shift in the development history of Kerala, which was historically south faced.

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Footnotes

1. Class I, towns with more than 1, 00,000 population.
2. Class II, towns with 50,000 to 99,999 population.
3. Class II, towns with 20,000 to 49,999 population.
4. Class IV, towns with 10,000 to 19,999 population.

5. Class V, towns with 5000 to 9,999 population.
6. Class VI, towns with less than 5,000 population.
7. The 529.45 km Silver Line corridor connecting Kasaragod and Thiruvananthapuram, with an operating speed of 200kmph, eases the transport between North and South ends of the state and reduces the total travel time to less than 4 hours, compared with the present 10 to 12 hours. The intermediate stations include Kollam, Chengannur, Kottayam, Ernakulam, Kochi Airport, Thrissur, Tirur, Kozhikode and Kannur. (<https://keralarail.com/silverline/>).

Effectiveness of e-Governance Initiatives in Telangana – A Study of Citizen Services Monitoring System (CSMS)

MALLIKA V.V.

ABSTRACT

Worldwide governments are being pushed to alter their government systems in order to provide citizen-centric service delivery through the use of cutting-edge Information and Communication Technology (ICT). The use of e-governance has emerged as a critical tool in the fight against the evils of mismanagement and corruption. Over the course of more than two decades, e-governance initiatives have been introduced in India. The present study is set in the context of the growing significance of governance, public service delivery and e-governance, which highlights various issues like awareness, efficiency, transparency, responsiveness, participation and accountability. The study particularly examines the critical e-governance parameters of the Citizen Services Monitoring System (CSMS) initiative in urban areas of Telangana. Based on the study results, important policy suggestions have been provided.

Keywords: *e-governance, good governance, participation, responsiveness, service delivery*

INTRODUCTION

The existing literature on governance penned by individual writers as well as the international organisations like (UNDP), (UNESCO), World Bank reiterates that governance is an all-encompassing concept. It strives to ensure the social, economic and political development of the country through the judicious use of authority vested in the state. It carries with itself all the vital ingredients of democracy, “accountability, transparency, human rights, social cohesion, equity, participation and fights against the corruption” (Cheema, 2001).

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Models of Public Administration and Reform Approaches in the Public Sector

The term “Public Administration” encompasses a variety of concepts. It is a structure that performs its duties in accordance with the laws of the land it serves. Many debates on Public Administration have led to various concepts and approaches (World Public Sector Report, 2015). The movement from “Old Public Administration” to “New Public Management” that occurred in the 1980s and 1990s has been extensively studied by researchers. Following this, the new millennium saw a paradigm shift in Public Administration, labelled the “New Public Service”, “New Public Governance”, or “Post-New Public Management” (Dunleavy and Hood, 1994; Denhardt and Denhardt, 2000; Osborne, 2006).

For a long time, notably in the 20th century, the traditional or old model of Public Administration drew its essential concepts from Max Weber’s ideas of bureaucracy. The Weberian paradigm is defined by “hierarchy and meritocracy”. It is criticised for prioritising rules over results, being resistant to change, innovation, and experimentation, and delaying important decisions. Market-driven economic forces grew stronger, affecting ruling institutions. The previous paradigm couldn’t keep up with a market-driven economy; thus, a new approach called New Public Management emerged (NPM-Competitive and Minimalist). The proponents of this strategy propose reducing the role of the state. “Competition, delegation, performance and responsiveness offer yardsticks to regulate bureaucratic behaviour and generate improved outcomes” (Dunleavy and Hood, 1994; Mc Court, 2013).

The application of market concepts to government has not resulted in a more equitable distribution of wealth. In this context, a call for a paradigm change and a new method to satisfy people’s democratic desires was made. So came the idea of governance.

New Public Governance (Plural and Pluralist) espoused by Osborne (2006; 2010) is distinguished by the fact that it prioritises citizens rather than the government. The citizen is the objective; governance is the means. Governments must now more than ever be open, accountable, transparent, and eager to serve (Osborne, Radnor and Nasi, 2013). The New Public Service approach is viewed as the most consistent among the several approaches. It asserts that public leaders should encourage citizens to express and implement their “shared interests” rather than manage or steer society (Denhardt and Denhardt, 2000).

E-Governance and Public Service Delivery

The government provides services directly or indirectly to the public. Effective governance is required to ensure citizen-centric public service delivery. Globally, governments must adapt their systems to enable citizen-centric service delivery through innovative Information and Communication Technology (ICT). Because of e-government, governments must now develop new methods of delivering public services (Ume Laila et al., 2020). Contemporary ICT tools have revolutionised the government's engagement with stakeholders such as citizens and businesses as well as the government's own departments (Bhattacharya, 2008).

E-Governance or 'electronic governance' is basically the application of Information and Communication Technology to the processes of Government functioning in order to bring about 'Simple, Moral, Accountable, Responsive and Transparent' (SMART) governance.

Review of Literature

Awareness among citizens is the first signal of the successful adoption of e-governance projects. However, there is a dearth of clearly defined systems, methods, and models and a shortage of awareness about the e-governance mechanisms at all levels (Kumar et al., 2018). Lack of education becomes a hurdle to create awareness among the people who are actually the real end-users (Dass and Bhattacharjee, 2011).

Besides the problems with the service providers, e-governance projects are suffering from the absence of awareness and prevalence of ambiguity in several forms (Naik, 2011; Dwivedi et al., 2016).

Many authors (Santos, 2003; Zeithaml et al., 2002) consider efficiency as a critical dimension along with reliability, security, and responsiveness. Khanra and Joseph (2019) are of the opinion that the web interface used for e-governance activities should be very simple and neatly organised to become more efficient. Saxena (2018) studied the efficiency of the 'Digital India' campaign in realising the mission objectives. Mir et al. (2020) consider the use of digital identification methods as a critical means to curb identity-related frauds in e-governance systems.

Study findings have established that transparency, simplicity, and convenience are given more preference by the Indian citizens than the cost of service (Kalsi and Kiran, 2015). Transparency is not about providing the information alone. Transparency speaks about the usefulness of the information available (Grimmelikhuijsen & Welch

2012; Iyer and R.N. 2017; Alathur et al., 2016; Kumar et al., 2018; Bindu et al., 2019). Several researchers have strongly argued that transparency in e-governance is an effective tool to curb the menace of corruption. Digital governance should thus enable the government to provide good governance with transparency (Basyal et al., 2018; Singh et al., 2010).

For the success of e-governance, winning public confidence is essential. Thus, there should be faster responses to the needs of the public. To be successful in implementation, the projects require moral support in terms of responsiveness and philosophy too (Jain Gupta and Suri, 2017). Kompella (2017) suggest the use of inter-organisational information systems (IOS) to speed up the process.

The governments have to find ways to engage all the stakeholders till the end-user level to make the e-governance mission successful (Naik, 2011). Kumar et al. (2018) found that the public who had computer literacy found participation easier in e-governance compared to those who lacked computer literacy. To transform the deployment of ICTs in e-governance into a permanent mechanism towards life-enhancement, literacy in ICTs and increased participation are vital (Calista and Melitski, 2012).

The interactions and behaviour of the government agencies towards accountability and transparency can be structured by the institutional and legal systems (Saxena, 2018; Chen & Hsieh, 2009). ICT is utilised as a means to improve accountability and transparency in government's informational exchanges and supports the efforts to deliver effective and efficient public services (Bhatnagar, 2008; Pathak et al., 2007).

Citizen Services Monitoring System (CSMS)

Citizen Services Monitoring System is an initiative of the Director for Municipal Administration of Telangana. The system aims to provide transparent and time-bound services to urban citizens. The CSMS works as a bridge between the municipal staff and citizens in handling the service applications and grievances effectively and helps in redressing them within a specified time while alerting the stakeholders from time-to-time on every stage of the movement. An end-to-end grievance management system that includes a mobile app that allows citizens to log grievances with the local government body is an important feature.

Citizens get free access 24X7 to know the status of their application via SMS alerts, App notifications, web access and concerned staff are alerted on their performance disposal while keeping the delivery rate available to the senior officers and Heads of Departments (HoDs) for effective monitoring. There is a provision for registering the service

request/grievance through the website, citizen buddy app, phone facility and citizen service centre.

Methodology

The present research work is based on field study and empirical analysis. The study is set out with the following objectives:

Objectives

- To study the critical e-governance parameters of the e-governance initiative, Citizen Services Monitoring System (CSMS) in urban areas of Telangana.
- To analyse the awareness levels of citizens regarding the Citizen Services Monitoring System.
- To evaluate the effectiveness of the e-governance initiatives in achieving the objectives of good governance.
- To analyse the problems in operationalising Citizen Services Monitoring System (CSMS).
- To recommend appropriate policy measures for further improving the system.

Hypotheses

1. **H₀ (Null Hypothesis):** E-governance initiatives does not contribute to the achievement of objectives of good governance (participation, transparency, responsiveness, accountability and efficiency).
H₁ (Alternate Hypothesis): E-governance initiatives contribute to the achievement of objectives of good governance (participation, transparency, responsiveness, accountability and efficiency).
2. **H₀ (Null Hypothesis):** E-governance initiatives such as Citizen Services Monitoring System does not reduce the transaction cost, time in accessing service delivery.
H₁ (Alternate Hypothesis): E-governance initiatives such as Citizen Services Monitoring System reduces the transaction cost, time in accessing service delivery.
3. **H₀ (Null Hypothesis):** Lack of inter-departmental coordination does not substantially impact the service delivery in the implementation of e-governance initiatives.

H₁ (Alternate Hypothesis): E-governance initiatives will have maximum effect in service delivery provided they have inter- departmental coordination.

Data Collection

Data are collected from both primary and secondary sources. For the collection of primary data, the tools employed were: (i) questionnaire/ schedule, (ii) Personal interview and discussion, and (iii) non-participant observation method. The secondary data regarding the performance of the Citizen Service Monitoring System (CSMS) were collected from the Commissionerate and Directorate of Municipal Administration (CDMA). Hence primary sources of data on implementing mechanisms and secondary sources like policy documents, performance reports of CSMS from CDMA, and web resources of the respective departments take an equal share in making qualitative analysis of the present research.

Study Instrument

A structured questionnaire was developed to assess the impact of CSMS in realising the goals of governance, i.e., participation, transparency, responsiveness, accountability and efficiency. The parameters were taken from the Good Governance Report published by UNDP in 1997.

Sampling Methodology

Based upon the total service requests resolved through CSMS at each Municipality (CDMA Performance Report), Urban Local Bodies (ULBs) were ranked from high to low. Out of 72 ULBs, 67 are Municipalities, and 5 are Municipal Corporations. From the 67 Municipalities, four were selected for the study by using Range.

Range taken on the basis of Service requests resolved for the selection of ULBs was:

Above 3000 : Boduppall
1000 – 3000 : Siddipet
500 – 1000 : Shadnagar
Below 500 : Vikarabad

Out of five Municipal Corporations, Karimnagar Municipal Corporation was selected based upon high performance. Through convenience sampling, the researcher approached the citizens who were availing these services and were willing to respond to the questionnaire.

Sample Size

For the purpose of the urban study of CSMS, a total of five Urban Local Bodies were covered. Out of the five ULBs, four were Municipalities, and one was Municipal Corporation. From each Municipality, 30 responses and 32 responses from Municipal Corporation were collected from households. Responses of five CSMS operators, five Municipal Commissioners, were collected. Thus, total sample size of 162 comprises 152 citizens, and the rest of the 10 sample represents CSMS operators and Municipal Commissioners.

The data collected were carefully analysed to examine the effectiveness of e-governance in the study region, particularly in the context of CSMS. The results of the data analysis are presented in the following section.

TABLE 1: SAMPLE DISTRIBUTION

<i>Respondent (s)</i>	<i>Number</i>
Sample for Citizens (House hold)	152
CSMS Operator	05
Municipal Commissioners	05
Total	162

Source: Author.

Results

Satisfaction levels with respect to participation in CSMS

Table 2 reflects the perceived satisfactory levels of the respondents with regard to the increased participation of the people after the advent of CSMS. An overwhelming majority of the respondents (72.4%) revealed that they were indeed either satisfied (56.6%) or highly satisfied (15.8%) with the participatory level of the people in the programme. The reasons that endeared the households were the provision for an online grievance redressal mechanism and online property tax assessment. These online arrangements, by their very nature, spurred the people’s participation for the obvious reasons they can put forward any of their grievance / requests sans their physical presence at the respective offices and with no or least disturbance to their routine work. Other attributes for the higher participation were better access to information through periodical website notifications, citizen charter and SMS alerts.

At the other end lies the dissatisfied segment. A little more than one-fourth of the respondents (26.3%) expressed either dissatisfaction (24.3%) or high dissatisfaction (2%). The reasons for such an unconcealed dissatisfaction were malfunctioning of the citizen buddy app, inadequate

access to information and their suggestions/feedback neither received solemn consideration nor acted upon. The table further reveals the data related to satisfactory levels of households with women participation after the initiation of CSMS. More than two-thirds of the respondents (70.4%) opined that they were either satisfied (62.5%) or highly satisfied (7.9%) in this particular aspect of an enhanced level of women participation with the introduction of CSMS. The reasons accounting for the increased level of women participation were chiefly Mission for Elimination of Poverty in Municipal Areas (MEPMA) and its tributary wings Town Level Federation and Slum Level Federation.

On the other hand, a quarter of the respondents (25.6%) felt that they were either dissatisfied (24.3%) or highly dissatisfied (1.3%). Besides them, a few of the respondents (3.9%) preferred to be neutral. In their perception, lack of technical know-how resulting in non-substantiation of laid down processes and procedures, want of a helpdesk to aid and advise the needy in a proper way, lack of general literacy, particularly the digital one, collided and contributed to the lukewarm response of the women.

Table 2 highlights the levels of satisfaction derived by the respondents from the benefits accrued to them because of CSMS. More

TABLE 2: SATISFACTION LEVELS WITH RESPECT TO PARTICIPATION IN CSMS

<i>Parameters</i>	<i>Highly Satisfied (5)</i>	<i>Satisfied (4)</i>	<i>Neutral (3)</i>	<i>Dissatisfied (2)</i>	<i>Highly Dissatisfied (1)</i>	<i>Total</i>
Participation	24	86	2	37	3	152
%	15.8	56.6	1.3	24.3	2.0	100.0
Women Participation	12	95	6	37	2	152
%	7.9	62.5	3.9	24.3	1.3	100.0
Benefits of Participation	13	93	4	37	5	152
%	8.6	61.2	2.6	24.3	3.3	100.0
Participation in Formulating and Modifying CSMS	21	86	3	38	4	152
%	13.8	56.6	2.0	25.0	2.6	100.0

Source: Field Data.

than two-thirds of the respondents (70%) felt that they were either satisfied (61.2%) or highly satisfied (8.6%). The reasons attributed for such an adulation were that in the wake of online arrangements being brought by the CSMS, households were able to avail themselves of considerable services even while sitting at their home desk, thus saving much desirable cost and time. However, more than one-fourth (27.6%) of the respondents expressed either dissatisfaction (24.3%) or high dissatisfaction of (3.3%). Besides them, very few respondents (2.6%) remained neutral. The reasons for such an avowed dissatisfaction were improper functioning of the App and the presence of corrupt elements. The table also indicates the level of citizen participation in formulating and modifying CSMS. More than two-thirds (70%) of the respondents reported that they were indeed either satisfied (56.6%) or highly satisfied (13.8%) with the part being played by them in formulating and modifying CSMS.

Those who subscribe to this view recalled that the feedback given by them, suggestions offered and the grievance put forward were indeed taken into consideration and acted upon. At the other end lie more than one-fourth of the respondents (27.6%) who were not much enamoured of the system and expressed the view that they were either dissatisfied (25%) or highly dissatisfied (2.6%). The reasons ascribed were the availability of feedback option only in-app and its non-availability in other media like website, citizen service centre, phone call (Table 2).

Satisfaction levels with respect to transparency in CSMS

The results in Table 3 show that nearly three-fourths (72.3%) of respondents were either satisfied (57.2%) or highly satisfied (15.1%) with regard to transparency in the process and procedures of CSMS. They reported that certain features of CSMS like Citizen Charter, file tracking mechanism, and feedback from stakeholders had enhanced the transparency in the process and procedures of CSMS. On the other hand, more than one-fourth (27%) of the respondents expressed either dissatisfaction (19.1%) or high dissatisfaction (7.9%). Only a few respondents, i.e., 0.7%, were neutral.

Respondents reporting dissatisfaction levels said that some of the officials themselves are uploading fake documents and certificates. A considerable number of the respondents cited certain instances of illegal mutation certificates. Another cause attributed by the households for their dissatisfaction was the discriminatory assessment of property tax.

Further, Table 3 reveals that an overwhelming majority of the respondents (72.4%) expressed either satisfaction (54.6%) or high satisfaction (17.8%) with respect to transparency in timely reporting

TABLE 3: SATISFACTION LEVELS WITH RESPECT TO TRANSPARENCY IN CSMS

<i>Parameters</i>	<i>Highly Satisfied (5)</i>	<i>Satisfied (4)</i>	<i>Neutral (3)</i>	<i>Dissatisfied (2)</i>	<i>Highly Dissatisfied (1)</i>	<i>Total</i>
Transparency in process and Procedures	23	87	1	29	12	152
%	15.1	57.2	0.7	19.1	7.9	100.0
Transparency in Timely reporting of Progress	27	83	1	36	5	152
%	17.8	54.6	.7	23.7	3.3	100.0
Needy and Deserved Getting the benefits	15	90	6	29	12	152
%	9.9	59.2	3.9	19.1	7.9	100.0
Easy access to information	29	77	3	34	9	152
%	19.1	50.7	2.0	22.4	5.9	100.0

Source: Field data.

of progress, and the reasons cited were issuing of a unique identity number, the facility to track the status at every stage.

At the same time, some of the respondents (23.7%) expressed dissatisfaction, and 3.3% expressed high dissatisfaction. The causes mentioned were non-receiving of regular SMS alerts, the abrupt closure of service request/complaint.

The data from Table 3 also reveals that more than two-thirds of the respondents (69.1%) expressed either satisfaction (59.2%) or high satisfaction (9.9%) with regard to the needy and deserved getting the benefits. On the other hand, a considerable number of respondents were either dissatisfied (19.1%) or highly dissatisfied (7.9%). They were of the view that the benefits of the programme were not reaching those who deserved and who needed them most.

The Table 3 also unfolds the satisfaction levels of respondents with regard to easy access to information. More than two-thirds of respondents (69.8%) felt that they were either satisfied (50.7%) or highly satisfied (19.1%). The causes mentioned were, display of citizen charter, provision for both online and physical access, and the display of a dashboard on the website. On the other hand, a little more than one-fourth of the households surveyed (28.3%) spoke of either dissatisfaction

(22.4%) or high dissatisfaction (5.9%). And the main reason attributed to such dissatisfaction was the lack of provision for the right to information in the Citizen Buddy App to know the facts in certain cases of illegal mutations and fake certificates (Table 3).

Satisfaction levels with respect to responsiveness in CSMS

Table 4 unravels the opinion of the respondents on the responsiveness of the employees in the discharge of their obligations mandated by CSMS. According to the above data, while half of the respondents (51.3%) reported that the responsiveness of the employees was indeed satisfied, 19.1% felt highly satisfied. Quick and good response on the part of employees, calling the households immediately after applying online were the gladdening features. On the other hand, a quarter of the respondents (25.7%) felt that the responsiveness of the employees was dissatisfied; that being so, a very minute percentage of the respondents (0.7%) deemed it to be highly dissatisfied. Besides those, 3.3 per cent of the respondents remained neutral. The reasons mentioned by the group of respondents for their considered view were the rash and rude behaviour of some personnel.

TABLE 4: SATISFACTION LEVELS WITH RESPECT TO RESPONSIVENESS IN CSMS

<i>Parameters</i>	<i>Highly Satisfied (5)</i>	<i>Satisfied (4)</i>	<i>Neutral (3)</i>	<i>Dissatisfied (2)</i>	<i>Highly Dissatisfied (1)</i>	<i>Total</i>
Responsiveness of Employees	29	78	5	39	1	152
%	19.1	51.3	3.3	25.7	.7	100.0
Implementation of Citizen Charter	21	88	3	37	3	152
%	13.2	58.3	2.0	24.5	2.0	100.0
Responsiveness towards needs of the People	24	84	2	38	4	152
%	15.8	55.3	1.3	25.0	2.6	100.0

Source: Field data.

Table 4 further unravels the data related to satisfaction levels of respondents on the implementation of Citizen Charter. It can be inferred from the data that more than half of the respondents (58.3%) were satisfied, and one-eighth (13.2%) were highly satisfied. Respondents revealed reasons for such satisfaction on their part. They reported that

their requests/ grievances were being redressed within the time frame. Further, they added that norms like intention delays inviting penalties, outer time limit at every level of file movement and dashboard on which was displayed every action of every staff member and every movement of the file were acting like spurs for timely performance.

On the other side of the fence, almost one-fourth of the respondents (24.5%) expressed dissatisfaction; besides that, very few of the respondents felt that they were highly dissatisfied (2%). The reasons mentioned for such an avowed dissatisfaction were the documents being kept pending even after one month in certain cases, the existence of only one single counter instead of multiple counters in certain places, inadequate staff, lack of coordination among MeeSeva, Sub-Registrar Office, Municipal Office and officials often citing legal and financial implications for non-compliance of Citizen Charter.

Table 4 also unravels the views of the respondents with regard to the responsiveness on the part of officials towards their needs. It can be discerned from the data that more than half of the households (55.3%) were satisfied, and more than one-sixth (15.8%) were highly satisfied.

At the other end, whilst one-fourth of the respondents (25.2%) expressed dissatisfaction, very few respondents (2.6%) felt that they were highly dissatisfied. Apart from these, still, a lesser number (1.3%) preferred to be neutral. Those respondents who expressed disenchantment gave vent to their feelings. The respondents made a strong plea to the effect that their needs like Birth, Death Certificates, and Property Valuation Certificate ought to be resolved at a single point, i.e., CSMS (Table 4).

Satisfaction levels with respect to accountability in CSMS

Table 5 reflects the satisfactory levels of respondents with regard to the security of the data in the Citizen Service Monitoring System. While more than half of the households (53.3%) expressed the view that they were satisfied, close to one-fifth (18.4%) reported high satisfaction. Reasons ascribed by them to arrive at such a positive conclusion were the lack of any apparent technology threats so as to breach their data and a third-party security audit by Telangana State Technology Services (TSTS). On the other hand, whereas close to one-fourth (24.3%) of the households reported that they were dissatisfied in this aspect, a few of them (3.3%) unhesitatingly reported high dissatisfaction. A meagre per cent (0.7%) of them preferred to be neutral.

Table 5 further unravels the satisfaction levels of respondents with respect to CSMS accountability. Whereas more than half of

TABLE 5: SATISFACTION LEVELS WITH RESPECT TO ACCOUNTABILITY IN CSMS

<i>Parameters</i>	<i>Highly Satisfied (5)</i>	<i>Satisfied (4)</i>	<i>Neutral (3)</i>	<i>Dissatisfied (2)</i>	<i>Highly Dissatisfied (1)</i>	<i>Total</i>
Security of data	28	81	1	37	5	152
%	18.4	53.3	0.7	24.3	3.3	100.0
Account-ability of CSMS Officials	22	88	0	36	6	152
%	14.5	57.9	0.0	23.7	3.9	100.0
Grievance Redressal	21	87	2	35	7	152
%	13.8	57.2	1.3	23.0	4.6	100.0

Source: Field data.

the respondents (57.9%) were satisfied, and 14.5 per cent aired the view that they were highly satisfied. The factors that contributed to their enchantment were the operator duly providing them with an acknowledgement with a unique ID number, date and time of the request, date of service delivery along with the name and mobile number of concerned official to whom the request/grievance will be sent, sending SMS alerts along with tracking reference number, and App notifications; penalising the staff for inordinate pending of the request and the citizen being reimbursed for such a lapse, intimation of shortfall notice through SMS alerts, intimation of reasons to the citizen in the case of rejection.

However, close to one-fourth (23.7%) of the respondents expressed their unconcealed dissatisfaction with this particular aspect of accountability. It being so, a small segment of the respondents (3.9%) felt that they were highly dissatisfied. They further reported that the issues like non-intimation of the reference number, non-receipt of SMS alerts, absence of any sort of action against the defaulting/erring official, shortfall intimation not being served through SMS alerts, and reasons for rejection not being mentioned in the remarks column accounted for and enhanced their dissatisfaction.

Table 5 unfolds the satisfaction levels of households on the grievance redressal mechanism of CSMS. While more than half of the households (57.2%) revealed that they were satisfied, close to one-seventh (13.8%) mentioned that they were highly satisfied. The reasons ascribed include pre-mapping, i.e., stating in clear terms to the effect that which type of

grievance goes to which officer and also specifying the area, registering each and every complaint along with its date, time; reference number, mentioning the mobile numbers of concerned officials, the possible date of resolution, uploading the photos relating to grievance depicting the pre-complaint position and the other one after the solving the same. Besides these, the feedback option that enables them to give a rating on a scale of one to five and its inherent provision of penalising the underperformer further endeared the programme.

At the other end stood a close to one-fourth of the households (23%) who opined that they were dissatisfied with the grievance redressal system. Apart from this segment, a few of the respondents (4.6%) felt that they were highly dissatisfied. A few of the households (1.3%) remained neutral. The reasons that evoked such a negative response embrace complaints not being registered online at a few places, and at other some places want of proper action despite complaints being registered, lack of a proper mechanism that enables the citizen to appeal against defaulting or erring field staff; want of a proper mechanism that allows the citizens to go for appeal in case their problem remains unsolved at the level of the municipality (Table 5).

Satisfaction levels with respect to efficiency in CSMS

Table 6 reflects the data related to satisfaction levels of respondents on quickness and accuracy in service delivery. It was observed that nearly three fourth (73%) of respondents were either satisfied (62.5%) or highly satisfied (10.5%) with quickness and accuracy in service delivery. It was also evident that more than one fourth (26.9%) were either dissatisfied (24.3%) or highly dissatisfied (2.6%).

The respondents reported causes for their dissatisfaction and they were lack of coordination between Registration and Municipal Departments with regard to mutation requests, being asked by the officials repeatedly to upload the same documents in MeeSeva, Sub Registrar Office, MRO Office and CSMS and the technical problems.

It is also inferred from Table 6 that nearly three fourth (73.1%) of households were either satisfied (58.6%) or highly satisfied (14.5%) with regard to the reliability of services being provided through CSMS. Out of 152 respondents, 24.3 per cent were dissatisfied, and only a few respondents, i.e., 2.6 per cent, were highly dissatisfied.

Further, Table 6 provides the data related to satisfaction levels of households on cost reduction through CSMS. Data shows that more than two-thirds (69.7%) of respondents were either satisfied (57.9%) or highly satisfied (11.8%) on this aspect. On the other hand, more than

TABLE 6: SATISFACTION LEVELS WITH RESPECT TO EFFICIENCY IN CSMS

<i>Parameters</i>	<i>Highly Satisfied (5)</i>	<i>Satisfied (4)</i>	<i>Neutral (3)</i>	<i>Dissatisfied (2)</i>	<i>Highly Dissatisfied (1)</i>	<i>Total</i>
Quickness and Accuracy	16	95	0	37	4	152
%	10.5	62.5	0.0	24.3	2.6	100.0
Reliability of the Service	22	89	0	37	4	152
%	14.5	58.6	0.0	24.3	2.6	100.0
Cost of Service	18	88	4	37	5	152
%	11.8	57.9	2.6	24.3	3.3	100.0
Easeness of Receiving	28	79	4	35	6	152
%	18.4	52.0	2.6	23.0	3.9	100.0
Direct contact with the Service Provider	26	74	9	36	7	152
%	17.1	48.7	5.9	23.7	4.6	100.0
Flexibility of Time	25	83	3	35	6	152
%	16.4	54.6	2.0	23.0	3.9	100.0
Timely Reporting of Progress	14	91	2	32	13	152
%	9.2	59.9	1.3	21.1	8.6	100.0

Source: Field data

one-fourth (27.6%) were either dissatisfied (24.3%) or highly dissatisfied (3.3%). Only 2.6 per cent of respondents were neutral.

The respondents who were satisfied reported that the factors like the provision of registering the service request/grievance through the website, Citizen Buddy App, phone facility, regular SMS Alerts on the status of the application helped them in saving their precious time and travelling cost. The respondents who expressed dissatisfaction in the aspect of cost reduction opined that the reasons like non-availability of all the services online, the apathetic attitude of officials despite registering the service request/grievance through the App made them physically visit the office and as such no effective reduction in the cost.

Table 6 also unveils the data related to the opinion of the respondents on ease in receiving services through CSMS. Out of 152

respondents, a strong majority (70.4%) of households expressed either satisfaction (52%) or high satisfaction (18.4%). The respondents said that the features like 24 X 7 access, SMS alerts, App notifications, web access contributed to easeness in the delivery of services. On the other hand, a little more than one-fourth (26.9 per cent) felt either dissatisfied (23%) or highly dissatisfied (3.9 per cent), and then 2.6 per cent were neutral. The reasons for such dissatisfaction in their view were all the municipal services not being made online, non-receipt of acknowledgement and SMS alerts. It is also inferred from the data that almost two thirds (65.8%) of households expressed either satisfaction (48.7%) or high satisfaction (17.1%) for having direct contact with the Service Provider. The reasons attributed to their satisfaction are the quick resolution of their grievances/requests and the Service Provider creating awareness on the process and procedures of CSMS. At the same time, more than one-fourth (28.3%) were either dissatisfied (23.7%) or highly dissatisfied (4.6%). Only 5.9 per cent of respondents were neutral.

It can also be known from the above table that a very good majority (71%) of households expressed either satisfaction (54.6%) or high satisfaction and (16.4%) with regard to the flexibility of time in availing various services. At the same time, a little more than one-fourth (26.9%) of the households reported either dissatisfaction (23%) or high dissatisfaction (3.9%).

Table 6 also reflects the opinion of respondents on timely reporting of progress by the CSMS staff. Data shows that more than two-thirds of the respondents (69.1%) opined that they were indeed either satisfied (59.9%) or highly satisfied (9.2%) with regard to timely reporting to progress by the concerned staff.

At the other end of the spectrum lies less than one-third of the respondents (29.7%) who felt that they were either dissatisfied (21.1%) or highly dissatisfied (8.6%) in this particular aspect of timely reporting of progress. Reasons for their dismay include non-receipt of much-needed periodical SMS Alerts and non-intimation of reasons for rejecting service requests in the concerned remarks column (Table 6).

Testing of Hypothesis

A two-tailed test has been carried out to examine the significant difference in each of the variables (time and cost) considered before and after the introduction of CSMS. The hypothesis formulated for the two-tailed test :

$$H_0 = X_b = X_a$$

$$H_1 = X_b \neq X_a$$

Where X_b and X_a are the values of the variables (time and cost) before and after the introduction of CSMS. Further, a One-tailed test with the following hypothesis has been carried out to examine the significant difference.

$$H_0 = X_b = X_a$$

$$H_1 = X_b > X_a$$

Tables 7 include the mean and significant values of a one-tailed and two-tailed test.

Results: Testing of Hypothesis

H_0 (Null Hypothesis): There is no significant difference in the time and cost before and after the introduction of CSMS.

H_1 (Alternate Hypothesis): There is a significant difference in the time and cost before and after the introduction of CSMS.

The Two-Tailed test rejects the Null Hypothesis ($H_0 = X_b = X_a$) in all the cases (service requests and grievances) in favour of the alternate hypothesis ($H_1 = X_b \neq X_a$). It clearly establishes that after the introduction of CSMS, there is a difference in the time and cost of availing service requests and grievances in municipalities.

Further, a One-Tailed test was also conducted to test the null hypothesis. It rejects the null hypothesis ($H_0 = X_b = X_a$) in favour of the alternate hypothesis ($H_1 = X_b > X_a$). Hence it is proved that the time taken and cost incurred in availing service requests and grievances was more before the introduction of CSMS. It shows that the introduction of CSMS reduced the time and cost significantly in availing services.

Discussion on Results

It can be summarised from the study that Citizen Services Monitoring System (CSMS) enhanced the public service delivery system. Awareness of CSMS was created through widespread publicity, stories in newspapers and posters at public places. CSMS improved the participation of the people in development activities by taking feedback and suggestions from people through multiple digital channels like website, citizen buddy app, phone calls etc. It promoted transparency in Municipal Administration due to digitalisation of services. CSMS increased the responsiveness of employees towards the needs of the citizens by scrupulously following the citizen charter. It enlarged or augmented the process of accountability through an online grievance redressal system, feedback mechanism on the performance of the employees. The programme also increased the efficiency levels in administration because of inbuilt systemic features like auto-escalation

TABLE 7: MEAN DIFFERENCE AND SIGNIFICANT VALUES OF ONE-TAILED AND TWO-TAILED TEST TO SERVICE REQUESTS OF CITIZEN SERVICES MONITORING SYSTEM (CSMS)

<i>Particulars</i>	<i>N</i>	<i>Time in days</i>		<i>Mean difference</i>	<i>T</i>	<i>(Sig-1)</i>	<i>(Sig-2)</i>	<i>Cost in Rs</i>		<i>Mean difference</i>	<i>T</i>	<i>(Sig-1)</i>	<i>(Sig-2)</i>
		<i>Before mean</i>	<i>After mean</i>					<i>Before mean</i>	<i>After mean</i>				
Birth certificate	10	11	3.8	7.2	33.0	0.000	0.000	325	20	305.0	3.54	0.003	0.012
Assessment of Property Tax and allocation of door number	42	26.6	12.4	14.2	39.9	0.000	0.000	350	71.57	278.4	7.08	0.000	0.000
Transfer of property	27	28.15	12.44	15.7	39.44	0.000	0.000	611.1	173.5	437.6	5.05	0.000	0.000
Sanction of the water supply connection	13	21.2	11.1	10.1	25.46	0.000	0.000	458	115	343.0	6.27	0.000	0.000
Building permission	13	46.9	26.92	20.0	38.90	0.000	0.000	507.7	147.5	360.2	10.54	0.000	0.000

Source: Field data.

TABLE 8: MEAN DIFFERENCE AND SIGNIFICANT VALUES
OF ONE-TAILED AND TWO-TAILED TEST TO GRIEVANCE
REQUESTS OF CITIZEN SERVICE MONITORING SYSTEM (CSMS)

<i>Particulars</i>		<i>Time in days</i>		<i>Mean difference</i>	<i>T</i>	<i>(Sig-1)</i>	<i>(Sig-2)</i>
	<i>N</i>	<i>Before mean</i>	<i>After mean</i>	<i>Before time</i>	<i>Before time</i>	<i>Before time</i>	<i>Before time</i>
Drain not cleaned, over flowing	44	11.89	4.73	7.2	33.20	0.000	0.000
Manholes	18	9.72	2.5	7.2	32.36	0.000	0.000
Road problems and issues	31	11.06	4.71	6.4	23.51	0.000	0.000
Drinking water problems	12	11.08	3.5	7.6	24.54	0.000	0.000
Non-functioning of street light	15	10.07	2.13	7.9	40.56	0.000	0.000
Others	16	12.3	5.06	7.2	12.32	0.000	0.000

Source: Field data.

of files, provision for multiple channel access, i.e., website, mobile app., citizen service centre, phone call, and all these features culminated in increased accuracy, speed, reliability in service delivery and reduction in time and cost.

The study also brought out certain challenges like digital illiteracy and fewer levels of awareness in certain study areas, thus hindering the participation of people. Improper functioning of Citizen Buddy App is observed in some study areas. Also, it is observed that certain important services like the assessment of property tax were not brought under the ambit of CSMS. Citizens have complained of discriminatory assessment in levying Property Tax. Lack of interdepartmental coordination, bureaucratic hassles, inadequately trained staff are the major factors that impede the efficiency of the system.

SUGGESTIONS AND THE WAY FORWARD

Policy Suggestions for Strengthening the CSMS

To ensure citizen-centred public service delivery, adequate measures and mechanisms have to be installed to bring interdepartmental coordination between Registration and Municipal Departments.

The online system has to be designed in such a way so as to make it foolproof so that physical visits by citizens are avoided or at least minimised.

It is further suggested to scale down the cumbersome procedures and re-engineer the processes incorporating the viewpoints of all the stakeholders. The corresponding laws, rules, regulations of Municipal Administration have to be changed. Administrative structures have to be redesigned so as to make them e-governance compatible.

All the Municipal services, including layout permissions, are to be necessarily brought under the purview of CSMS.

All the Municipal services must be delinked with MeeSeva, and Citizen Service Centre in the Municipality has to be made Single Window System to ensure quick delivery and avoid duplication of uploading the same documents in MeeSeva, MRO office, Sub-Registrar Office.

It is also suggested that all the options of Citizen Buddy App/ Website regarding citizen services and grievances are to be made clearer in the cases such as rejection or shortfall of documents. The reasons must be mentioned clearly, and wherever possible, simple and quick solutions are to be provided by the officials.

To bring in more transparency, all the municipal services are to be brought under the ambit of CSMS and ensure the full-length digitalisation of services.

Proper vigilance mechanisms have to be devised to check the instances like uploading of fake documents, discriminatory assessment of property taxes, thus ushering more transparency.

Action has to be initiated against those employees who were given a poor rating by citizens, and as a part of the carrot and stick policy, good performance has to be rewarded.

Feedback and suggestions offered by the citizens regarding the overall functioning of the CSMS ought to be given solemn consideration.

The name and designation of the appellate authority have to be clearly displayed in the Municipal Office so as to enable the citizens to complain in case the problem remains unresolved at the Municipal office level.

Adequate steps have to be undertaken to enhance the e-Participation Index through e-Information sharing, e-Consultation and e-Decision making.

CONCLUSION

The study established emphatically that initiatives such as CSMS are working well and strengthening the roots of democracy. Now governance is at the doorsteps of households, and public services are just a click away. At the same time, it is also found that there exist formidable operational problems that invite earnest attention and certain shortcomings that can be overcome with interdepartmental coordination and oversight mechanisms at the state level. There is a need for more studies on the working of mobile apps in achieving the goals of governance.

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Assessing the Quality of Low Income Group Houses in India: Identification of Indicators

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ABSTRACT

A house is essentially an expression of people's way of life and culture. It is a symbol of pride, an identity of one's social affiliation to different groups and communities. It is expected that a good - quality housing shall be responsive to a wide variety of human needs. Hence, the need of a house ought to be seen through the prism of both quantitative as well as qualitative attributes by the policymakers and providers of houses. Although literature on housing in India, nay of different countries is replete with different aspects of affordable housing, such as affordability of house, area, volume, amenities, location, household income, policy aspects of housing, etc. there has been no study so far to assess the Quality Standards for LIG Housing Projects in India or elsewhere. This study therefore seeks to identify the set of Housing Quality Indicators (HQIs) for quality assessment of LIG housing in India. It is expected that such an identification of HQIs would help assess housing quality either through a participatory process (comparing end users' expectation and perception about the quality of housing) or by any independent organisation.

Keywords: *Housing quality, Housing quality indicators, SERVQUAL*

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HOUSING QUALITY - THE BACKDROP

A house is not merely a shelter to protect oneself from the vagaries of nature and various socio environmental threats emanating from the society. It essentially is an expression of people's way of life and culture. It is a symbol of pride, an identity of one's social affiliation to different groups and communities. It is a reflection of one's preferences and prejudices. It is an indicator of one's economic standing in the society. Therefore, a house represents one's preference for a particular design choice which s/he would not only cherish as a living icon of way of life, but would also prefer to be associated with its attendant values (Blauw PW, 1994; Bhatti and Church, 2004). People associated with the provision of housing, namely – the architects, planners, and builders ought to appreciate that a home is not simply an area to live in, it must necessarily ensure a variety of functions for the occupants. It is expected that a good - quality housing shall be responsive to a wide variety of human needs (Heywood, 2004; Dwijendra, 2013). Hence, the need of a house ought to be seen through the prism of both quantitative as well as qualitative attributes by the policymakers and providers of houses. Housing should not be considered simply as an infrastructure as it facilitates the formation of a settlement which subsequently enables people to identify and communicate with the neighbourhood, society, and the natural environ. As shelter, housing represents levels of living, besides the welfare and culture of the residents. Hence, housing could be a means for self-realization of the residents and their integration with the surroundings.

An analogy can be drawn between a house and a human heart (Hanson, 1999; Heywood, 2004). A house protects the privacy and safety of its occupants and supports their occupational and recreational needs. A house is a place of retreat, relaxation, and at times a place of work as well. It secures autonomy and independence. It is the manifestation of the self and his / her social rank. A house is, therefore a composite whole which not only satisfies various human needs, but also embodies human aspiration and cultural values. Acknowledging the significance of house as one of the primary human needs, it has been incentivised both from the demand as well as the supply side. Since Independence, although various housing schemes have been taken up by the Government, the major thrust has been on housing for the poor. In the post-Independence period, the immediate focus of housing was on the Economically Weaker Sections (EWS), industrial workers, and the Low-Income Groups (LIG) by way of subsidised housing. Such housing schemes by the Government have resulted in the massive addition to the housing stock. However, assessment of housing qualities in India for EWS /

LIG housing, nay, all types of housing has been a formidable exercise in view of the general lack of definitional consensus on what 'good' quality housing is and the absence of a single overarching regulatory body responsible for superintending housing quality issues. Hence, this paper makes an attempt to identify housing quality indicators for Low Income Group housing for whom the choices are very limited.

HOUSING QUALITY – LITERATURE REVIEW

Good-quality housing could be a major component for guaranteeing a healthy neighbourhood. Poor-quality housing may cause several health issues and is often related to contagious diseases (such as tuberculosis), stress, and dejection. Thus, good-quality housing should be made accessible to every household and satisfactory environs both within and around the house should be ensured to make one contented and happy. Housing quality has several components, each of which may be outlined in many ways. An unambiguous definition of housing quality takes into consideration both the interior and exterior structural elements of the house besides the aspects of its internal and external environ. A much more comprehensive definition might incorporate the neighbourhood characteristics as well as the perception about environmental sustainability. Housing quality is also regarded as housing condition and / or housing habitability, both evaluated through the lens of objective and subjective appraisal. Housing quality assessed through subjective lens holds quality as a dimension of housing that has several implications for its occupants (Heywood, 2004; Apparicio, Séguin and Naud, 2008). Quality on its own does not adjudicate between the efficiency and deficiency of a house. In fact, the quality aspects only ensure whether the minimum standards are met to make the house acceptable to its occupants. (Duncan, 1971; Feijten and Mulder, 2005; Dwijendra, 2013). It appears that housing qualities have been interpreted in varied ways by various attributes or by the extent to which a given community is afflicted by the housing problems (Blauw PW, 1994). It has also been seen that although housing quality is susceptible to the socio-economic and political distinctiveness of the communities, most of the quality assessment exercises take into account different amenities and physical structures of the dwellings, namely, – water, electricity, toilet and bath facilities, size, area of rooms, convenience of rooms etc. besides the location. It is intriguing to find that although extensive research on affordable housing have been undertaken in developing countries, none of these researches points out the necessity of a standard definition of housing to ensure the provision of good-quality housing (Batley, 1996; Godish, 2001, 2016; Heywood, 2004; Karsten, 2007; Dwijendra, 2013). Such a shallow conception of housing leads to the creation of sub-

standard housing units that are not functional. The builders / real estate developers must necessarily appreciate that housing is an expression of human wants, and therefore they must be emphatic on the specific needs of the potential occupants of the house and the concomitant customised design for such houses. In making the provision for housing, builders are expected to face numerous constraints, some of which can well be unavoidable. But this should not deter the builders in providing good quality housing that underscores the basic human needs, crucial to promoting the well-being of its residents.

Adams (D. Adams, 1995; O. A. Adams, 1995) observes that 'Good quality housing should be able to reckon with the diversity of human needs and the ever-changing needs of individuals'. Qualitative analysis has used 'cultural probes' to decipher the distinctive values and lifestyles of individuals (D. Adams, 1995; O. A. Adams, 1995; Adams, 2000). Therefore, quality of the house is not simply the final product, it very appropriately begins with the design elements ensuring and incorporating the autonomy and power for the end-users in every step of the design (Harrison, 2004; Wentling, 2017). Urban housing regulator in the developing countries would consider a house sub-standard from the house-quality point of view if the house does not satisfy the statutory housing standards and byelaws (Hanson, 1999). Thus, a house shall be considered satisfactory if it is constructed with permanent building materials and provided with supporting infrastructures and amenities. Any endeavour to assess the housing quality ought to be linked to the physical qualities of the house and its utility (value-in-use) to the occupant(s). Waterson argues that the utility of a house lies in its suitability for the end users, aligning to their life styles and fulfilling their cultural values as well (Waterson, 1990; Janowski and Waterson, 1996). Besides the widening gap between supply of and demand for housing, lack of quality housing, cultural inappropriateness of the design of social housing, etc. also afflict the housing sector very badly (Wakely, Schmetzer and Mumtaz, 1976).

It is often seen that the massive construction of affordable housing projects has hardly ever met the requirements of the users and hardly ever built taking into consideration the cultural identity of the occupants. Moreover, most of the houses are found to be bereft of quality design and adequate basic services, let alone the small plot size (Turner, 1976). Quite regrettably, such affordable houses for the urban poor are found to have been built like un-habitable boxes and allocated across the poor urban households without caring whether such housing caters to the expression of way of life for its occupants and their cultural ethos. It appears that affordable housing has not only gone beyond the reach

of affordability of urban poor, it has also not taken into cognisance the cultural appropriateness and / or housing quality while conceiving the design of the housing project and subsequently implementing it.

Good-quality housing should be able to surmise the diversity of peoples’ aspiration and needs and the ever-changing wants of individuals. Subjective (qualitative) analysis has taken recourse to the ‘cultural probes’ to decipher the distinctive lifestyles as well as values of simply the final product, it very appropriately begins with the design elements ensuring and incorporating the freedom, liberty, and authority for the end-users in every step of the dwelling-design (Wentling, 1995; Harrison, 2004). While breaking down the different facets of housing, quality of housing constitutes a prominent facet as expected (Figure 1).

Fig. 1: Various Facets of Housing



Source: Prepared by the Authors.

In India, literature is replete with different aspects of housing sector. Extensive researches have been made on different aspects of affordable housing, such as affordability of house, area, volume, amenities, location, household income, policy aspects of housing, etc. but there has been no study so far to assess the Quality Standards for LIG Housing Projects in India. Though one can assess the housing quality in India indirectly through the Norms and Standards of minimum requirement as per building bye-laws such as provision of windows, light and ventilation, minimum width and height of the room, minimum width of passage, toilet etc., but such assessment cannot capture the broad quality aspects of housing. Also, the building bye-laws do not have any spatial indicators such as distance to various amenities, access to public transport, etc. (location aspects), and also do not take into account the environmental, aesthetic and many services indicators that come under the physical infrastructure. Considering the constraint of non-availability of more options for buyers and limitations in the number of providers, it is essential to assess the LIG housing quality preferably through end users’ perception in order to ascertain whether the housing, provided as per existing building bye-laws on the site, does meet the

expectations of end users. This study, therefore seeks to identify the set of Housing Quality Indicators (HQIs) for quality assessment of LIG housing in India. It is expected that such an identification of HQIs would help assess housing quality either through a participatory process (comparing end users' expectation and perception about the quality of housing) or by any independent organisation. This study excludes Middle- and High-Income Group housing (MIG, HIG, Ultra HIG) which have wider choices available for the buyers who can afford luxury at different income levels.

HOUSING QUALITY - IDENTIFICATION OF INDICATORS

Since attributes of a normative affordable house differs across countries and although such differences are also observed across the zones of a country, the contextual perspective for the present study is the typical affordable housing made under government initiatives and private enterprises in India. The present study shall therefore customize the housing quality indicators that are developed in other countries as well as recommended by researchers in India taking into account the differential socio-economic and physical conditions between India and western countries. Affordability being relative, level of minimum area, specification may vary with the context and hence the present study shall take care of the difference in affordable housing (A.H.) / low cost housing between India and western countries. The conceptual perspective for study on the other hand shall enquire: (a) are the quality standards used in various countries for housing applicable in Indian context? (b) What is the comprehensive set of indicators to assess quality of housing? (c) What considerations are needed in selecting the indicators? (d) How to deal with the dynamism in the indicators in Indian context?

Johns and Howard (1998), in their study point at the different connotations that are beset with the word 'service' which naturally results in great degree of confusion around the word since 'service' in management literature could indicate a performance, a product, an industry, an offer or a routine process. Since the last three decades, service qualities are being examined as key issues confronting the service providers (Ladhari, 2009). Quality service provision begets civic confidence for the service providers (Cronin and Taylor, 1992). Consumers are no longer ignorant these days, rather they are more informative and proactive as well as empowered to make the service providers comply with the commitment towards meeting the assured service qualities (Donnelly *et al.*, 1995). Berry and Parasuraman (Parasuraman and Berry, 2004) assert that the understanding of client's expectations towards service quality is fundamental to measure the

service quality. Based on a basket of expectancy theories, expectations are interpreted as partial assessment and subsequent benchmarking of the standards (or reference points) of a certain product or service against which the product or service is judged (Zeithaml, Berry and Parasuraman, 1993). Therefore, service quality can be claimed to have been ensured satisfactorily, provided customer satisfaction have been attended to. Taking into consideration customers' expectations, quality can thus be linked to the variation between the expected quality and perceived quality (Parasuraman, Zeithaml and Berry, 1985). Service Quality (SERVQUAL) Model was developed as 'Gaps Model' by Parasuraman (Parasuraman, Zeithaml and Berry, 1985a) to assess the gap between users' expectation(s) and perception(s). Bigger differences between expectation(s) and perception(s) have been viewed as low-quality service and vice versa (Parasuraman, Zeithaml and Berry, 1988).

Although HQIs are identified to assess the quality of housing and although such quality – assessment can best be done through the above mentioned SERVQUAL model, this study restricts its scope to the identification of HQIs only. Towards this aim, the following references on quality indicators of housing have been consulted for the identification of housing quality indicators for this study.

- U.S. Department of Housing and Urban Development
- Welsh Housing Quality Standard (WHQS)
- Scottish Housing Quality Standard (SHQS)
- Sacramento Housing and Redevelopment Agency (SHRA)
- Housing Choice Voucher Program Guidebook
- Homes and Community Agency- Government of United Kingdom
- Housing Quality Indicators (HQI) used by Nelson Okehilem
- HQI used by Dr. Sudhi Mary Kurian and Dr. Ashalatha Thampuran

Since the SERVQUAL instrument has 5 dimensions, namely, - empathy, assurance, responsiveness, reliability, and tangibility (Ham and Hayduk, 2003; Mursaleen, Ijaz and Kashif, 2014), the identification of HQIs should be so aligned as to be grouped across these five dimensions. These five dimensions of SERVQUAL model are briefly defined as follows:

- (i) Tangibility: The availability of physical facilities, equipment and tools, etc. namely, signage, furniture, etc.;

- (ii) Reliability: The consistency in providing flawless services on a sustained basis over a period of time by the agency;
- (iii) Assurance: The knowledgebase of the agency staff about the service being provided by the agency and their being courteous;
- (iv) Responsiveness: The responsive demeanor of agency staff in the delivery of the service by the agency; and
- (v) Empathy: The agency executives' and staff's dexterity to pay personalized attention to each customer.

Although these five dimensions of SERVQUAL are not applied towards the identification of HQIs in this paper, it is held that such dimensions of housing qualities shall be hugely relevant in constructing the framework for assessment of housing qualities as well as categorizing the HQIs between Product Quality and Service Quality taking into account the original categories of each HQI.

Following stages have been followed in the identification of HQIs:

- (i) *First stage:* listing of HQI taken from various literatures and various Housing Boards' norms regarding HQI.
- (ii) *Second stage:* group-wise shortlisting of HQI.
- (iii) *Third stage:* first filtration of shortlisted HQI (through focus group discussion) taking into consideration the contextual differences in order to fit the indicators in contextual framework.
- (iv) *Fourth stage:* final filtration (finalization) of HQI through expert opinion survey.

A host of HQI studied under the first stage from various literatures and various Housing Boards' norms regarding housing quality are given below.

(i) U.S. Department of Housing and Urban Development

Under the U.S. Department of Housing and Urban Development Inspection Checklist, there are various housing quality indicators, distributed across eight components, namely – (a) Living Room, (b) Kitchen, (c) Bathroom, (d) Other Rooms Used for Living and Halls, (e) All Secondary Rooms (Rooms not used for living), (f) Building Exterior, (g) Heating and Plumbing, and (h) General Health and Safety. Several sub-indicators under the aforesaid eight components have been read in detail to identify and formulate an ideal, all comprehensive set of housing quality indicators for the present study.

(ii) Welsh Housing Quality Standard (WHQS)

First introduced in 2002, the WHQS intends to ensure that all dwelling units are of good-quality standard and appropriate for the requirements of the present as well as the future occupants. In the Welsh Housing Quality Standards (WHQS), forty-one sub indicators are given under seven different components, such as: (a) State of repair, (b) Safety and security, (c) Adequate heating, fuel efficiency and well insulation, (d) Modern kitchens and bathrooms, (e) Well managed (for rental housing), (f) Attractive location and safe environments, (g) Suitable for specific requirements of the household (e.g. specific disabilities). WHQS also contains ten key aspects which are linked to the abovementioned seven components and forty-one different sub indicators.

(iii) Scottish Housing Quality Standard (SHQS)

A synopsis of the five comprehensive criteria (A to E) involving 55 elements and 9 sub-elements of the Scottish Housing Quality Standard (SHQS) are furnished in Annexure-7 (Scottish government). Scottish Housing Quality Standard (SHQS) consists of five broad criteria, namely, - (a) Compliance with the current tolerable standard, (b) Free from serious disrepair, (c) Energy efficiency, (d) Presence of modern facilities and services, and (e) Healthy, safe and secured environ. Under these five broad criteria, fifty-five elements and 9 sub elements are incorporated.

(iv) Sacramento Housing and Redevelopment Agency (SHRA)

SHRA envisages a neighborhood that is an excellent place to reside, work and carry out business where each household has access to a decent, safe, secured and affordable house. Constituted under a Joint Powers Agency Agreement (JPAA) on April 20, 1982 by the City Council and County Board of Supervisors, Sacramento, SHRA mobilized both financial resources and manpower to invigorate low-income communities, generate opportunities for affordable housing, besides serving the public housing residents.

(v) Housing Choice Voucher Program (HCVP) Guidebook

The objective of HCVP is to ensure a decent, safe, secured and hygienic housing at an affordable price to LIG families. To achieve this, HCVP regulations stipulate a set of crucial housing quality standards which all dwelling units must comply with minimum criteria required for the health, hygiene, security and safety of the programme participants before assistance can be awarded on behalf of a family and at best annually during the term of the assisted occupancy. HQS regulations

stipulate performance standards and suitability criteria to fulfil each performance prerequisite. HQS contains requirements for various types of housing, including individual and multi - family houses, as well as precise requirements for a particular type of housing, namely - constructed homes, assembled housing, single room occupancy, shared housing and group housing.

(vi) Housing Quality Indicators used by Nelson Okehilem

Nelson Okehilem (2011) sets forth HQIs having four main impact factors because of their significant roles in the 'critical successes' of affordable housing quality in the UK. These impact factors are: sociological, economical, technological and environmental. Also identified were the indicators and criteria under them, which are all relevant for the development of a quality benchmark model.

(vii) Kurian and Thampuran (Kurian and Thampuran, 2011) perceive that the usability of a house is dependent not only on its size but also on whether it can be organized to suit the way the residents wish to live in. The authors have recognised that larger dwellings have implications of cost and land use, and consequently sustainability. Site design characteristics are mostly evaluated when client requirements indicate the overall objective and these are used in conjunction with a site-specific brief, allowing particular relevant features to be emphasised. The cost of regular maintenance and of making changes to a unit as new living patterns emerge over time is an important part of the quality of the unit.

(viii) Aesthetic Quality Indicators

Aesthetic quality indicators have been used by Jack L. Nasar (Jack L. Nasar, 1994). He examines three kinds of aesthetic variables: formal, symbolic and schemes. It highlights the importance of enclosure complexity and order as a formal variable of style as symbolic variable having a typical relation to schemes.

After studying all these above mentioned HQIs, eighty-seven indicators are shortlisted and broadly categorized group wise (Table 1) in five different sets, namely, (i) Physical Quality Indicators, (ii) Spatial Quality Indicators, (iii) Economy and Design Efficiency Based Indicators, (iv) Environmental Indicators and (v) Aesthetic Quality Indicators. These are outcome indicators considering housing as a physical infrastructure along with services since House plus Neighbourhood Services constitute Housing.

TABLE 1: PRELIMINARY CATEGORIZATION OF HQIS

A	PHYSICAL QUALITY INDICATORS
BUILDING LEVEL	
Building- Internal Unit	
1	Accessibility (building level)
2	Area of tenement (space)/ unit size
3	Unit layout
4	Accessibility (unit level)
5	Unit noise level
6	Unit light quality
7	Unit ventilation
8	Presence of window
9	Presence of ventilator
10	Window condition
11	Ceiling condition
12	Wall condition
13	Floor condition
14	Presence of sink in kitchen
15	Space for storage, preparation, and serving of food
16	Presence of bathroom and condition
17	Presence of toilet and condition
18	Electrification (available points)
Building- External	
19	Condition of structure
20	Condition of stairs, rails, and porches
21	Condition of roof/ gutters
22	Condition of exterior surfaces
23	Condition of chimney
24	External finish
25	Presence of compound Wall
26	Building facing direction
27	Distance between buildings
Building Services	
28	Drinking water supply
29	Water supply for use

(contd.)

30	Electricity availability
31	Plumbing
32	Sanitation- sewer connection
33	Garbage collection
34	Garbage disposal
35	Fire safety
36	Other services
B	SPATIAL QUALITY INDICATORS
37	Location
38	Accessibility (site level)
39	Proximity to bus stop
40	Proximity to school
41	Nearness to market place
42	Proximity to hospital
43	Proximity to bank
44	Nearness to post office
45	Nearness to place of worship
46	Park / play field within 1 km
47	Public water supply system
48	Garbage disposal facility
49	Public drainage system
50	Common waste disposal facilities
C	ECONOMY AND DESIGN EFFICIENCY BASED INDICATORS
51	Subsidy- free housing
52	Use of economical materials/local materials
53	Water optimization
54	Energy optimization
55	Structural stability
56	Lesser repair cost
57	Low-cost building techniques
58	Design by architect
59	Role of contractors
D	ENVIRONMENTAL INDICATORS
60	Eco-friendly materials use

(contd.)

61	Lesser pollution levels
62	Health and safety
63	Waste recycle and disposal
64	Water recycle and reuse
65	Circulation
66	Transportation
67	Use of wood
68	Use of PVC material
E	AESTHETIC QUALITY INDICATORS
Formal Aesthetic Quality	
Enclosure	
69	Openness
70	Spaciousness
71	Density
72	Mystery
Complexity	
73	Diversity
74	Visual Richness
75	Ornamentation
76	Information rate
Order	
77	Unity
78	Order
79	Clarity
Symbolic Aesthetic Quality	
80	Naturalness
81	Upkeep
82	Intensity of use
83	Style
Specific Aesthetic Quality Indicators	
84	External finish
85	Well defined compound wall
86	House facing definite direction
87	Central courtyard for house/building

First filtration of the above mentioned eighty-seven HQIs has been carried out through focus group discussion, taking into consideration the contextual differences in order to fit the indicators in contextual framework. Focus Group Discussion (FGD) requires assembling people from comparable milieu or experiences together to deliberate on a specific subject of interest. It is an oft used tool of qualitative research where questions are asked to the members of the group about their observations, views, attitudes, ideas or beliefs. In FGD, participants are free to engage themselves in intense interactions with other members of the group. Unlike other qualitative research methods, it promotes intra group deliberations both intensively and extensively. A focus group discussion was conducted by inviting people from various backgrounds such as academicians, practicing architects, town planners, civil engineers, other professionals, builders, developers and also research scholars. The topic under focus group discussion was to figure out the most relevant HQIs for this study from amongst the eighty-seven HQIs identified through literature survey. Approximately forty participants were involved in the process who gave their views towards reducing the numbers of HQIs considering the contextual and conceptual framework of this study.

Participants shared their views about the indicators of Housing Quality and filled the Google forms provided to them for marking the importance of each discussed indicators on a 5-point Likert scale where one represents least important parameter and five represents most important parameter. Google form was created used for focus group discussion. With the help of focus group discussion, the eighty-seven indicators originally selected from literature survey were brought down to fifty-three (Table 2), which are suitable in Indian context, and helpful for assessment of housing quality (contextual differences are considered in order to fit the indicators in contextual framework). Focus Group Discussion (FGD) also helped to enrich and widen the perspective of housing quality and housing studies.

The indicators filtered through FGD were further taken for Expert Opinion Survey for further reduction and confirmation (finalization) of indicators in order to prepare the SERVQUAL questionnaire for field surveys towards the participative assessment of housing quality based on users' expectation and perception. Following steps were adopted while finalising the FINAL indicators:

- (A) All fifty-three indicators filtered through FGD are put to Likert scale of 1 to 7 where 1 is the least important and 7 is the most important parameter for this study. Survey form was created with the help of Google form and results of ranking and scores of various indicators are furnished in Fig. 2 and 3.

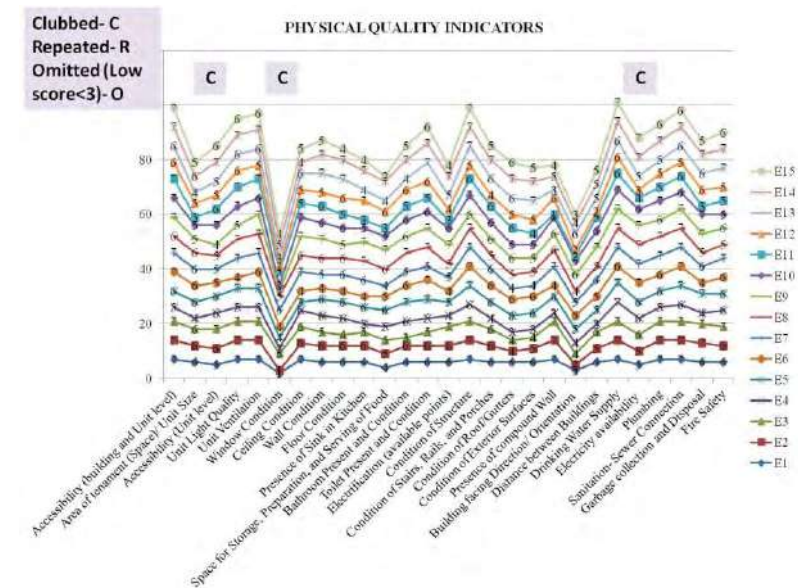
TABLE 2: SHORT LISTING OF HQIS THROUGH FGD

SL. NO.	INDICATORS
A	PHYSICAL QUALITY INDICATORS
BUILDING LEVEL	
Building- Internal Unit	
1	Accessibility (building and unit level)
2	Area of tenement (space)/ unit size
3	Accessibility (unit level)
4	Unit light quality
5	Unit ventilation
6	Window condition
7	Ceiling condition
8	Wall condition
9	Floor condition
10	Presence of sink in kitchen
11	Space for storage, preparation, and serving of food
12	Presence of bathroom and condition
13	Presence of toilet and condition
14	Electrification (available points)
Building -- External	
15	Condition of structure
16	Condition of stairs, rails, and porches
17	Condition of roof/gutters
18	Condition of exterior surfaces
19	Presence of compound wall
20	Building facing direction/ orientation
21	Distance between buildings
Building Services	
22	Drinking water supply
23	Electricity availability
24	Plumbing
25	Sanitation- sewer connection
26	Garbage collection and disposal
27	Fire safety

(contd.)

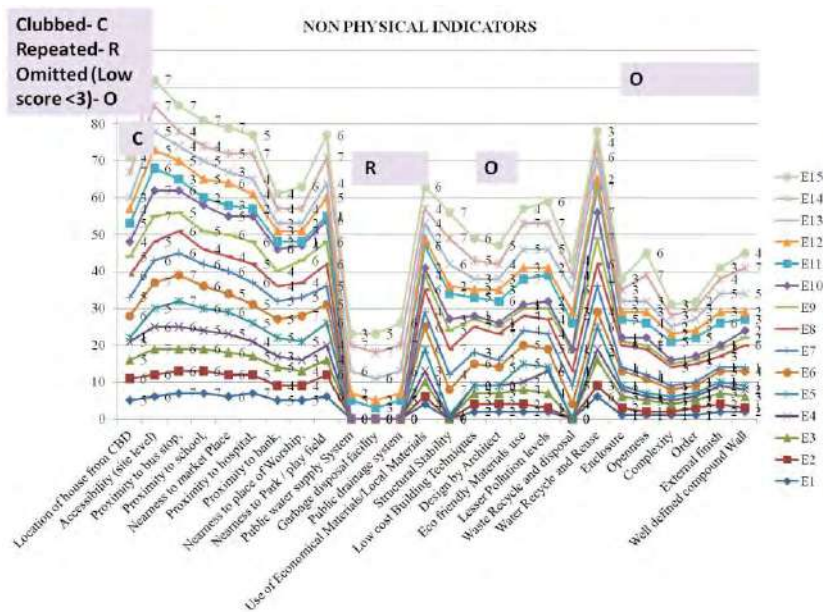
B	SPATIAL QUALITY INDICATORS
28	Location of house from CBD
29	Accessibility (site level)
30	Proximity to bus stop
31	Proximity to school
32	Nearness to market place
33	Proximity to hospital
34	Proximity to bank
35	Nearness to place of worship
36	Nearness to park / play field
37	Public water supply system
38	Garbage disposal facility
39	Public drainage system
C	ECONOMY AND DESIGN EFFICIENCY BASED INDICATORS
40	Use of economical materials/local materials
41	Structural stability
42	Low cost building techniques
43	Design by architect
D	ENVIRONMENTAL INDICATORS
44	Eco-friendly materials use
45	Lesser pollution levels
46	Waste recycle and disposal
47	Water recycle and reuse
E	AESTHETIC QUALITY INDICATORS
Formal Aesthetic Quality	
48	Enclosure
49	Openness
50	Complexity
51	Order
F	SYMBOLIC AESTHETIC QUALITY
Specific Aesthetic Quality Indicators	
52	External finish
53	Well defined compound Wall

Fig. 2: Physical Quality Indicators’ ranking as per Expert Opinion Survey



Source: Analysis by Author

Fig. 3: Non-Physical Quality Indicators’ ranking as per Expert Opinion Survey



Source: Analysis by Author

- (B) Fifteen experts across various fields, namely – academics, architecture, civil engineering, State Town Planning Department and PWD, researchers etc. had been consulted under the expert opinion survey in order to further reduce the number of indicators through outright exclusion, clubbing, removing and grouping.

The results of Expert Opinion Survey are furnished in Fig. 2 and 3. Each line in respective figure represents the weightage given by the experts across each Housing Quality Indicators on a scale of 1 to 7.

- (C) Consequent upon the brainstorming, out of the 53 indicators, some of the indicators, found to be proximate to one another, are clubbed with each other; some repeated indicators under different heads were removed and kept under one domain in order to avoid the confusion of respondents; indicators scoring less than 3 (three) as modal value have been omitted considering their less importance to this particular study; and, some original indicators have been kept 'as it is' in response to the modal value of scoring. The clubbed, repeated, and omitted indicators are shown in Table 3.
- (D) In all, thirty indicators have finally been selected for this study as shown in Table 4.

TABLE 3: CLUBBED, REPEATED, OMITTED HQIS THROUGH
EXPERT OPINION SURVEY

Clubbed Indicators
Accessibility (building and unit level)
Window condition (unit light and ventilation)
Electrification (available points), Availability of electricity
Garbage collection and disposal
Location (proximity to the various public amenities)
Removed Indicators because of repetitiveness in different aspects
Public water supply system
Garbage disposal facility
Public drainage system
Structural stability
Waste recycle and disposal
External finish
Well defined compound wall
Omitted Indicators
Aesthetic quality indicators (all set)
Design by architect
Low cost building techniques

TABLE 4: FINAL HOUSING QUALITY INDICATORS

<i>Sl. No.</i>	<i>Indicators</i>	<i>Sl. No.</i>	<i>Indicators</i>
1	Accessibility (building and unit level)	17	Building facing direction
2	Area of tenement (space)/ unit size	18	Distance between buildings
3	Unit light quality	19	Drinking water supply
4	Unit ventilation	20	Electricity availability
5	Ceiling condition	21	Plumbing
6	Wall condition	22	Sanitation - sewer connection
7	Floor condition	23	Garbage collection and disposal
8	Presence of sink in kitchen	24	Fire safety
9	Space for storage, preparation, and serving of food	25	Accessibility (site level)
10	Presence of bathroom and condition	26	Proximity to public transport
11	Presence of toilet and condition	27	Proximity to the public amenities such as school, market place, hospital, bank, playfield/ park, place of worship etc.
12	Condition of structure	28	Use of economical materials/ local materials
13	Condition of stairs, rails, and porches	29	Waste water recycle and reuse
14	Condition of roof / gutters	30	Obnoxious activities
15	Condition of exterior surfaces		
16	Presence of compound wall		

CONCLUSION

It has been argued in this study that notwithstanding the affordability of the house owner, area of the house, housing quality should also be factored into the evaluation of any housing scheme. In its bid to identify the HQIs, this study surveys both foreign and Indian literature. Considering the various aspects of housing, this study adopts the SERVQUAL method for grouping the HQIs under five dimensions although these dimensions were not retained in the finally selected thirty HQIs. As has been explained, this identification of HQIs has been put through rigorous filtration process. Housing quality has several components, each of which may be outlined in many ways. An unambiguous definition of housing quality takes into consideration both the interior and exterior structural elements of the house besides the aspects of its internal and external environ. A much more comprehensive definition might incorporate the neighbourhood characteristics as well as the perception about environmental sustainability. Housing quality is also regarded as housing condition and / or housing habitability, both evaluated through the lens of objective and subjective appraisal. However, this study submits that the quest for even more sound HQIs should ensure that:

- Future study be extended to other income groups considering their requirements, lifestyles and demands.
- Aesthetic quality indicators should be incorporated under the listed housing quality indicators made in this study.
- Other aspects such as climate, locations, impact of housing policies, durability, etc. can be factored in while assessing the housing quality.
- Tenure security as a separate aspect may be considered while assessing housing quality. Future study can underscore the importance of tenurial security, if such an aspect is found to be crucial in determining the legal status of a house.
- Unlike in the present study where LIG house owners have not been consulted while choosing the HQIs (it has been restricted to experts and other stakeholders) because of their perceived unawareness about different HQIs, future study can even make the selection of HQIs participatory, especially in the cases of MIG / HIG housing since these segments are believed to be fairly informed about a host of HQIs including even the specific indicators (e.g. aesthetics, interior spaces, etc.) and are

also expected to influence the choice of HQIs because of their higher affordability.

- Since both years of occupation and the quality of previous occupation could impact the expectation – perception gap of the respondents about the quality of their present house, future research can be done by taking into consideration both these aspects.
- SERVQUAL model should be applied in the identification of HQIs through a participatory process since the five dimensions of SERVQUAL, namely, empathy, assurance, responsiveness, reliability, and tangibility shall surely facilitate the identification of HQIs on the part of the house owners.

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Evolution and Growth of Chirimiri Town: A Critical Appraisal on Sustainability of Colliery Towns in 21st Century India

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ABSTRACT

Coal mining in India has initiated the process of urbanisation in sparsely populated interior regions of India, and most of the colliery towns of India are small in size and mono-functional in nature. Coal mining in central India was initiated at the beginning of the 20th Century, and a few small urban settlements evolved with the beginning of the collieries. Most of these colliery towns are mono-functional and still insignificant in population size.

On the contrary, Chirimiri has evolved into a relatively populous multi-functional town over the years. Henceforth, it is interesting to demystify the evolution process of the largest colliery town in the region. It is also worth understanding that the decline of mining towns is a common phenomenon across the globe, and the process of de-urbanisation of the Chirimiri town has already begun. However, population decline is slow, and the town is fighting hard against its inevitable fate. Unfortunately, like many small towns, Chirimiri is also a neglected town where no significant record is available about the town (not even City Development Plan). The present study attempts to describe the evolutionary history of the town systematically.

Keywords: Urbanisation, Evolution; Colliery town; Chirimiri; Sustainability.

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INTRODUCTION

Towns and cities have existed for over eight millennia (Tellier, 2019), but fewer than three per cent of the world's population lived in urban settlements before 1800 (Davis, 1969). The world's urban population has been surging to an unimaginable level as half of the world's population was already residing in urban areas in 2007 (UN, 2008), which had increased to 55 per cent in 2017 (UN, 2018). A substantial discrepancy in urbanisation across the globe is observed due to the variation in the historical factors responsible for urbanisation (Kasarda and Crenshaw 1991). The historical causes accountable for urbanisation have changed over time. Mining has contributed to urban evolution in many regions of the world (Eller, 1982). Many urban centres in India were evolved due to mining activities, and coal mining in India has initiated the process of urbanisation in unsettled interior regions (Avtar et al., 2019). India is dotted with many colliery towns spread across the country.

Mining settlements typically consist of purpose-built housing constructed by mining companies (Marais et al., 2018). Despite revolving around coal mining activities, these settlements are generally heterogeneous. Mining settlements and their attendant social dynamics are shown to evolve in differing ways, depending on the type of mining taking place and the length of time the mines have been in operation (Gough et al., 2019). Ever-growing energy demand has led to the evolution and development of many colliery towns (Avtar et al., 2019).

India has a long history of commercial coal mining covering nearly 250 years, starting from 1774 by M/s Sumner and Heatly of East India Company in the Raniganj Coalfield along the western bank of river Damodar. The demand for coal increased considerably about a century later due to the introduction of steam-based rail engines in India. Further, it was boosted during the I and II World Wars (MoC, 2011). Due to increasing demand, the British Government has explored new areas for coal mining, and many new colliery towns were evolved in different parts of the country. Most of them are located in relatively inaccessible interior parts of the central and east Indian states such as Madhya Pradesh, Odisha, Jharkhand, West Bengal, and Chhattisgarh. Generally, these colliery towns are developed as subsidiary towns around a leading urban centre. However, they rarely grow as independent urban centres of significant size. Chirimiri is a typical example of a colliery town that evolved in an interior location and achieved a considerable population size.

A vast coal reserve was identified Central India, and a detailed survey of this interior area (Chirimiri-Jhilimili region) was made in the

second decade of the 20th Century. *The Geological Survey of India* (GSI) report revealed the prospects of good quality coal in this inhabited region around a small village, Kurasiya (GSI, 1913-14). A big town has evolved around an almost barren area due to coal mining.

Chirimiri is a colliery town developed in an interior location and has become an independent urban centre of about one lakh population. As per the Census 2011, Chirimiri was a Class-II town which had been town granted the status of Municipal Corporation by the Chhattisgarh Government in 2008. The town is divided into 40 wards and nine zones namely: Pondi, Koriya, Gelhapani, Dumanhill, Godaripara, Badabazar, Bartunga, Chhota Bazar and Haldibadi. Chirimiri evolved as a multi-nucleus town without a central city as these nine zones are physically separated from each other by hilly mounts and forested areas.

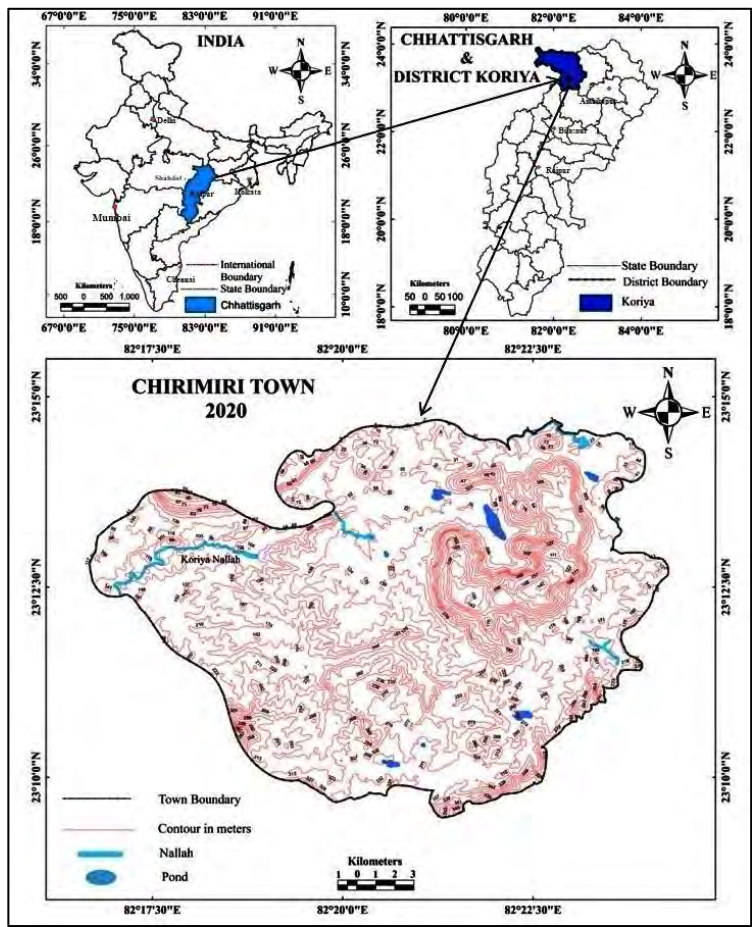
The present article is a descriptive study based on secondary data collected from various sources and compiled information based on intensive field visits. The study is woven around a few critical questions about the town's historical evolution and future, such as: How has a relatively large town evolved in an interior and inaccessible location? Why did the other urban settlements of the Chirimiri-Jhilmili Coalfield remain insignificant in size and mono-functional while Chirimiri grew significantly in size and achieved functional diversity? How the Chirimiri evolved as a multi-nucleus town in due course of time? Most importantly, what is the future of an interior-located colliery town in the 21st century globalised world?

CHIRIMIRI TOWN: SITE AND SITUATION

Chirimiri-Jhilmili Coalfield is a part of Central India Coalfields, located in Koriya district, Chhattisgarh. It is spread over 125 square kilometres with estimated total reserves of around 312 million tonnes. The Talchars formation bounds this coalfield on three sides except for North, where the Basalts of Deccan Trap cover the area. Chirimiri town is a colliery town located in Chirimiri-Jhilmili Coalfield area of Central Indian Coalfield (SECL, 2020).

Chirimiri is located in the Koriya district of Chhattisgarh between the geographical coordinates of 23°9'28" North to 23°14'41" North latitude and 82°16'40" East to 82°24'16" East longitudes (Fig. 1). The town is spread over 12900 hectares at an average elevation of about 600 meters above mean sea level. Chirimiri is located in the hilly area of the Chhattisgarh Plateau, where the height of different localities varies considerably. Chirimiri railway station is located in the valley (582 meters above mean sea level), one of the town's lowest points. After a steep height from the railway station Bada Bazar, Chhota Bazar, and

Fig. 1: Location and Regional Setting of Chirimiri Town



Bartunga is located in a relatively plain area of equal elevation. Haldibadi is situated in a stairs-like terrain where the height from Railway Station (lowest point) to Post Office (highest point) varies considerably. The main market and the cinema hall of Haldibadi are situated in the middle of these two extremes. Doman hill, Korea, Gelhapani, and Godaripara possess relatively higher elevations. The Chirmiri town is situated in a location with limited connectivity. The National Highway-43 originates from Gulganj in Madhya Pradesh, passes through Baikunthapur (district headquarter) and Ambikapur in Chhattisgarh, and terminates at Chaibasa in Jharkhand is the only major road network that provides inter-state connectivity to the town. Similarly, the Anuppur-Chirimiri trunk rail route is the only link available from the town. The rail route is still served only by the five *trains* (Passengers) halt in every small station located on the route.

The location inertia is readily evident as the limited north-south connectivity is available from Anuppur Railway Junction (95 km away) of Madhya Pradesh. Similarly, the East to west rail connectivity is available from Katni Junction of Madhya Pradesh, located 230 km away from Chirimiri. The nearest National Highway (NH-43) is 25 km away from the city, and limited inter-state and intra-state bus connectivity is available through private buses.

COLLIERY TOWNS OF THE CHIRIMIRI-JHILIMILI COALFIELD

The South Eastern Coalfields Limited (SECL) has divided the central Indian Coal Field into eight coalfields. Six belong to the Chirimiri-Jhilimili Coalfield area spread in Madhya Pradesh and Chhattisgarh, while the remaining two (Johila and Sohagpur) are exclusively situated in Madhya Pradesh. The Chirimiri-Jhilimili Coalfield is mainly spread over the old Sarguja district (now Surajpur, Koriya and Manendragarh-Chirimiri-Bharatpur districts) of Chhattisgarh and part of this coal field is spread in Madhya Pradesh also (mines of Anuppur district). The group covers an area of about 5,345 square kilometres (2,064 sq m) with estimated reserves of 15,613.98 million tonnes. The deposits are at a depth of 0-1200 meters (Purohit, 2016). Chirimiri is the most important town located in Chirimiri-Jhilimili Coalfield area.

Chirimiri is principally a colliery town, and the evolutionary history of the town is closely associated with the account of coal mining. It is the last railway station of the trunk railway route connected to the Anuppur Railway Junction. Due to its remoteness, an automatic question arises how does such a big town evolve in an interior location? Before analysing its evolutionary history, it must be noted that it is not a small colliery town developed around a relatively big town. The Central India coalfield is dotted with many such kinds of colliery towns. Table 1 comprises the list of urban centres located in the Chirimiri-Jhilimili Coalfield area. Small size colliery towns developed around a relatively big urban centre is a feature characteristic of colliery towns of the region. Contrary to it, Chirimiri is a sizeable independent town that evolved exclusively in a remote location. The history of the evolution of Chirimiri is closely associated with the history of coal mining in the region.

The coal mining in Central Indian Coalfield began in the 19th Century, and Umaria was the first mine opened by Britishers in the 1880s. The only objective of the Umaria mine was to support the railway operation in Katni Railway Station (Robinson et al., 1902). Later on, after the exhaustive survey of the Central Indian Coal Field at the beginning of the 20th Century, an enormous potential of this coalfield area was recognised, and a trunk rail line was constructed from Anuppur

TABLE 1: URBANISATION IN CHIRMIRI-JHILMILI COALFIELD BASIN

<i>Dist.</i>	<i>Town</i>	<i>First Enumerated</i>	1941	1951	1961	1971	1981	1991	2001	2011
Koriya (Chhattisgarh)	Chirimiri (M. Corp.)*	1941	10,044	—	6563	30105	53015	89,460	93,373	85317
	Manendragarh (M)	1941	5027	5478	9807	12532	19265	26326	30758	33071
	Khongapani (NP)*	1991						14297	17862	17400
	Jhagrakhand (NP)*	1941	5149	—	5745	8424	11851	13933	7504	7680
	Nai-Iedri (NP)*	2011								5334
	Baikunthpur (M)	1951		2515	3262	5065	6530	8316	10077	28431
Surajpur (Chhattisgarh)	Shivpur Charcha (M)*	1991						13404	15217	23514
	Katkona (NP)	2011								4552
	Bishrampur (NP)*	1991						11313	12376	11367
	Bhatgaon (NP)*	1991						8639	8228	11204
	Surajpur (M)	1971				5296	7477	13049	16834	20189
	Premnagar (NP)	2011								4954
Anuppur (Madhya Pradesh)	Jarhi (NP)*	2011								7228
	Pratappur (NP)	2011								5635
	Bijuri(M)*	1981					9880	17009	28218	32682
	Kotma(M)*	1951		3691	—	8176	10949	21169	28487	29704
	Pasan (M)	1971				6691	15787	26060	29565	28447
	Dola (CT)*	1991						8849	10377	9273
Amarkantak (NP)	Badra (CT)*	2001							4756	4785
	Deohra (CT)*	2001							10840	9686
	Amarkantak (NP)	2001							7082	8416

Source: Compiled from Census data
*colliery town

towards Chirimiri and Ambikapur. The Chirimiri-Jhilimili coalfield area is spread over three districts, and 21 towns listed in Table 1 are located in these three districts. Out of 21 towns, 14 can be identified as Colliery towns, while the towns like Manendragarh and Baikunthpur are developed as service centres only because of coal mines. They were also colliery towns; however, their subsidiary colliery towns such as Khongapani, Jhagrakhand, Nai-ledri, Shivpur, Charcha were identified as separate towns in the later census and granted civic status by the state government. So, coal mining has a deterministic impact on the urbanisation of the Chirimiri- Jhilimili Coalfield area. However, none of the colliery towns of the Central India Coalfield flourished like Chirimiri.

Coal mining began here in 1928, and it has attracted many people in search of livelihood. The first record of the Chirimiri population was available for the 1941 Census, when 100,44 people resided in the town. Since then, the town has grown swiftly, particularly after the nationalisation of coal mines in 1972 (Sinha & Sinha, 1986). A nearby big town had served as a service centre for every new colliery town that has evolved in the Chirimiri-Jhilimili coalfield area. However, in the case of Chirimiri, no significant settlement was situated near the town. The vast coal reserve and non-availability of any service centre have become a motivational factor behind the evolution of a functionally diversified town, which later turned into the most significant urban centre of the region. On the one end, the vast coal reserve has attracted investors, and other people have sensed the opportunity for themselves in different fields such as trade and commerce, education and health. Since no alternative to these things was available in nearby areas, Chirimiri has turned into a diversified town.

A simple fact can explain this idea in a better way. At the beginning of the 21st Century, the average size of the town in this coalfield area was 15,788 people per town, while the average size of colliery town (excluding Chirimiri) was a mere 9,695 persons per town. Table 1 indicates that it has grown six times higher than the average urban settlement and about ten times higher than the average colliery town within a few decades. Before the recent population decline, Chirimiri was larger than Shahdol and almost equal to Ambikapur (Census of India, 2001 & 2011). Shahdol is the largest service centre in the Central India Coalfield (Sohagpur Region), while Ambikapur is the largest service centre in North Chhattisgarh Plateau (Fig. 1). Both have multiple location advantages due to extensive central location and road-rail connectivity. However, despite locational inertia, the Chirimiri has successfully competed with them in the 20th Century, and these cities have never served as the service centre of Chirimiri.

The Chirimiri has adopted a self-sustaining model of development where everything required for the town's survival was available in the town (except foodgrain). Chirimiri was quite contrary to the functionally over-dependent colliery town that evolved in the region. The Chirimiri town is a Primate city in the Chirimiri-Jhilimili Coalfield region as it has more than twice the population of Manendragarh, the second most populated town in the region (Table 1). Therefore, it is worth demystifying the journey of a town that has achieved prominence despite all odds.

THE BEGINNING AND NOMENCLATURE

The town has evolved over almost a barren land. It has gone through many phases in its evolutionary history. Chirimiri has vast coal reserves that have attracted the Britishers to initiate mining to exploit the potential. The town is located at the eastern edge of Central India Coalfield, where a vast coal reserve is available within 1200 meters below the surface. During British rule, coal prospecting was carried out in the first half of the second decade of the 20th Century. This survey revealed the availability of abundant coal in the Chirimiri, Korba, and Manendragarh areas. Later first coal mine was opened in Manendragarh (earlier called Karimati) in 1927. A year later, in 1928, a coal mining operation was started in Chirimiri by W.M. Pitt (GSI, 1930). A railway line was laid from Anuppur to Bijuri and extended to Chirimiri in 1931. Until the railway line was laid, the coal dispatch ran from the bullock cart to Bijuri. To the northeast of the railway station was Khurasiya Colliery, the first mine to become operational in the town (SECL, 2020).

There are many fascinating aspects associated with the name of Chirimiri town and its internal parts (zones and *dafai*). This coal-rich area has many stairs and rams, which was initially called as *Chhedi-Medi* (छेड़ी-मेड़ी) by local peoples. Later, the British called it Chedi-Medi (चेडी-मेड़ी), which turned into Chirimiri or Chirmiri due to difficulties associated with the pronunciation. The city has two official names used interchangeably very frequently; for instance, the post office is called Chirimiri, and the railway station is labelled Chirmiri. Older people still use the name Chirmiri; however, most of the official records are stuck with the name Chirimiri which is also used in the title of this study.

EVOLVED INTO A MULTI-CULTURAL TOWN

Migrants from West Bengal and Odisha are the town's earliest settlers and the largest sub-groups. The *Bang Samaj* and *Utkal Samaj* played a significant role in shaping the cultural tradition of the Chirimiri town. Shri B. B. Lahiri (Bibhuti Bhushan Lahiri), popularly known

as *Dadu Lahiri*, has played a significant role in the economic and cultural development of the town. He was an engineer by profession who arrived in the Chirimiri as a contractor and became the most noteworthy personality due to his visionary works. He had started the Lahiri Secondary School (in 1948) and Lahiri college (1953). The Lahiri College is the third oldest college in the Chhattisgarh state that has turned into the most recognised higher education institution in the Central Coalfields Region and Old Sarguja District. Students from Bilaspur, Shahdol, and Ambikapur used to go there to pursue higher education. He was instrumental in opening the railway track, cinema hall, and creation of Kali Bari Temple. A Bengali-pattern Durga festival and became popular here due to the initial influence of the Bengali community. It is celebrated by all communities and turned into the most important social gathering in the town. The *Utkal Samaj* (Odiya Community) has preserved its culture by constructing the Jagannath temple in Pondi. All communities had contributed to the construction of the Jagannath temple.

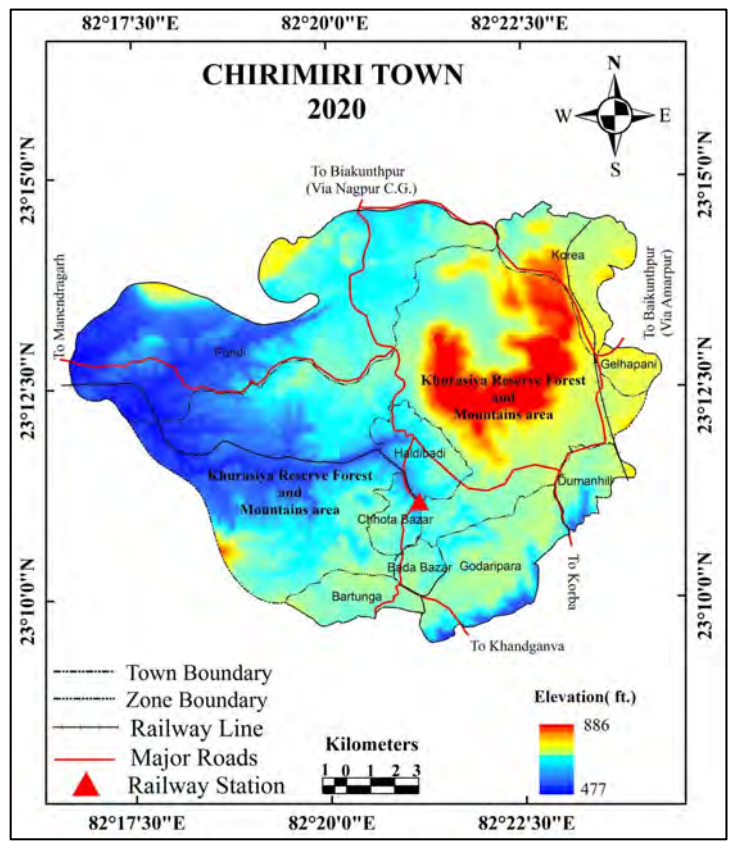
Migrants had also arrived from Andhra Pradesh, Poorvanchal (both Uttar Pradesh and Bihar), Madhya Pradesh, Maharashtra, and others parts of the country. One can find the people of every region of India in a small town. People proudly called the city 'Mini India'. It has become an excellent melting point of different cultures, and acceptance of the multi-cultural identity without the slightest hesitation is the core cultural value of the town.

EVOLUTION AS A MULTI-NUCLEUS TOWN

Before exploring the town's history, one most fascinating fact about the town needs to be mentioned is that it is not like a typical town with a single nucleus with or without adjoining outgrowth. Chirimiri is a distinct town with multiple nuclei without a central city (core). More importantly, these nuclei are physically separated from each other (Fig. 2). The town has evolved during different periods due to the opening of new coal mines, and to explore the history of Chirimiri town, one has to understand the evolution of multi-nuclearity. However, it is difficult to identify the exact process of evolution as the settlements (both houses and road network) were shifted consistently due to the opening of new mines and the conversion of underground mines into opencast mines. The evolution of different zones is described in subsequent paragraphs.

1. **Kurasiya – the Lost World of Chirimiri:** One of the oldest settlements of Chirimiri town was evolved around a village known as Kurasiya. The first lease of the colliery in the princely

Fig. 2: Zones of Chirimiri Town



Source: Compiled by authors.

state of Korea was awarded to Banshilal Abirchand, who took over W.M. Pitt and began excavation work in Kurasiya Colliery. Sometime later, Khurasiya Colliery was leased to Tata. Many people still call the adjacent area of Kurasia Colliery as Tata. Before its evacuation, due to the initiation of opencast mining, the Kurasiya used to be the most populated nucleus of the Chirimiri town.

Kurasiya colliery was located about one km away from the railway station. There used to be a quarry office; a mini car repairing shed, a powerhouse, and later a coal handling plant near *Muhada* in the same order. The rest house of Kurasia colliery was located near Kalibadi Temple. The densely populated settlement around Kurasia mines was known as Number 10 *Dafai*. Coal from Kurasia mines was discharged through locos.

Later on, everything surrounding Kurasia colliery was destroyed after the initiation of opening-cast mining at the same place. Although the destruction of cultural features such as roads and buildings is commonly evident in the town, large-scale destruction and resettlement observed in Kurasiya have never been evident. In Kurasiya, everything was destroyed, and a new road was constructed for newly opened opencast mines. The entire population of Kurasiya was shifted to B-type quarters in Godaripara, Ekta Nagar and Azad Nagar.

2. **Pondi:** In 1946, the collieries at Sajapahad and Pondi were opened by Birla and Sardar Inder Singh, respectively. At that time, Sajapahad was called as Pure Chirmiri and Pondi as West Chirmiri. Sajapahad was an exclusive mining area, and people working there were used to live in Pondi. In common parlance, these names are still prevalent. Sajapahad colliery was collapsed in 1968, and its ruins are still visible. However, the precise location of the old mine is difficult to identify. Mines of Sajapahad and West Chirimiri collieries located in Pondi are closed, and their employees were shifted to NCPH Colliery in 1968. At present, the Sajapahad area is a village-like settlement that forms ward number 1 of the Chirimiri Municipal Corporation under the Pondi zone.

The office of the General Manager (GM office), the Municipal Corporation, and the office of the Life Insurance of India (LIC office) are located in Pondi, which is evolving as the city's administrative centre. In recent times many private offices and educational institutes were also attracted to Pondi mainly because of the flat terrain, a rare commodity in the town. Apart from it, the coal reserve of adjoining mines is already exhausted, and the flat terrain of Pondi is located outside the coal reserve area. Henceforth, the Pondi area is free from the fear of evacuation and attracted higher private sector investment in recent years.

3. **Koriya:** This zone is named after the Koriya Colliery that operated here. The nomenclature of Koriya is associated with Koriya Riyasat of the region, which was instrumental in the opening up of the coal mines in the town. The Koriya mine was closed in the late 1990s as the coal reserve was exhausted. The population has declined considerably subsequently.
4. **Godaripara:** This northern-eastern nucleus of the town is characterised by old colliery quarters built for labourers engaged at Kurasiya mines. Most of the old quarters of this

area are depleted and captured by local residents (non-colliery workers). New colonies (B-type quarters) were developed in Godaropara for the old residents of Kurasiya.

5. **Gelhapani:** The mining in Gelhapani was initiated by Karamchand Thapar in 1946. It was known as North Chirimiri Colliery. The mines of Gelhapani had closed almost more than two decades ago. It is located in the peripheral area and lost all its glory in time. It is the least populous area of the town, and less than three percent of the town's population resides in this zone (Table 2). In a recent demarcation of wards boundaries, the number of wards in this zone has reduced from two to one, which will reflect in the next census. The survey for open cast mining was conducted but never implemented due to its proximity to the forest area (Laxman Jharia forest).
6. **Haldibari:** Around 1941, coal mining began at Pondri Hill by Manikchand B. Dadabhai, which came to be called New Chirimiri Pondri Hill Colliery or NCPH Colliery. Presently, this area is known as Haldibadi. The name Haldibadi was given after the initiation of the post office. Earlier only Amanala and the surrounding area were collectively called Haldibari; later on, the entire Pondri Hill area became famous as Haldibari. However, Pondri Hill is still used occasionally in government records, such as election polling booths. Compared to other zones and proximity to Railway Station, its centrality has played a significant role in its emergence as the most populous and prosperous zone of Chirimri town. Table 2 indicates that more than 20 per cent of the town's population resides in Haldibari.

Before the commencement of the railway station, Pachpedi and Gudiya *Dafai* were essential settlements of the Chirimiri town. From 1928 and 1931, when bullock carts were used for coal transportation, the route passed through Pachpedi and Gudiya *Dafai*. Now Pachpedi and Gudiya *Dafai* have been evacuated due to Haldibadi opencast mines.

Haldobadi developed rapidly after establishing the Railway Station and got prominence after the evacuation of Kurasiya. During World War II, the demand for coal increased significantly as the war materials were sent through railways; the mode of transportation was mainly dependent on coal. At that time, steam engines dominated rail transport, so the British Government promoted coal mining. The coal of the Northern Chirimiri colliery came through the ropeway sliding built

near the railway station. Houses of the labour class working in Northern Chirimiri settled on the hill mound near the ropeway sliding. A natural water source locally known as *Turrah* (natural water spring) exists here. Before the commencement of the modern piped water supply, the entire population of Haldibadi was dependent on the same *Turrah*. The *Turrah* still supplies water to many households for their daily needs. During the water crisis, which is a commonly observed phenomenon during the summer, the same *Turrah* supplies water to a larger population of the Haldibari.

The labour houses of Haldibadi located near the hills of the Chirmiri Railway Station are mostly depleted and pathetic. Many of the residents of these households are dependent on the informal trade of coal stolen from loaded railway racks and sold in the local market. People (mainly women and children) directly engaged in this illegal trade are probably economically most vulnerable.

TABLE 2: ZONE WISE POPULATION CHARACTERISTICS OF CHIRIMIRI TOWN

Zone No	Zone Name	Population		Wards included in the Zone	
		No.	Share (%)	Total	Ward No.
1	Pondi	12152	14.24	06	1, 2, 3, 4, 5
2	Koriya	6849	8.03	03	6,7, 8
3	Gelhapani	2436	2.86	02	9
4	Haldibari	17317	20.30	08	10, 11, 12, 13, 14, 15, 16, 17, 18
5	Chhota Bazar	10465	12.27	05	19,20, 21, 22, 23
6	Baratunga	4569	5.36	02	24, 25
7	Godaripara	15213	17.83	06	26,27, 30, 31, 32, 33, 34
8	Bada Bazar	3666	4.30	02	28,29
9	Dumanhill	12650	14.83	06	35, 36, 37, 38, 39, 40
	Total	85317	100	40	-

Source: Compiled from Census of India, 2011.

- Chhota Bazar:** One of the oldest collieries of the town was situated in the Chhota Bazar. Mining in Chirimiri was started here in 1928 (same year mining began in Kurasiya), although the

core mining area and settlement later shifted to Kurasiya. Very few people know that in the beginning, the term Chirimiri was used for the Chhota Bazar area only. Later the term Chirimiri was designated for the whole town, and each nucleus received a separate identity. Fire in the underground mine of Chhota Bazar has forced the authorities to close the mining operation from this end. The Muhada and entire mining operations of this coal block were shifted to Baratunga. This zone is located in proximity to Kurasiya and is the oldest surviving nucleus of the town. The oldest schools in the town Guchchi School (established in the 1930s), Lahiri School, Govt. Lahiri College are situated in this area. Some oldest (mostly abandoned) bungalows are also situated in the hilly area of Chhota Bazar. One of the bungalows belongs to Shri V.B. Lahidi, the real architect of town. The majority of the present residents of the Chhota Bazar area are non-colliery workers engaged chiefly in the informal sector.

8. **Baratunga:** 'Bara' means extensive or superior, and 'Tung' means mountain peak. The mountainous area of southern Chirimiri is Baratunga, whose friction had become Bartunga. Bartunga resembles a vast mountain that gives meaning to this name. The village of Bhandardei is situated at the bottom of Bartunga hill, and no further connectivity is available from that hilly area. Many opencast mines characterise this southern part (nucleus) of the town. Due to these opencast mines, the old roads of Baratunga were eradicated, and new roads are still under construction. Henceforth, the connectivity between Bartunga is from the rest of the town is severely affected. A branch of the State Bank of India (SBI) and Delhi Public School (DPS) sponsored by SECL is located in Bartunga. However, limited commercial activities have been developed here due to its remoteness.

Bhandardei village is located in the proximity of Bartunga, and both share a joint polling booth located in Bartunga. It is essential to mention that the revenue record of Chirmiri is recorded in the name of Bhandardei.

9. **Badabazar:** It is a small but one of the prominent areas of the town as the primary market of the town is located here. A weekly market is assembled here every Tuesday. Bada Bazar area is dominated by business community households. The majority of Jain, Sikh and Sindhi communities' houses are located here. It was a highly flourishing area when the Kurasiya

was a prime settlement of the town. After the evacuation of Kurasiya, the prominence of Bada Bazar has reduced considerably. It is observed that the evacuation of Kurasiya has led to the changes in the functioning style of the business community of the Bada Bazar. They have reacted differently to the same situation; first, some have shifted their home and business from the Bada Bazar to Haldibari. Second, many of them still reside in Bada Bazar and operate their business in Haldibari. Third, few of them are still operating the business in the Bada Bazar area. The wholesale business has never shifted from Bada Bazar, so despite all these negative factors, it remains a prominent market area of the town. It is worth understanding that only retailers have shifted from Bada Bazar to Haldibadi while wholesalers remain intact on their old premises; hence the Bada Bazar area has never lost its relevance as a marketplace. The health centre of the state government and guest house of SECL is also situated in the Bada Bazar. It is also the terminal point of city buses.

10. **Dumanhill:** Earlier, the Sonamani mine was operated from the Dumanhill area and workers of Sonamani mines used to reside here. Later Sonamani mine was closed as the coal reserves were exhausted, and labourers working there were shifted to other mines in the town. In 1981, Kendriya Vidyalaya Chirimiri started its operation from Dumanhill area. It is a diverse area with a reasonable population of colliery and non-colliery workers.

CURRENT SCENARIO AND FUTURE PROSPECTS

As discussed earlier in this study, the evolution of Chirimiri is directly linked with the availability of a vast reserve of coal. Non-availability of any other town in the nearby area has motivated the people to bring the functional diversity required for survival. Furthermore, locational inertia (limited connectivity with other cities) has made it self-sustaining. From the beginning, every adversity has worked in favour of the city. However, close observation of the towns' economy indicates that many favourable factors have also turned into negative in the recent past.

The secret to the prosperity of the Chirimiri lies below the earth's surface. Coal mining is the main contributor to the city's economy. All the built structures of the town rest above the coal reserves and may need to be demolished if required. However, this coal reserve has choked any viable investment in property by common people, and the majority

of the built structure is *ad-hoc*. One of the main hurdles in creating a viable city for the future is the non-availability of residential land and the lack of residential quarters for permanent residents and migrants. The residential problem is the most widely discussed issue that has remained unsolved.

Many of the SECL residential quarters (called *Dafai* or Colony) built for coal mine workers are characterised by illegal occupancy. The pathetic condition of quarters has led to illicit occupancy as many workers are unwilling to live there. Henceforth, these quarters are captured by local residents (non-colliery workers). These illegal occupants have invested some resources in renovation and are enjoying the government quarters and facilities without additional costs. The fear of evacuation has much impact on the residential structure of the town as the investment in private housing is minimum. These illegally occupied SECL quarters provide a viable and socially acceptable solution to the housing shortage in the town. It is not easy for new residents to find a suitable house for rent, but there is a high possibility of getting a SECL quarter if they are willing to do so. In the last few years, a mass retirement from SECL has increased illegal occupancy in vacant quarters of vacant SECL. It is evident everywhere in the town and well known to everyone, including SECL officials. It may be a technically illegal but socially acceptable practice that provides alternative housing facilities at a lower cost. However, due to the non-availability of land for new construction, the new migrants find it difficult to survive in the town for a long time. The town's survival in the future greatly depends on the solution to land-related issues. The active participation of SECL in public welfare may solve the problem that has been pending for many decades.

The location inertia, which has helped the town to become a self-sustained place, has choked further diversification. It has not attracted the capital required for further diversification of the economy.

Many unfavourable factors such as mass level displacement due to opencast mining and lack of diversification of the economy (hugely dependent on the income of colliery workers) are responsible for it. However, people are well aware of the declining population trends, the decline in the per capita income of colliery workers, and the trickling down of the capital towards the large urban centres. The diversification of the economy is essentially required to save the city.

Due to immense pressure from local citizens, the city was granted the status of Municipal Corporation in 2003, and a new *tehsil* named after the town was established in 2018. In August 2021, the state

government created a new district named after the town (the exact name is Manendrgarh-Chirimiri-Bharatpur). The town can be developed as an administrative centre in the future. The town already has many higher education institutions such as a college (recently promoted as PG college), nursing college, and ITI. It has a reasonably large hospital governed by SECL (Regional Hospital, Godripara) and dedicated mainly (but not solely) to colliery workers and a separate government hospital for ordinary people at Bada Bazar. The town can become a vibrant city despite locational inertia.

SUGGESTIONS AND RECOMMENDATIONS

The road to survival for the towns seems grim, and the population decline may be inevitable in the present scenario. However, a few steps can help the authority prevent the further decline of the town. Some of the suggestions are listed below:

1. The long-awaited demand of local citizens, politicians, and social workers is that permanent land rights should be granted for the wasteland (where coal is exhausted). To date, no significant progress has been made on this issue despite all the efforts made by every concerned stakeholder. If SECL can transfer this land to develop the built-up area through private investment, it can initiate a chain reaction in the city economy.
2. The residential area can be enhanced by filling an empty open cast mining area. However, it may be applicable only in a few places around Haldibari. It has limited applicability to other open cast mine areas as they are located in an almost barren land.
3. It is estimated that the city has enough coal reserves available for the next 30 to 50 years. However, the recruitment of permanent labour in SECL is almost seized, negatively affecting the city's economy. The mining by private companies through machines has adversely affected the city economy. Despite all hurdles, this model of privatisation needs revision. The extra income of the colliery employee is the 'real fuel' that drives the town's economic growth. The decline in the number of employees and their replacement with machines may lead the city towards a slow and painful death.
4. The city has worked as the service centre for the nearby rural areas in higher education. From the 1950s to 1990s the, Lahiri College was the most reputed higher educational institution in the region. However, it has now become a model to study

how an institution has deteriorated due to persistent negligence and short-sightedness. The numerical strength of the college has also declined due to lack of diversification in due course of time. The whole education model needs revision which may require a painful surgery of the complete system. Nevertheless, if it is done, its past glory can be achieved.

5. Most importantly, a colliery town requires a different insight. It can not be adequately understood through the experience of other cities. Similarly, it can not revive through any approach applicable to other cities. All the stakeholders need a flexible but firm approach to develop the town as a sustainable city that can accommodate itself to the ongoing changes and if it requires some flexibility in existing laws and rules that need to be incorporated.

CONCLUDING REMARKS

A vast reserve of coal was discovered in the border area of Madhya Pradesh and Chhattisgarh at the beginning of the 20th Century. A large reserve of coal near the subsurface attracted massive investment from Britishers and private investors. The interior location and huge coal reserve led to the evolution of an independent town which became the region's largest urban centre. A growing population and local demands for various services have led to functional diversity and further population growth. It must be noted that all the colliery towns of the region remained insignificant in terms of population size and functional diversity because they were well connected with the other towns and availed services from nearby towns. However, the locational inertia and lack of connectivity became a bliss in the case of Chirimiri. The geographical factors which seemed negative for the development of the town became favourable in due course of time. However, it appears that the town had already achieved its peak, and the process of decline began. The location inertia that favoured the development of Chirimiri as a colliery town in the 20th Century turned negative in the 21st Century. Ambikapur, Shahdol, and Bilaspur (Cities at the terminal point of Central India Coalfield) are growing very fast in the 21st Century because of their location on the main route and their role as administrative towns. Even more, every town in the Central Coal Field Region is growing, but the population of the Chirimiri has declined, and the road to survival seems grim. Once again, the city needs a visionary person like V. B. Lahiri who is imaginary enough to understand the future needs, intelligent enough to plan, and a successful entrepreneur to bring investment.

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APPENDIX - I

List of Abbreviations

CDP	City Development Plan
DPS	Delhi Public School
GM	General Manager
GSI	Geological Survey of India
ITI	Industrial Training Institute
LIC	Life Insurance of India
MoC	Ministry of Coal
NCPH	New Chirimiri Pondri Hill Colliery
SADA	Special Area Development Authority
SBI	State Bank of India
SECL	South Eastern Coalfields Limited
UN	United States

Appraisal of Sustainability Concerns of Guru Nanak Dev University Campus, Amritsar

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ABSTRACT

The higher education institutions act as role models for incorporating sustainable practices by adopting various development strategies and actions in the core activities such as teaching, research and community outreach as well as in other activities like spatial planning, management of physical growth and development, maintenance of buildings and open spaces, supply of electricity, water and other utilities, etc. These institutions play an important part in taking different sustainable initiatives. This paper attempts to benchmark and appraise the sustainability concerns based on the guidelines issued by the Ministry of Housing and Urban Affairs. The indicators of sustainability under physical and social pillars have been localised for the Guru Nanak Dev University Campus and the campus has been assessed based on the identified parameters.

Keywords: Sustainability, Higher Education Institutions, Livability, Campus Sustainability

INTRODUCTION

Sustainable development is a big challenge to improve the development both qualitatively and quantitatively. The planning of campuses in the light of sustainable goals acts as demonstration projects for the society as well as for the city governing bodies. Through such initiatives, these institutions can demonstrate innovative ideas,

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methods, practices and even technologies that can be beneficial for the masses. Such an initiative also provides hands-on learning experience for the students as well. While addressing the sustainability concerns of campus, it is important that it follows eco-friendly practices which promote sustainability, minimise waste, bring efficiencies, use renewable resources and promote recycling to build the water, solid waste, energy and landscaping sectors.

Based on the global Sustainable Development Goals (SDGs), every nation is seeking sustainable solutions various for environmental concerns for overall welfare, health and economy of the regional, city and local environs. India has devised 'livability standards' to match the spirit of SDGs. The Indian government has asked the higher education institutions, for the attainment of the SDGs, to reduce their carbon footprints of the national and global environment. Hence, sustainability concerns, a livable environment and pragmatic solutions have become major topics in academic discourse in Universities and colleges. Inter-disciplinary research has grown to a point where the four key pillars of sustainability, i.e., governance, economic, social and physical are being integrated to create a livable environment for the students, workers and residents within the institutions.

Guru Nanak Dev University has also taken various initiatives to improve the livability as well as the sustainability of the campus. Established in 1969, Guru Nanak Dev University, Amritsar is amongst the prestigious higher education institutions of the country to impart education and promote research in the Humanities, learned professions, Science, especially in applied nature and technology. The University presented many models in achieving these objectives to create a sustainable living environment in the campus. The present article benchmarks the initiative taken up by the campus-based on Sustainable Development Goals and livability standards.

International and National Toolkits and Guidelines focusing on sustainability concerns

Sustainability has become a topic of concern at the National and International level since 1972, with the first United Nations Conference on the Environment, held in Stockholm followed by the Brundtland Report of 1987 and various other summits such as Earth Summit, Millennium Summit, World Summit on sustainable development, to name a few. In 2015, Sustainable Development Goals were formed that were set to be achieved by 2030, representing 17 goals that were to be achieved by various set targets. At the institutional level, the United

Nations Educational, Scientific and Cultural Organization (UNESCO) has taken the responsibility of Education for Sustainable Development which is to be monitored through policy initiatives and their collaboration with relevant stakeholders to be implemented by 2030. It focuses on enhancing the educational system in light of sustainable development goals for which it has identified a toolbox that highlights the capacity building of educators, empowering young contributors and actors, enhancing local level actions and implementation of the same. Other than the incorporation of sustainable development in education, a number of guidelines, sustainable plans, toolkits have been prepared at the international level. Sustainable development parameters, identified by guidelines, for appraisal of Guru Nanak Dev University are summarised as follows:

- The University of Victoria Campus has proposed Sustainability Guidelines, 2006 focusing on campus planning & site design, sustainable transportation, energy efficiency & renewable energy, water efficiency & stormwater management, waste management, conserving materials & resources and indoor environment quality.
- The University of Wisconsin Oshkosh Campus Sustainability Plan, 2008 -2012 lays stress on electrical energy management and conservation, freshwater conservation, storm water management, facilities planning, renovations and construction, transportation, purchasing, recycling, food services and grounds operations.
- The International Alliance of Research Universities (IARU)-Green Guide for Universities, 2009 identified energy management, water management, landscape management, biodiversity protection, dining services, waste management, building energy and emissions, life cycle cost (LCC) analysis, laboratory, green purchasing, transport & communication and employee & student engagement.
- Greening Universities Toolkit, 2011 highlights sustainability in research, education for sustainability, governance and administration, community outreach, energy, carbon & climate change, water use, land use and material flows.
- Environmental Sustainability of University Campuses, 2014 talks about resource efficiency, renewable energy production, water efficiency, sustainable campus landscape, material/ waste conservation, sustainable transportation, green building initiative and grey water recycling.

- Sustainable Development Goals has been set as global goals to be achieved by 2030 with specific targets and benchmarks. These focus on outcomes that are based on physical, social, economic and environmental development. A total of 17 global goals have been identified. In the light of SDGs, Times Higher Education Impact Rankings, 2020 ranks the campuses at the international level delimiting the goals and targets to higher education level solely based on the sustainable development goals. The SDG goals and sub-targets under the TIME's ranking focus on Research, Education and Publication. In addition to research and education, it also emphasises on taking different measures at the campus level that can make the campus sustainable. The details of the same have been summarised in Table 1.

TABLE 1: SDGs AND INDICATORS AS PER THE
TIMES HIGHER EDUCATION IMPACT RANKINGS, 2020

SDG 1 – No Poverty	• Proportion of students receiving financial aid • University anti-poverty programmes • Community anti-poverty programmes
SDG 2 – Zero Hunger	• Student hunger • Proportion of graduates in food sustainability • National hunger
SDG 3 – Good Health and well being	• Proportion of health graduates • Collaborations and health services
SDG 4 – Quality Education	• Proportion of graduates with teaching qualification • Lifelong learning measures • Proportion of first-generation students
SDG 5 – Gender Equality	• Proportion of first-generation female students • Student access measures • Proportion of senior female academics • Proportion of women receiving degrees • Women's progress measures
SDG 6 – Clean Water and Sanitation	• Water usage; Water care • Proportion of reused or recycled water in the community
SDG 7 – Affordable and Clean Energy	• Clean energy measures • Energy use • Energy and the community

(contd. Table 1)

SDG 8 – Decent work and Economic growth	• Employment practices • Expenditure per employee • Proportion of students taking work placements • Proportion of employees on secure contracts
SDG 9 – Industry, Innovation and Infrastructure	• Patents • Number of university spin-offs • Research income from industry
SDG 10 – Reduced Inequalities	• First-generation students • Students from developing countries • Students and staff with disabilities • Measures against discrimination
SDG 11 – Sustainable cities and Communities	• Support of arts and heritage • Expenditure on arts and heritage • Sustainable practices
SDG 12 – Responsible Consumption and Production	• Operational measures • Proportion of recycled waste
SDG 13 – Climate Action	• Low-carbon energy use • Carbon neutrality
SDG 14 – Life below Water	• Supporting aquatic ecosystems • Water-sensitive waste disposal • Maintaining a local ecosystem
SDG 15 – Life on Land	• Supporting land ecosystems • Land-sensitive waste disposal
SDG 16 – Peace, Justice and strong Institutions	• University governance measures • Working with government • Proportion of graduates in law and civil enforcement
SDG 17 – Partnerships for the goals	• Relationships to support the goals

- Green-Campus Guidebook 2016-2017, Ireland focuses on litter and wastes energy, water conservation and protection, transport and travel, biodiversity, green information and communications technology, procurement, air quality and climate change.
- Guide to Campus Living, 2019-2020 gives weightage to campus living services, study and computer centres, safety in the residence halls and apartments, health and wellness and standards for living in campus.

At the national level Livability Standards and Ease of Living has been proposed by the Ministry of Urban Development to match the spirit

of sustainable development goals. To improve the Livability standards of cities 79 indicators (57 Core Indicators and 22 Supporting Indicators) has been identified. While the Core indicators are considered an essential measure of the livability of cities, the supporting indicators supplement the Core indicators by adding value to them. The four pillars of livability standards are Physical, Social, Economic and Institutional. Similarly to improve the quality of life of the residents', Ease of Living Index has been proposed in 2018 to examine the liveability of Indian cities across a set of three pillars, which encompass the various aspects of the well-being of citizens across three pillars i.e. quality of life, economic ability and sustainability including a total of 14 categories and 50 indicators. For educational institutions, GRIHA, IGBC and CSE have made guidelines and toolkits at the national level, that can be adopted by the higher education institutions. These also emphasise the sustainability of the educational institutions and the key parameters of each are summarised in subsequent points.

- Green Rating for Integrated Habitat Assessment (GRIHA), 2015 focusing on on-site planning on energy, water and wastewater, solid waste management and transport.
- Indian Green Building Council (IGBC) Green Campus Rating System, 2017 highlights the need for site planning and management, sustainable transportation, water conservation, energy efficiency, material and resource management and health and well-being, green education and innovative design.
- Green Sense- Educational Campus Inventory CSE, New Delhi, 2018 focused on land, energy, water, air waste, consumption, conservation, operations and maintenance.

This paper appraises various parameters such as education, health, housing and inclusiveness, public open spaces, power supply, water supply, wastewater management, transportation and mobility solid waste management and environment that have been identified based on the national and international toolkits and guidelines as discussed above. Considering them as base the key parameters are further divided into two pillars i.e. physical and social, as defined in livability standards and seven sustainable development goals (refer to Table 2). Out of the total SDGs, 7 goals that have been assessed in this paper are goals number 3, 4, 6, 7, 11, 12, and 13.

To analyse the campus on the above parameters the results against each indicator and its subsets has been analysed with reference to the benchmarks proposed by different international/ national agencies and best practices of peer institutions.

TABLE 2: LOCALISED SDGS AND LIVABILITY STANDARDS
COVERED FOR APPRAISAL OF THE CAMPUS

Category	Sustainable Development Goals	Livability Standards Indicator	Methods Adopted
Parameters covered in Social Pillar of Development			
Education	4. C- Increase in supply of qualified teachers.	Student-Teacher ratio	Total number of students/total number of teachers available
	4. A- Upgrade education facilities	Percentage of departments with access to digital education	(Total number of departments with digital access/total number of departments) *100
Health	3.8- Achieve universal health coverage	Number of beds in health center per 1,000 population	(Total number of beds in dispensary /total population of the campus) *10000.
	3.C- Substantially increase health financing and recruitment	Healthcare professionals per 1,000 population	(Total number of qualified health professionals/total population of the campus) *10000.
Parameters covered in Physical Pillar of Development			
Housing and Inclusiveness	11.3- Inclusive and sustainable urbanisation	Percentage of students and permanent workers provided residence within the university	(Total strength of student and staff living in campus/total population of the campus) *100.
		Net Density	Total population of the campus/total residential area (in hectares).
Public Open Spaces	11.7- Universal access to green and public spaces	Per capita availability of green spaces	Total area of green space/total population of the campus.
		Per capita availability of public and recreational places	Total area of public and recreational space/total population of the campus.

(contd.)

Power Supply	7.2, 12.2- Achieve sustainable management and efficient use of natural resources	Percentage of total energy derived from renewable sources	(Total installed capacity for generation of renewable energy in campus/total energy consumption from all sources) *100
		Per capita electricity consumption	Total energy consumption in the campus/ total population of the campus.
Water Supply	6.1- Universal and equitable access to safe and affordable drinking water for all	Per capita supply of water	Total quantity of water supplied into the distribution system/ total population of the campus
		Quality of water supplied	(Number of samples meeting or exceeding specified potable water standards/total number of samples tested for water quality) *100
Wastewater Management	6.4- Sustainable supply and withdrawal of water	Percentage of water connections covered through meters	
	6.2- Adequate and equitable sanitation and hygiene for all	Coverage of toilets	(Total number of properties with access to individual and/or community toilets/total number of buildings in campus) *100
		Coverage of sewerage network	(Total number of properties with connection to waste water management systems/total number of buildings in campus) *100
	6.3- Improve water quality by reducing pollution, eliminating dumping and minimising the release of hasardous chemicals and materials	Collection efficiency of sewerage network	(Total waste water collected per day/total waste water generated in the campus per day) *100
		The extent of reuse and recycling of wastewater	(Quantum of waste water recycled or reused per day/total waste water received at treatment plants per day) *100

(contd.)

Solid Waste Management	11.6- Reduce the adverse per capita environmental impact	Household-level coverage	(Total number of households and establishments covered through doorstep collection/total number of households and establishments in the campus) *100
		Efficiency of collection	(Total quantum of SW collected/total quantum of SW generated in the campus) *100
		The extent of solid waste recovered through reuse	(Average quantum of SW that is processed or recycled/average SW generated in the campus) *100
Transportation & Mobility	11.2- Provide access to safe, affordable, accessible and sustainable transport systems for all	Geographical coverage of E-bus	Total length of e-bus (Km)/total area of the campus
		Availability of E-bus	(Average number of e-bus available per day/total population of the campus) *1000.
		Percentage coverage of footpaths - wider than 1.2m	(Total length of footpath in the campus/total length of road in the campus) *100
		Percentage of traffic intersections with pedestrian crossing facilities	(Total number of intersections with pedestrian crossing facilities/total number of intersections in the campus) *100
		The extent to which universal accessibility is incorporated in a public rights-of-way	(Number of public right-of-way areas designed as per universal design principles/total number of public right-of-way areas in the campus) *100
Environment	13.4.1 Commitment to carbon-neutral university	Scope 1 and scope 2 emissions neutrality achieved	GHG emissions from transport, in campus waste and wastewater treatment, use of DG sets and electricity has been included. Carbon sequestration of trees included
	Campus Carbon Footprint	Per capita carbon emissions (tCO ₂ e/person)	Total GHG emissions (Scope 1+Scope2)/campus Population

Source: Sustainable Development Goals; Livability Standards, Ministry of Urban Development, Government of India (modified as per campus suitability)

Guru Nanak Dev University -Brief Campus Profile

The campus of Guru Nanak Dev University (GNDU) was established on November 14, 1969. The Guru Nanak Dev University has a vast campus, spread over 500 acres of area with a total population of 14,245 in 2021. It is a residential campus and 30 per cent of the total population resides within the campus. Different activities on the campus can be categorised into various land use. The campus has around 30 blocks including administrative, academic, hostels and construction and management departments. The academic blocks comprise of different faculties that include 60 departments (refer to Fig. 2). Out of the total area, 4.03 per cent of the area is institutional area accounting for 20.17 acres and another 3.5 per cent of the area is under residential use accounting for 17.5 acres. The total built-up area of the campus accounts for only 7.5 per cent.

The remaining area is an open area that comprises playgrounds, parks, gardens, agriculture area, open area and circulation as depicted in Fig. 1. The campus has also a biodiversity-rich botanical garden covering an area of 25 acres having different species of trees, shrubs, cactus flower beds and various other plants. Other than this, various nurseries are located on the campus while 23.18 acres of the area is under different playgrounds spread over the sports and recreational zone.

Campus Appraisal based on Localised SDGs and Livability Standards

In this section, the Guru Nanak Dev University campus has been assessed and appraised based on the selected indicators mentioned

Fig. 1: Built-up Area of the Campus

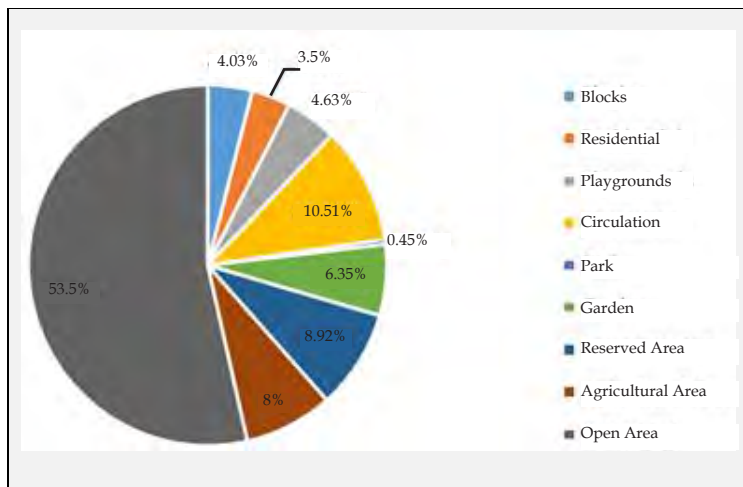
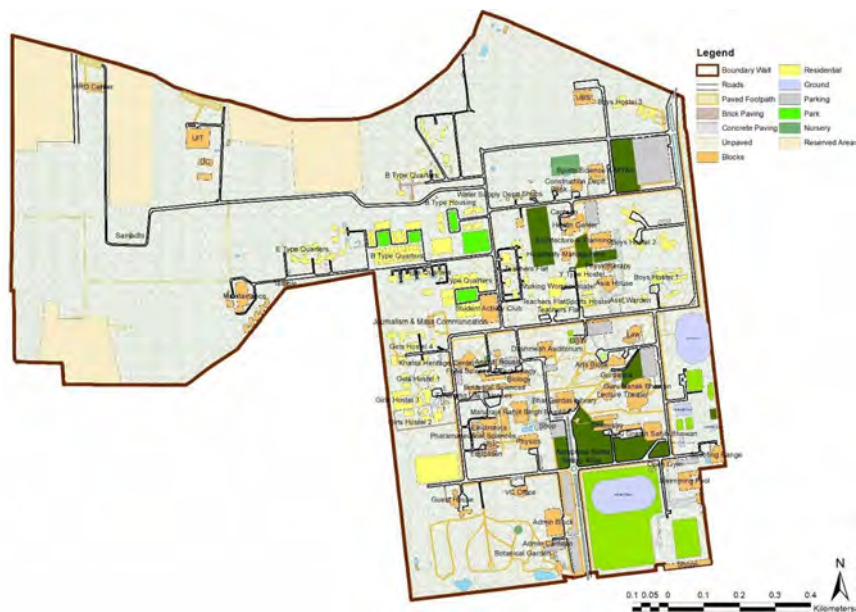


Fig. 2: Land use and Built-up area of GNDU campus



against social and physical pillars as highlighted in Table 1. Under both the pillars, categories and indicators have been selected considering the livability standards and relevant sustainable development goals have also been mentioned. To appraise the campus, data from different departments of the campus have been collected and the campus has been evaluated based on the listed indicators.

Social Pillar

The social pillar of development includes education and health indicators. Under the education category, the student-teacher ratio and access to digital education has been analysed and both are fulfilling the benchmarks set by the Ministry. Student strength in the university campus in session 2020-21 is 11000 and the total teaching staff is 580. Thus, the campus meets the criteria of the 19:1 student-teacher ratio (refer to Table 3).

The campus has a health centre that was established in 1973 as a primary health care facility. There are various facilities available in the health centre that includes Medical OPD, Dental OPD, Sports Dentistry Clinic, Ayurveda OPD and Physiotherapy Center with a total of 25 staff members. In addition, 29 hospitals are on the empanelment list with the university. Therefore, the number of beds in the health centre and healthcare professionals meet the benchmarks. Sustainable

TABLE 3: BENCHMARKING THE SOCIAL PILLARS OF
DEVELOPMENT IN THE CAMPUS

<i>Category</i>	<i>Indicator</i>	<i>Results</i>	<i>Benchmark</i>
Education	Student-Teacher ratio	19:1	30:1
	Percentage of departments with access to digital education	100%	100%
Health	Number of beds in health centre per 1,000 population		25 beds per 10000
	Healthcare professionals per 10,000 population	15 per 10000	23 per 10000

Source: Computed Values, 2021

Development goals 3 and 4 i.e., good health, well-being and quality education are achieved by the campus, based on the benchmarking results.

Physical Pillar

The physical pillar of development has been divided into seven categories i.e., housing and inclusiveness, public open spaces, power supply, water supply, wastewater management, solid waste management, transportation and mobility. Each indicator has been assessed based on the data collected from the campus, staff and students, and has been compared to the livability benchmarks (refer to Table 3).

(a) **Housing and Inclusiveness:** The net density and percentage of individuals both staff and students who have been provided housing within the campus have been analysed. Guru Nanak Dev University is a residential campus that provides housing to its staff and students. The campus provides housing to 30 per cent of the staff members and students which is far more as compared to the University of Mysore, Manglore University, Jamia Millia Islamia, Anna University and Don Bosco University all having only up to 20Per cent residential population of the campus. The campus provides housing to 30 per cent of the staff members and students. There are different types of hostel accommodations for boys and girls separately. Different categories of houses are provided for staff including A, B, C, D, E and teacher flats. The present housing stock in the campus is sufficient to meet the staff housing needs, thus meeting 11.3 SDG.

(b) **Public open spaces:** The open areas has been analysed based

upon per capita green space availability and per capita recreational spaces available which are far more than the benchmarks set by the Ministry. The university is a lush green campus with only 7.5 per cent of the area as a built-up area. The remaining area is open. The campus has around 35,000 trees and shrubs making it one of the greenest areas of the city. The campus has a botanical garden that has different species of trees in it and makes it biodiversity-rich as well. The campus also satisfies the criteria given by CSE i.e. at least 10Per cent of the area needs to be under forest and 15Per cent green (CSE, 2018) while the campus has 85Per cent of the area under green. The per capita green area of the campus is 103 sq.m which is more than the standard 10-12 sq.m. Similarly, the per capita availability of public and recreational places is 11.23 sq.m., thus making it a green campus and meets 11.7 SDG that focuses on green spaces.

- (c) **Electricity:** Electricity supply has been studied based on the total units consumed by the campus in a year. The electricity supply in the campus is from both renewable as well as non-renewable energy sources. The campus is generating 1.48 MWe solar electricity through rooftop solar panels that are placed on the campus buildings. Solar electricity accounts for 20 per cent of the total electricity consumed whereas the benchmark set under the guidelines is 10 per cent. Another benchmark set by the IGBC that on-site renewable energy generation needs to be at least 10 per cent and can go to more than 50 per cent of the total annual energy consumption (IGBC, 2017) has also been fulfilled by the campus with 20 per cent of its energy generated from the renewable source of energy. It is also recommended to install renewable energy for up to 5 per cent of the entire load (CSE, 2018). For the remaining electricity, the campus is dependent on the grid supply. The per capita electricity consumption of the campus is 320 kWh which is much lower than the national average of 1010 kWh. The per capita electricity consumption in the residential area of the campus accounts for 725 kWh which is also less than the national average. It thereby meets the SDG focusing on efficient and sustainable use of natural resources.
- (d) **Water Supply:** Water supply has been studied based on three indicators i.e., per capita supply of water, the quantity of water supplied and per centage of water connections covered through smart meters. Smart meters are completely

absent in the case of GNDU while the other two indicators are fulfilled by the campus. There are seven tube wells on the campus and around 2.94 MLD of groundwater is extracted to meet the requirement as mentioned. However, based on the demand, the water required is 2.32 MLD therefore, the actual water consumption of the campus is more than the standard. Similarly, the per capita water consumption based on the demand (including agriculture demand) accounts for 163 lpcd, based on the supply of it is 206 lpcd that is much more than the standard water consumption requirement of 135 lpcd. Therefore, there is an urgent need to take conservation measures to limit water consumption.

- (e) **Wastewater:** In wastewater management, four indicators has been analysed i.e., coverage of toilets, the extent of reuse and recycling of wastewater, sewerage network coverage and collection efficiency. Total wastewater generated in the campus accounts for 1970 KLD. The university installed a sewerage treatment plant of 2500 KLD capacity in 2008. The wastewater is treated on the campus thus making it a zero wastewater discharge campus that is in line with the IGBC standards promoting decentralised wastewater treatment systems with 100 per cent on-site wastewater treatment, and at least 25 per cent of the wastewater should be reused on the site (IGBC, 2017). The wastewater is treated on the campus thus making it zero wastewater discharge campus. A total of 1500 KLD (approximately) of wastewater is reused on the campus for forestry, irrigation of plants and gardening purposes. The excess water is stored in the constructed water tank. Hence, the mentioned SDG's and livability standards indicators are completely fulfilled by the GNDU campus (refer to Table 4).
- (f) **Solid waste management:** This aspect has been studied based on three indicators i.e., household-level coverage, the efficiency of collection and solid waste recovered through reuse. Total waste generated on the campus accounts for 1.7 tons. Waste from residential areas, hostels and canteens is collected daily and weekly from the institutional areas. There are tricycles and trolleys to collect waste. The organic waste is segregated at the source and is used on the campus to produce compost. E-waste and biomedical waste are being managed as per the guidelines. The paper waste is recycled as per the university guidelines. Of the total waste,

63.3 per cent of the waste is either reused, recycled or sent to the authorised vendor for proper waste management. Entire campus organic waste is used to make compost; thus it meets the GRIHA guidelines that emphasise complete utilisation of organic waste by using different ways. Similarly, e-waste is sent to authorised recyclers as highlighted in GRIHA and CSE toolkits. However, the extent of waste recovered is less than the 80 per cent benchmark as highlighted in table 4, while the other two indicators are achieved to 100 per cent (refer to Table 4).

- (g) **Transport and Mobility:** There are five indicators i.e., the geographical coverage of e-buses, availability of e-bus, footpath coverage, universal accessibility and pedestrian crossing facilities that have been studied. Since 2018, the campus has been declared a car-free campus. There are two parking places provided at both the gates of the campus and students are not allowed to bring their cars to the campus. This resulted in drastic decrease in the number of cars on the campus. The campus has provided e-bus services to commute within the campus. There are only 8 e-buses and there are issues related to the availability of the e-buses due to lesser frequency. As per the benchmark availability should be ≥ 0.6 , whereas on campus it is 0.47.

For pedestrian movement in the campus, the footpaths has been constructed for enhanced accessibility. In terms of coverage of footpaths wider than 1.2 m, the campus meets the criteria. However, various efforts are required to make these footpaths universally accessible as at present there are various issues related to the continuity of footpaths. Thus, universal accessibility in the public rights of way is only implemented up to extent of 60 per cent against the 100 per cent requirement. In the international context, the guidelines emphasise complete universal accessibility and at least 90 per cent of motorised trips should be by public transportation, NMT or e-vehicles.

- (h) **Environment:** The campus is a lush green campus and has around 34,000 trees and shrubs in the campus. There are 1.48 MWe of solar electricity that is generated on the campus. The campus also has lesser emissions in the transport sector as the cars of the students are not allowed within the campus. The waste and wastewater are treated within the campus.

TABLE 4: APPRAISAL OF PHYSICAL PARAMETERS OF LIVABILITY
STANDARDS AND SUSTAINABLE DEVELOPMENT GOALS

<i>Category</i>	<i>Indicator</i>	<i>Results</i>	<i>Benchmark</i>
Housing & Inclusiveness	Percentage of students and permanent workers provided residence within the university	30%	
	Net Density	103 pph	Highest
Public Open Spaces	Per capita availability of green spaces	103 square meters	The total area of green space/Total population of the campus.
	Per capita availability of public and recreational places	11.23 square meters	The total area of public and recreational space/Total population of the campus.
Power Supply	Percentage of total energy derived from renewable sources	25%	(Total installed capacity for generation of renewable energy in campus/Total energy consumption from all sources) *100
	Total electricity consumption per capita	320 kWh	Total energy consumption in the campus/Total population of the campus.
Water Supply	Per capita supply of water	206 lpcd	135 lpcd
	Quality of water supplied	100%	100%
	Percentage of water connections covered through meters	Nil	100%
Wastewater Management	Coverage of toilets	100%	100%
	Coverage of sewerage network	100%	100%
	Collection efficiency of sewerage network	100%	100%
	The extent of reuse and recycling of wastewater	76%	20% or more
Solid Waste Management	Household-level coverage	100%	100%
	Efficiency of collection	100%	100%
	The extent of solid waste recovered through reuse	63.3%	80% or more

(contd.)

Transportation & Mobility	Geographical coverage of E-bus	2.5 Km	>=1
	Availability of E-bus	0.47 per 1000 person	>=0.6 per 1000 person
	Percentage coverage of footpaths - wider than 1.2m	167%	>=75%
	Percentage of traffic intersections with pedestrian crossing facilities		100%
	The extent to which universal accessibility is incorporated in the public rights-of-way	60%	100%
Environment	Scope 1 and scope 2 emissions neutrality Achieved	112%	100%
	tCO2e/person	0.09	1.9 (India, 2019)

Source: Livability Standards, Ministry of Urban Development, Government of India (modified as per campus suitability)

Therefore, all these activities are making the campus a low carbon campus. Considering the Data mentioned above, the per capita carbon footprint of the campus comes out to be 0.09 tCO2e/annum/person which is far lower than the national level footprint of India i.e., 1.9 (Tiseo, 2021) and a world average of 4.5 (World Bank, 2018). The Scope 1 and 2 emissions neutrality achieved in the campus is 112 per cent against the benchmarking of 100 per cent. Therefore, the campus has taken various initiatives to move towards a carbon-neutral campus.

With the 100 per cent implementation of Sustainable Development Goals 6,7 and 11 the goal of clean water and sanitation, affordable and clean energy, and sustainable cities and communities of the campus could be fulfilled for which the campus needs to focus on smart water meters, solid waste recovery through reuse and incorporating universal accessibility in the design.

GNDU Campus and other Peer Institutions

While comparing the GNDU campus with the peer institutions of comparable size in terms of sustainability parameters, the campus is the flag bearer setting benchmarks for other institutions that they

should strive to achieve. GNDU campus has the maximum green area, i.e. 85%, while only 34.42 per cent of the area is under built-up (refer to Table 5). In terms of energy consumed per year, it has already achieved the benchmark of producing 20 per cent of its energy from renewable sources of energy. However, it can still learn from the University of Mysore consuming less energy per year with greater size than the GNDU campus. GNDU sets benchmarks for other institutions in waste generating, producing the least waste by utilising 40 per cent of its organic waste to make compost and recycling the paper waste as per university guidelines.

TABLE 5: COMPARISON OF GNDU SUSTAINABILITY PARAMETERS WITH THE PEER INSTITUTIONS.

<i>Campus</i>	<i>Total area (acres)</i>	<i>Green area</i>	<i>Energy consumed per year (kWh)</i>	<i>Water consumption (kilolitres)</i>	<i>Waste generation (tonnes)</i>
University of Mysore	717.98	Less than 10%	220.80	3500	226
Mangalore University	353	Above 50%	183.29	3390	211.2
Jamia Millia Islamia	239.04	Above 50%	110		
Anna University	250	Above 50%	999.86	1900	740
Don Bosco University	274	Above 50%	102.28		
Guru Nanak Dev University	500	85%	320	2940	2.1

Source: Green Campus Movement, CSE, 2021

CONCLUSION

Benchmarking is a crucial tool to evaluate the sustainability practices adopted by educational institutions. Various parameters of sustainable development have been identified based on international and national guidelines and toolkits and are further compared with Guru Nanak Dev University Campus. The campus achieves the indicators under livability benchmarks of sustainability in the social pillar with a student-teacher ratio of 19:1, 100 per cent access to digital education and 15 healthcare professionals per 10,000 population. Under physical pillar indicators, the campus provides housing to almost 30 per cent of its residents and

has higher per capita green areas. The campus also generates onsite renewable energy, accounting for 20 per cent of the total load, thus meeting the benchmarks. Similarly, 100 per cent of the wastewater is treated and reused on campus. However, the campus needs to regulate the water supply by providing water connections through smart meters, increasing the e-bus service and achieving universal accessibility in design, and increasing the solid waste reuse in the campus to meet the national and international benchmarks. The campus is an inspirational model for achieving the SDGs in social, housing, green spaces, renewable energy, wastewater treatment and environmental categories. Overall, it has been found that the campus is a carbon-neutral campus and exceeds the commitment to Carbon neutrality in scope 1 and scope 2 emissions.

Note: This paper includes the findings of the Research Project sanctioned under Center for Sustainable Habitat Component-4 of RUSA 2.0 titled *“Sustainability Concerns and Livable Environment: Case Study GNDU, Amritsar”* being undertaken by Center for Sustainable Habitat, Guru Nanak Dev University, Amritsar.

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National Level Activities during April – June 2022

K.K. PANDEY*

The activities at national level witnessed consolidation of proposals of flagship urban missions and other specific schemes/projects towards annual follow-up, and inter-country and multi-lateral cooperation with a particular reference to (i) PMSVanidhi, (ii) Smart City Mission, (iii) AMRUT (iv) Swachh Bharat Mission 2.0, (v) Housing/PM Awas Yojana, (vi) Urban Mobility and (vii) Bi-lateral/Multi-lateral Cooperation.

PM SVAnidhi

The Cabinet Committee on Economic Affairs under the leadership of Hon'ble PM has announced the extension of the flagship programme of GOI – PM SVAnidhi till December 2024. The continuation will strengthen the vision of providing a dignified & prosperous life to urban street vendors & hawkers.

MoHUA launched Phase-2 as '*SVANidhi se Samridhi*' on April 13, 2022 after the conspicuous success of Phase-1 of flagship scheme. The new version expands its feathers in addition to 126 cities across the 14 states, targeting around 2 million scheme sanctions for FY 2022-23.

On the occasion of 15th Civil Service Day on April 21, 2022 a session on Digital Payment & Good Governance was held which included 31.9 lakh loans were sanctioned to street vendors under visionary scheme, of PM SVAnidhi.

Smart City Mission

TRAI (Telephone Regulatory Authority) on May 18, 2022 on the occasion of their 25th Anniversary organized a meet in Smart city Bhopal for setting standards for digital usage in SCs (Smart Cities) & collaboration for roll out of 5G technologies & pilot in this regard.

'Smart City Smart Urbanization' conclave was held on April 18, 2022 in Surat to deliberate on Phase-2 of the SCM, furthering the relevance of ensuring ease of living for citizens by focusing on the issues of area development, digital governance, innovation, & finance. It had the Thematic Pavilions, like Reimagining Public Spaces, Digital Governance, Innovation, Climate Smart Cities, and Smart Finance, providing

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numerous learning opportunities for over 1000 plus participants on increasing ease of living, climate resilience, urban town planning, etc.

An interactive on the vision of the SCM was held on April 19, 2022 to deliberate on the plan of expanding the mission to the next level by focusing on innovations & overcoming the challenges of procurement by embracing new ideas circumventing the issues in the making of new Smart Cities.

AMRUT (Atal Mission for Rejuvenation and Urban Transformation)

2nd apex committee meeting of AMRUT 2.0 to review & approve the SWAPS (State Water Action Plans) for 9 States/UTs worth ₹15,425.27 crores was held on May 11, 2022. It was suggested to formulate comprehensive projects to achieve universal coverage of water supply, sewerage in 500 AMRUT cities, & POA for reuse-cycle of water. Proposed SWAPS by the States/UTs cover Chhattisgarh ₹1,580.5 crores, Tripura ₹112.928 crores, Gujarat ₹5,128.414 crores, Uttarakhand ₹263.04 crores, Meghalaya ₹493.17 crores, West Bengal ₹7625.688 crores, Assam ₹336.53 crores, Ladakh ₹192.05 crores, and Puducherry ₹65.12 crores.

Swachh Bharat Mission

MoHUA on April 12, 2022 also approved a project worth ₹776 crores on legacy waste remediation across 3 MCDs. The approval will facilitate recovery of around 186 acres of land by rejuvenating approximately 253 lakh MT of legacy waste under the goals of Garbage Free Cities

The 'National Behaviour Change Communication Framework for Garbage Free Cities' IEC initiative was launched on April 28, 2022 under the Swachh Bharat Mission - Urban 2.0.

On May 01, 2022 Hon'ble PM, Shri Narendra Modi, addressed Swachhata warriors as the '*Mahanayaks*' of the country's cleanliness drive. On this occasion of Labour Day (May 01, 2022) SBM - U 2.0 highlights the selfless & dedicated efforts of our country's task force.

Swachh Survekshan Toolkit 2023 was launched on May 24, 2022 for the 8th edition of the annual sanitation survey to focus on emphasizing waste to wealth. Imperative role of citizen feedback & the need for cities to walk in a new direction, enhancing the level of cleanliness was emphasised.

Fifth National Advisory & Review Committee (NARC) meeting of SBM was held on 25 May 2022 with 14 States/ UTs to deliberate on city action plans and overall State plans for Solid Waste Management

and central share of Rs 1143 Crores was approved for various projects. The meeting also had detailed discussions on efforts to improve source segregation, effective project implementation of legacy dumpsites, processing of solid waste & used water, the C&D waste processing and mechanized sweeping in order to contribute toward Clean Air. SBM also has made appreciable digital footprint to highlight sanitation related grievances through Swacchata App with over two crore users across 3500 plus cities. In addition around 500 cities have their own apps.

Highlighting the SBM model of 3R, the environment ministry on May 27, 2022 has made it mandatory for consumer goods companies to recycle at least 60% of their electronic waste by 2023, with targets to increase them to 70% and 80% by 2024 & 2025, respectively.

Urban Housing/PM Avas Yojana

The Central Advisory Council meeting of PMAY was held on April 12, 2022. It was presided over by Hon'ble Minister, MoHUA to address the issues in the housing sector. The council discussed issues related to the RERA Act, rules, buyer-seller agreements, and issues related to stalled projects.

The 52nd Foundation Day of HUDCO was organised on April 25, 2022 wherein Union Minister, MoHUA Shri Hardeep S Puri, expressed the future need for HUDCO to develop competence to meet large urban infrastructure requirements & gain the technical capacity to support the state govt.

The first project among the six LHPs(Light House Projects) under the ambit of PMAY Urban was completed in Chennai with inaugural function addressed by Hon'ble PM Shri Narendra Modi on May 26, 2022. The project has 1152 houses constructed with a project cost of ₹116 crore. With the best of new-age global technologies, materials & processes, the Light House Project furthers the goal of *Ghar Hua Apna, Pura Hua Sapna*. The Project contains 12 towers with six floors, offering 1,152 model houses with new age infrastructure.

Urban Mobility

The construction of 82 km Delhi-Meerut RRTS as on April 04, 2022 is going in full swing. 90% viaduct on 17 km priority section completed, Five stations taking shape, train trials to begin this year. System contracts track laying progress at pace.

It will provide India's first Regional Rapid Rail with the capacity of covering Delhi to Meerut in less than an hour. The NCRTC's Delhi-Ghaziabad-Meerut rail corridor aims to commence its service for the betterment of commuters by 2023.

The 1st Train set of the country's First RRTS (Rapid Rail Transport System) is ready and handed over on May 09, 2022 to Indian Railways emphasizing the Make in India initiative, state-of-the-art RRTS train sets have been manufactured at the Alstom factory in Savli, Gujarat.

Multi-lateral / Inter-country Cooperation

Secretary MoUA chaired the first Russia -India Working Group Meeting on April 06 2022 on Urban Developments. Several developmental & sustainable solutions were showcased from both sides to enhance public transport & housing infrastructure, ensuring smart-sustainable cities for their citizens.

Government of India team headed by Secretary MoHUA had discussions on April 28, 2022 with World Bank Regional Director for Infrastructure, Mr. Guangzhe Chen on the possibilities of collaboration in Urban Mobility to seek deliberated technical & financial assistance to safe mobility solutions in Indian cities. Secretary expressed views on the opportunities for both nations to learn from each other's experiences and challenges, furthering the Indo-Russian partnership to enhance urban landscapes.

As per PIB, GoI, the National Institute of Urban Affairs (NIUA) and World Resources Institute (WRI) India, in conjunction with the World Environment Day that was observed on June 05, 2022, jointly announced 'Leaders in Climate Change Management' (LCCM), a practice-based learning program. It aims at building capacity among urban professionals to lead climate action across sectors and geographies in India. To facilitate this face-to-face learning program, the Administrative Training Institute (ATI), Mysuru, also signed a tripartite Memorandum of Understanding (MoU) with NIUA and WRI India, becoming the first delivery partner of the LCCM program. LCCM envisions capacitating 5,000 professionals, including mid to junior-level government officials and frontline workers, and preparing them to champion climate change adaptation and mitigation solutions towards a coordinated effort to achieve India's climate commitments. The launch also marked the achievements of the Ministry of Housing and Urban Affairs towards India's urban climate goals. The Union Minister for Housing and Urban Affairs Shri Hardeep Singh Puri, launched the learning program and a half-day workshop June 06, 2022 to build capacities among climate leaders in Indian cities.

The developments in the quarter indicate commitment at highest level in Government of India to continue constant efforts towards sustainable and inclusive urban development.

Transit Oriented Development in India

KUSUM LATA*

India's fast urbanization process is inextricably linked to its economic growth and these economic and structural improvements aimed at reducing poverty are both products and drivers of modern urbanization. In this view, Rapid city expansion is necessary because of the faster urbanization that results from population growth and rising wages. Transit Oriented Development (TOD) promotes compact urban expansion to capture the economic benefits of urbanization while also enhancing socio economic productivity by improving resource efficiency and quality of life. As a result, it is essential to focus on developing dense, diversified neighborhoods in metropolitan regions. These areas promote human-scale urban environments that are enhanced by healthy public green spaces, lively markets, and a range of affordable housing and public transit options. Indian cities currently have the optimal circumstances for extending this land-use-transportation integration model across the nation due to their present densities and recent investments in public transportation. TOD, a growth and development management strategy, its adaptation is gradual and is possible at various scales, including node, corridor, city, and region. Various approaches have been explored towards TOD in different parts of the world like Curitiba, Tokyo and Paris. A brief of these approaches in these cities is as follows:

Curitiba: Curitiba integrated land use and transportation to control the city's rapid population growth and keep it from growing into an unmanageable, sprawling metropolis (Parsons Brinckerhoff Quade & Douglas, Inc., 1996). The BRT system considerably facilitated Curitiba's transition from a radial to a linear paradigm of urban growth. The primary radial arteries of the city serve as the backbone for the transportation system. For each primary radial artery, a "trinary system" comprising three highways was designed. The center road of the three features a two-way bus route that feeds into terminals, or transfer sites, as well as a limited number of traffic lanes. Curitiba achieved its aim of compact expansion without private automobiles by implementing policies and practices in four crucial areas: land-use planning, public transportation, parking regulations, and institutional procedures.

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Tokyo: Tokyo's public transportation system uses a train network to connect suburbs to the city center. The urban areas around train stations are mostly pedestrian-friendly and high-density mixed-use zones with retail, commercial, and office operations. To increase passenger volume, private transportation operators in Tokyo have created high-density neighborhoods around metro lines. In Tokyo, the government is encouraging the private sector to cooperate with state-owned transport operators, with no operational subsidies but a free market for the transit and real estate sectors.

Paris: In Paris, the project Grand Paris aspires to transform the Paris region into a major world-class metropolis and improve people's quality of life, resolving spatial disparities, and making the city more sustainable. New economic centers, residential and mixed-use neighborhoods, and scientific and academic clusters are envisioned on transportation nodes formed by the new transportation system, which will connect these poles as well as airports, railway stations, and the city center.

In India, with the aid of several national level initiatives and missions, cities are growing at faster pace. India's Smart City Mission aims to promote growth and investment in Indian cities, is a prime example of this. TOD is also one of the ways to encourage sustainable urban transport. Examples of TOD approaches adopted by Ahmedabad, Delhi and Mumbai are explained as follows:

Ahmedabad: Ahmedabad is an example of a forward-thinking approach to TOD implementation. After seeing a drop in public transportation utilization, the 'Janmarg' Bus Rapid Transit System was introduced. The Janmarg's operational performance has hastened the implementation of policy directives that employ BRT to achieve TOD. The goal is to decrease sprawl by encouraging compact city forms with greater densities in locations with good public transit. The city's development plan emphasizes mixed land use, high density, public transit, a grid-based pedestrian circulation network, and a market-driven approach to land utilization in order to establish the city's Central Business District (CBD).

Delhi: In order to reduce traffic congestion and improve air quality, Delhi has made considerable expenditures in Mass Rapid Transit systems, including the Metro Rail and an earlier Bus Rapid Transit System. Following metro investments, Delhi's growth pattern demonstrates development-oriented transit (transit following development in Gurgaon, Noida, and so on) or transit nearby development (existing neighborhoods within the city benefitting from Metro options). The planning body made an attempt to

design a comprehensive Transit Oriented Development Policy to revamp station areas and neighborhoods along Metro corridors. The adoption of the TOD Policy guidelines in the Metro corridor pilot zones is expected to halt the highway-driven spatial development paradigm, allowing areas inside city borders to be densified.

Mumbai: Greater Mumbai Area is a megapolis constructed through land reclamation and rail network expansion. Greater Mumbai and its satellite towns are part of the Mumbai Metropolitan Region, each satellite town has both jobs and residents, and it develops in a node-based structure around suburban railway stations. Several job centers may be found throughout Greater Mumbai. They are linked to the satellite towns by a complex network of suburban rail, metro, monorail, public buses, auto-rickshaws, and significant pedestrian modes. Mumbai demonstrates corridor-based TOD, with unusually high public transportation mode. Mumbai and Navi Mumbai, along with the rest of the Mumbai Metropolitan Region, have displayed regional transit-oriented expansion since the first railway line. The total number of passengers using this suburban rail network has multiplied six-fold since it first opened while capacity growth was disproportionate. The Comprehensive traffic and transportation study is being updated so that interventions such as pedestrian infrastructure, complete street networks, designated areas for Intermediate personal transport (IPT) and street vendors etc can be introduced in an effective way. This will help retain the higher public transit modal share in the city and the region.

Strategic Planning was a prevalent practice in Curitiba, Tokyo and London before the introduction of TOD in these cities which has been missing in the Indian cities. Ahmedabad, which has the country's first BRT system, Delhi, which has a Metro system that matches Paris in scale and length, and Mumbai, which has node-based expansion around suburban railway stations, have all been more ad hoc in their nature. This restricts their ability to profit from advances to public transit infrastructure.

After drawing some similarities between the cities discussed, Ahmedabad envisions strict parking regulations, feeder network and first and last mile connectivity and affordable housing as observed at Curitiba. Delhi & Paris are capital cities with a similar land area, population and length of the metro network, lacking growth management strategies which are resulting in transit following the development. Different approaches while dealing with multimodal integration and last mile connectivity are exhibited. To address the issues pertaining to affordable housing, the Delhi Master Plan 2041 proposed nodal TOD.

Both Mumbai and Tokyo feature railway-guided node-based growth. In Tokyo, the institutionally encouraged coordination between rail and land development has increased transit quality and made it financially feasible. Such integration is absent in Mumbai, causing transit to run at a loss while the quality of the transit system deteriorates owing to inhumane train congestion. Citizens are being incentivized to use private transport by high parking provision.

Transit Oriented Development (TOD) strategy focuses on equitable city development, such that the majority of the population lives and works in locations with safe and accessible walking and cycling facilities, with dependable and high-quality public transportation. Essentially, transit-oriented development seeks to make Indian cities future-ready. This strategy will combat urban sprawl and transportation congestion. Widely recognised by planners and governments worldwide, it seeks to reduce congestion through improved public transportation and land use integration, while also increasing inhabitants' quality of life.

Sewerage Management in Urban Areas: Waste to Wealth

SACHIN CHOWDHRY*

Urbanization on the one hand offers vast opportunities for economic development, but on the other hand poses several challenges. Increasing population in the urban areas needs to be offered basic services. Developing countries face such challenges more severely because of several factors, including unplanned development and mismatch between demand and supply due to resource constraints. India too faces similar challenges.

One of the basic services, and which has severe climatic repercussions as well, is sewerage management. The creation of infrastructure for sewage treatment facilities and sewerage network has not kept pace with the demand leading to huge gaps in sewage generation and treatment capacity across the states. As a result, partially treated or untreated sewage is discharged into environment, mainly rivers. It is the responsibility of the states and concerned urban local bodies (ULBs) to ensure required treatment of sewage to the prescribed norms before discharging into the river.

Central Pollution Control Board (CPCB) keeps track of the gaps through inventorisation of Sewage Treatment Plants (STPs). In its report on 'National Inventory of Sewage Treatment Plants in India-2021', it has made attempt to analyse the quantum of sewage generated, treatment capacity, sewage actually treated and treatment capacity complying to discharge norms in various state/Union Territories. It collects its data from State Pollution Control Boards/ Pollution Control Committees and ULBs. Some of the observations in the report are mentioned below:

- There were 1631 STPs (including proposed STPs) with a total capacity of 36,668 MLD covering 35 States/ UTs. Out of 1631 STPs, 1093 STPs (67%) were operational, 102 were non-operational, 274 under construction and 162 STPs were proposed for construction.
- Sewage generation from urban centres was estimated to be 72368 MLD, while total installed treatment capacity was 31841 MLD, which is merely 44%.

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- However, actual quantity treated was only 20236 MLD which is 28% of total sewage generated and 64% of installed capacity.
- Delhi has performed better than others, with 83% treatment of installed capacity. It is closely followed by Chandigarh and Gujarat at 80% and Telangana at 78%.
- Chhattisgarh treats sewage only 8% of installed capacity, with Odisha following closely at 13% and Tripura at 19%. Of bigger states, West Bengal treats 24% of installed capacity and Madhya Pradesh 29%.

There is need to realise that sewage can be a good source of revenue rather than being a problem. It can be treated for non-potable purposes and industrial utilities. The CPCB Report 2021 mentions that utilization of sewage has following positive impacts:

- (i) Re-use of treated sewage allows less demand from aquatic resources like rivers, ponds, lakes etc, and
- (ii) less consumption of raw water helps in conserving natural services.

Several ULBs have taken steps in this regard. All the states/UTs have prepared action plans on utilization of treated sewage in compliance with the direction of National Green Tribunal. Salient features of the action plans are mentioned below:

- In 7 States/UTs namely Delhi- 405 MLD (12.5%), Gujarat- 60 MLD (1.55%), Haryana- 192 MLD (16%), Madhya Pradesh- 84 MLD (4%), Tamil Nadu- 211 MLD (6.6%), Chandigarh- 27-40 MLD (10 to 16%) and Puducherry- 15.3 MLD (26%), domestic waste water is being treated and re-used for different purposes like horticulture, irrigation, non-contact impoundments, washing (Roads, Vehicles, Trains), construction and industrial activities
- Percentage of reuse and treated sewage is maximum in Haryana (80%) followed by Puducherry (55%), Delhi (50%), Chandigarh (35%), Tamil Nadu (25%), Madhya Pradesh (20%), Andhra Pradesh (5%)
- NCT of Delhi has set target to increase their re-usage from 12.5% to 60%. In future, utilization of 341 MGD treated sewage are proposed for drinking purpose (197 MGD), Irrigation (112 MLD) and 10 MGD in rejuvenation of water bodies.

The following cases indicate that how reuse of treated sewage can be revenue earner for the ULBs or agencies entrusted with the responsibility of sewerage management.

Chennai Metropolitan Water Supply and Sewerage Board

The Board has installed 2 tertiary treatment plants of 45 MLD capacity each to meet the raw water requirement of industrial areas. One plant at Koyambedu, which is working on PPP basis, has led to saving of freshwater due to the commencement of supply of treated water to industries. Around 20 MLD freshwater which was being supplied to them for industrial use has now been diverted for drinking water purpose of the Chennai city people. At the same time, the Board is earning revenue from the industries through the sale of treated water to them at Rs. 65 /kl. Rs. 19.67 crores worth of revenue was generated for the Board. Similarly, the other plant at Kodugaiyur, which is also working on PPP basis, has earned the Board the revenue worth Rs. 48.17 crores. This plant is selling the treated water to the industries at the rate of Rs. 80/kl.

Surat Municipal Corporation (SMC)

The Corporation has been supplying an average of 55 MLD of treated water to Pandesara GIDC Industrial Area since 1998. Water demand of Pandesara industries is approximately 90-100 MLD, comprising 80-85 MLD of process water requirement and 10-15 MLD of potable quality water demand. SMC has constructed a 40 MLD treatment plant to treat secondary treated water from Bamroli STPs and recycle, generate and supply industrial grade water for Pandesara Industrial Estate. The Corporation has been able to save 40 MLD of potable water, which was earlier supplied to Pandesara industries. In addition, it is earning revenue to the tune of Rs. 48.17 crores at the rate of Rs. 23 /kl. There is recognition of the fact now that there is a need for a paradigm shift in the way wastewater is handled / managed in the country. As water is a scarce commodity, it is imperative to manage the already used water in an environmentally friendly and economically sustainable manner. The two objectives can be achieved by recycling or reusing the used water.

Smart City Mission: Success Stories of ICT Infrastructure

AMIT KUMAR SINGH*

India is the second largest urban system in the world and its urban population is expected to grow from 377 million in 2011 to 600 million in 2030. In the coming decade urban population will contribute to more than 70% of the total population increase in the country. The high urban population in India has a detrimental impact on the citizen's life as well as on natural surroundings. In order to manage the ever-increasing population in the cities, it is important that infrastructure in the cities are upgraded and managed by using advanced Information and Communication Technologies (ICT) to make them sustainable in the long run. In India, The MoHUA, is responsible for implementing the urban development schemes across India. In this direction, Smart Cities Mission is one of the major initiatives of the Ministry to improve people's living quality in cities and towns by information and digital technology, using best practices, and more public-private partnerships. At present the Smart City Mission (SCM) in collaboration with the state governments of the respective cities, is working with 100 cities for area-based development. Application of Smart Solutions will enable cities to use technology, information and data to improve infrastructure and services.

It is good to note that MoHUA is successfully implementing Smart City Mission projects in different cities in collaboration with ULBs and State Governments by deploying AI solutions. Some of them are as follows;

GIFT city: India's first Greenfield Smart City: Under the Smart City Mission, the Government of Gujarat has developed Gujarat International Finance Tec City (GIFT City) as India's first Greenfield Smart City. Around seven km from Gujarat's capital Gandhinagar, the GIFT City, planned on 886 acres of land with 62 mn sq. ft. of built up area, includes banks, stock exchanges and financial services firms, office spaces, residential apartments, schools, hospitals, hotels, clubs, retail and various recreational facilities. Further, the entire city project has been divided into a multi-service Special Economic Zone (SEZ) spread over 261 acres and exclusive domestic tariff area (DTA) spread over 625 acres.

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This City is developed as a planned business destination for National International Entrepreneurs and provides competitive edge to financial services and Technology related activities. At present more than 200 entities have established their offices where more than 12,000 people are working. GIFT City has been equipped with some of the latest technology of present time which is useful to common man. From the latest public transport, to automated waste collection to an efficient district cooling system, GIFT City has the best amenities available for its residents. The infrastructure developed in GIFT City, such as District Cooling System (DCS), Automated Waste Collection System (AWCS), and Underground Utility Tunnel, contributes to making the city ready for a sustainable way of living. GIFT city has embraced water management through a 35% reduction in potable water and treatment & reuse of 100% wastewater. GIFT City has also installed an automated waste collection and segregation plant. Due to its Eco-friendly and technology driven Public utilities and hassle free business operations, GIFT City has won several awards and accolades at various forums.

Smart poles for Internet access and EV charging in Bhopal:

In conventional urban planning, ULBs use different infrastructure for streetlights, mobile network, street surveillance, environment monitoring etc. This makes it quite complex and costly to setup and maintain them. Recently, under the Smart City Mission Smart Pole has become the focal point not only for streetlights but also for Telecom Service Providers. Different cities under Smart City Mission are deploying a unified Smart Pole to reduce the connectivity costs and connectivity access to various public and commercial applications such as Emergency Call Box, Public Announcement System, Public Wi-Fi, Environmental Sensor, Flood Sensor, Smart Lighting), Variable Message Display boards, Surveillance Cameras, etc. CCTV cameras can be installed with the Smart Pole to improve upon safety and security in the city. Environmental sensors can be installed to monitor air quality, temperature, and humidity. Simultaneously, the implementation of LED-based streetlights helps to improve the quality of life of city residents by improving the city lighting.

Realizing the importance of Smart Pole, Bhopal Smart City Development Corporation Limited (BSCDCL) has launched first of its kind public private partnership (PPP) based smart poles and intelligent streetlights' project in India under the Smart Cities Mission. BSCDCL partnered with Bharti-Infratel, Ericsson, and HPL for its efforts to create Smart, Connected, and eco-friendly Communities. One of the highlights of this project is the deployment of smart poles and street lighting as

a multi-application platform. In 2017, it was planned to install two thousand smart poles and 18 thousand smart street lights in the city with an investment of about Rs 700 crore. Initially, as many as 500 such poles were to be installed. However, around 100 such poles have been installed till date. Along with that 20 thousand LED street lights has been installed on these Smart Pole. These LED lamps are equipped with a Central Control Monitoring System (CCMS), which allows remote monitoring and operation of the lights. The system sends alerts for each light that needs attention, reducing the chances of failure and sudden repair. Therefore, the avoided capacity of electricity can be ascertained from the reduced consumption of electricity. Now streets of Bhopal have got more illumination than before.

GPS-based Vehicle Tracking and Monitoring System (VTMS) for SWM - Indore

Indore is the most populous city of Madhya Pradesh and for the 5th consecutive year, Indore has been awarded with the title of India's Cleanest City for its performance in maintaining cleanliness, hygiene and sanitation. Indore Municipal Corporation (IMC) considers sanitation and Solid Waste Management as priority areas for the city. Timely clearing of secondary collection bins and transportation has been a major issue in Solid Waste Management in Indore - around 750 open garbage dumps in the city were not cleared regularly until recently. The city has adopted several initiatives aimed at preventing littering and making Indore the cleanest city.

Due to the combined efforts of the city's people, its public representatives and government officials, the city has become the cleanest in the country. However, Indore Municipal Corporation has successfully utilized the GPS based smart technology i.e. vehicle tracking solutions, construction of garbage transfer stations and developed app for data compilation on waste collection. They have also installed IP cameras at entry and exit of the landfill site, integrated Weighbridge Vehicle Monitoring System (IWVMS) at the entry and exit points, integrated VTMS with the Central Command and Control Centre and also given training to stakeholders for managing the complete VTMS eco-system. The success of Indore's urban solid waste management shows that urban India can be cleaned up if municipal bodies, NGOs, private companies and citizens come together and adopt smart solutions for waste management.

ABOUT CUS

In 1966, Centre for Training and Research in Municipal Administration (CTRMA) was established in IIPA with the support of Ministry of Health and Family Planning, Government of India, the then nodal ministry on urban local bodies. The Centre was created with specific objectives to operate as a knowledge centre and think tank on urban sector issues and an apex institution at national level. CTRMA was rechristened as CUS (Centre for Urban Studies) in 1974-75.

Director General, IIPA is the Director of CUS and chairperson of the Steering Committee. A faculty of CUS is nominated as Coordinator CUS, who becomes the Member-Secretary of the Steering committee. CUS has an interdisciplinary team of faculty members from Economics, Public Administration, Urban Planning and Civil Engineering background. In addition other faculty members of IIPA drawn from environment, disaster management, social development and e-governance background provide their professional input to CUS on case to case basis.

Objectives of CUS

The precise objectives of CUS are :

- (i) Organize suitable training courses for municipal and state officials concerned with Municipal Administration in order to improve the technical and professional character of municipal services;
- (ii) Hold seminars for the elected leaders of urban local authorities for the purpose of facilitating awareness of problems facing the local bodies and encouraging communication between the technical experts and the popular leaders;
- (iii) Arrange special conferences and study groups on contemporary problems of municipal administration,
- (iv) Help other States and regional training and research centres on municipal administration that might be established;
- (v) Promote research on various governmental problems of urban and metropolitan growth in India;
- (vi) Develop an efficient and up-to-date information centres and documentation services in municipal administration in India and abroad; and

- (vii) Provide suitable consultancy service to the various public bodies on municipal administration and to represent India in international conferences.

Outreach

In accordance with its objectives, the Centre during the last 55 years has carried out research, training and advisory services. The Centre has developed and strengthened its national and international outreach and coverage of stakeholders. CUS extends India's urban agenda to (a) Institutions and agencies of Government of India, (b) state government agencies, (c) ULBs (Urban Local Bodies) and para-municipal agencies dealing with specific services, programmes and schemes of Government of India and respective state governments.

Research

Recent Research activities include policy research to Government of India and states and major ULB's, Action research for functionaries at cutting edge level and evaluation of specific scheme and programmes. Research is also used to develop contents for capacity building programmes and disseminate information through a range of publications. CUS also carries out documentation of best practices on specific urban innovations.

Digital Training Initiatives

Since July 2020, CUS started first of its kind digital training programmes in the country to build capacities of middle and senior level urban functionaries through online training. These programmes also tend to seek lessons from Mission Karmayogi launched by the NDA government in September, 2020. Modules developed by CUS include.

- (i) Urban Governance and Administration
- (ii) Urban Finance and Revenue
- (iii) National Urban Livelihood Mission
- (iv) Integrated Urban Water Management System
- (v) Participatory Governance for Urban Management

The above programmes have a duration of 3 to 5 days and cover senior officers from urban local bodies and para-statal/para-municipal agencies dealing with various aspects of urban development.

(Refer CUS at <https://www.iipa.org.in/cms/public/page/centre-for-urban-studies> for its activities details)

NOTES FOR CONTRIBUTORS

This is intended as a guide for authors submitting a manuscript to *NAGARLOK* and as an aid to the preparation of the final copy of accepted articles.

Manuscript

- Manuscript should be in MS Word format. This should include the name, email ID and the institutional affiliation of the author(s).
- Manuscripts in English should use British spelling and typographical conventions.

Articles

- There should be no line spaces between paragraphs.
- Notes should be listed at the end of the main text.
- Manuscripts should be typed in Times New Roman, font size 12, each page numbered.

Punctuation and abbreviations

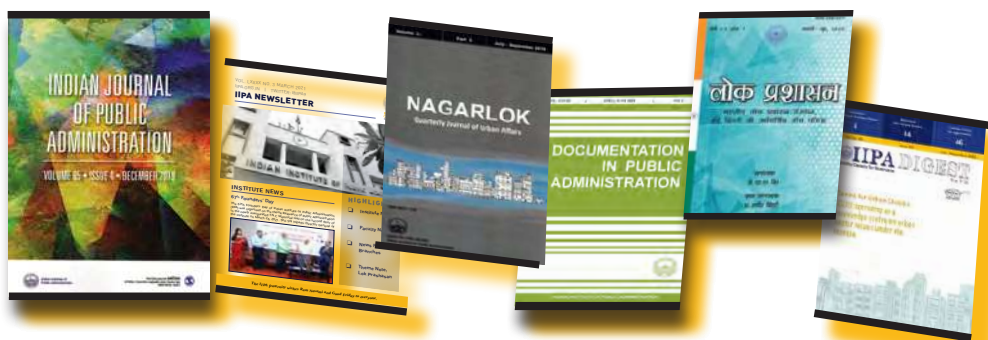
- Single quotation marks should be used to enclose actual quotes from other sources or for technical terms when they are first introduced. On subsequent mention of technical terms, no quotation marks should be used. Excessive use of quotation marks should be avoided.
- Double quotation marks are used to enclose quotes within text which is itself quoted.
- Latin abbreviations such as 'i.e.' or 'e.g.' are acceptable only in expressions within parentheses, as here: 'adjectives which collocate with fare (e.g. wholesome, simple, country) ...' Elsewhere, they should be replaced by their English equivalents, 'that is' or 'for example'. Italic should not be used for such abbreviations or for such common Latin expressions as 'ad hoc', et al., etc.
- Numbers up to 9 and vaguely expressed numbers should be spelled out in words. However, any numbers in a statistical context, precise numbers, units of measurement, and numbers above 100 should be stated in figures.

Table and figures

- Every table should be given a number and brief title or caption set above the body of the table and source at the bottom.
- Figures are also given a number and a caption, set below the figure.
- Avoid such expressions as 'In the following table ...', 'As can be seen in the figure above ...' In the printed version these elements may need to be repositioned due to constraints of page layout, always after the first mention of the Table or Figure number in the text.
- Source of figures should be given at the end of the table.

Text references

- Page references should be provided when reference is made to a specific passage in a book or article. These appear after the date of publication and are preceded by a colon and a single space: Jefferson (1996: 296 – 299) or Cowie (1999: 79).
- All works cited in the running text must be listed in the reference section at the end of the text.
- The reference section should include only those works that were cited in the text.
- Whenever possible, please give the full first names of authors and editors.



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The Institute disseminates information, analyses, viewpoints and knowledge related to public administration, governance, policy and development through its regular publications viz., monthly digital editions of IIPA e-Newsletters, quarterly editions of Indian Journal of Public Administration (IJPA) in association with Sage Publications, quarterly editions of Nagarlok, quarterly editions of Documentation in Public Administration (DPA), biannual editions of Lok Prashashan (Hindi Journal) and quarterly editions of IIPA Digest.

So far IIPA has published more than 500 books, monographs, reports, working papers, and compendiums in spheres of governance and public administration. A few of the books authored by renowned authors including IIPA faculty members are also available for purchase.

INDIAN JOURNAL OF PUBLIC ADMINISTRATION (IJPA)

(Quarterly since 1955)

Flagship refereed UGC CARE listed journal of IIPA, IJPA in collaboration with SAGE Publications publishes manuscripts covering topics related to Public Administration, Public Policy, Good Governance, Bureaucracy, Leadership, Environment, Law, Social Welfare, etc. Research articles, case studies, book reviews, essays, notes and documents related to themes authored by experts are regularly featured in IJPA. The author of the best article every year is conferred with the prestigious late Shri TN Chaturvedi Award by the Hon'ble Vice President of India.

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The journal covers topics related to Urban Studies with a focus on Urban Life, Metropolitan System, Urban Economic Development, Urban Finances, etc.

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