

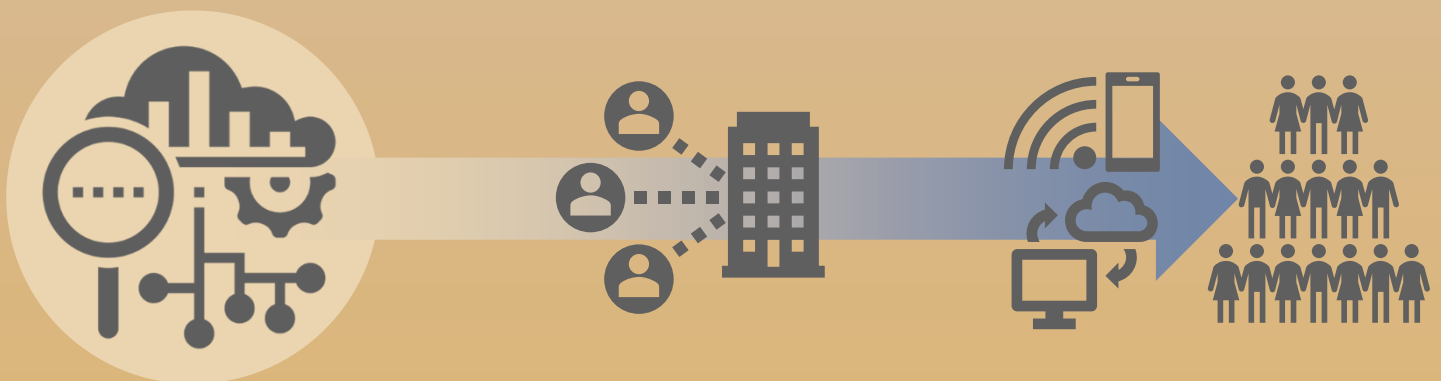
Online service delivery in India: Assessment of selected Indian cities using Local Online Service Index (LOSI)

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Preamble

This report marks a significant milestone in the landscape of digital services evaluation in India, focusing on the implementation of the Local Online Service Index (LOSI) methodology. As the nation continues its rapid digital transformation, understanding and assessing the efficacy of local online services become paramount. This document serves as a comprehensive exploration of the LOSI methodology's deployment in India, shedding light on its impact, challenges encountered, and the broader implications for local governance and digital service accessibility.

In a dynamic and evolving digital ecosystem, the LOSI methodology emerges as a vital tool for evaluating the efficiency, accessibility, and quality of online services at the local level. This report delves into the intricacies of its application within the Indian context, offering insights into the collaborative efforts, technological advancements, and policy considerations that have shaped its implementation.

This report constitutes a comprehensive evaluation of the current state of Municipal Governance Portals (MGPs) in select Indian cities, focusing on key dimensions such as institutional framework, technological infrastructure, service provision, information dissemination, and features promoting local participation. Rooted in the premise that India has achieved significant maturity in online public service delivery, particularly from the citizens' perspective, owing to technological advancements and collaborative efforts by public and private entities, the report seeks to substantiate this hypothesis through a rigorous assessment process.

The assessment unfolds across four distinct phases. Firstly, the selection of Urban Local Bodies (ULBs) and their dedicated Municipal Governance Portals (MGPs) forms the foundation. Emphasis is placed on identifying portals exclusively serving the ULB, disentangled from state or national schemes. Subsequently, the parameters integral to the Local Online Service Index (LOSI) questionnaire are comprehensively defined in the second step. The third stage involves meticulous questionnaire completion, substantiated by evidentiary support for each response. The final step incorporates a thorough validation of responses and the derivation of results through a percentage-based methodology, offering insights into city-wise and component-wise performance metrics.

Drawing on data gathered from diverse sources, including demographic indicators from Census India 2011 and Smart Cities database, the analysis identifies correlations between data points and various factors influencing a city's maturity in online services. The ensuing results produce a comprehensive database comprising city-wise, category-wise, and parameter-wise scores. This dataset offers an opportunity for visualization and in-depth analysis, utilizing maps and charts to discern data dispersion and identify positive or negative outliers for further scrutiny.

In conclusion, this report serves as an invaluable resource providing deep insights into the maturity levels of Municipal Governance Portals in Indian cities. By spotlighting exemplary practices in high-scoring cities and delineating areas for enhancement within each assessment component, the analysis contributes not only an evaluative snapshot but also pragmatic recommendations for improvements. These recommendations are strategically aligned with the identified areas of improvement, underscoring the report's commitment to informing policy and implementation strategies aimed at advancing the e-governance landscape in India.

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1 GOVERNANCE AND E-GOVERNANCE

1.1 What is E-Government?

The term "governance" is used to refer to predetermined structures and procedures intended to guarantee lawfulness, accountability, responsiveness, transparency, stability, equity, and inclusivity in a habitat. In addition to this, the term governance refers to the set standards, obeyed principles, and laws that guide the operations and management of public affairs in a transparent, inclusive, inclusive, and responsive manner [1]. Governance gets directly associated with managing an urban settlement. It may be a mega city, a small town, or a cantonment area, if there is a human population living in a place making a community, there is always a need for Urban Local Body (ULB) to regulate and sustain that habitat.

UNDP defines good governance as governing systems in places that are capable, responsive, inclusive, and transparent [2]. E-government can refer to a variety of things depending on the context, including "online government services" and "communication of information and services with citizens, businesses, and other components of government via electronic mediums." The traditional definition of e-government is the use of information and communication technologies (ICTs) to increase government agency productivity and deliver services to citizens online. The concept of e-government has grown over time to encompass the use of ICT by the government to facilitate a variety of interactions with its citizens and enterprises, as well as the use of open government data and ICTs to accelerate innovation in governance [3].

Different e-government services are presently offered, including Government-to-Government (G2G) services which entail data sharing and electronic communications between government agencies. At the national level, this encompasses both internal and inter-agency exchanges as well as various interactions between the national, state, and local levels. While Government-to-Business (G2B) services include both the provision of online business-focused services as well as business related transactions (e.g., payments, purchases and sales of goods and services). Government-to-Consumer/Citizen (G2C) services refer to programs created to make it easier for people of the nation and consumers of public services to interact with the government. This comprises communications regarding the provision of citizen services as well as involvement and decision-making processes [3].

1.2 Difference between E-Government and Digital Governance

In theory, the terms "e-government" and "digital governance" are confused and used interchangeably. However, in actual usage, each phrase has a distinct meaning and serves a different purpose. Although they have a similar meaning and are used more frequently, e-government and digital government have slightly distinct connotations. Where e-government majorly focuses on the delivery of services using actual information and communication technology (ICT) used to improve the governments' operations, as opposed to digital government, which refers to the comprehensive digital structures set up by the government to address the needs of its citizens [4].

E-government uses current digital technologies to improve governance by digitizing documents and services. When the administrative and public authorities collaborate effectively, this type of governance can effectively support the functionality and operations of the concerned stakeholders.

While several departments and organizations work together, a smooth procedure can be achieved when transmitting or acquiring various types of information from the public using the implemented internet technology. An effective, open, and practical digital government is produced through the general framework of e-government technology.

1.3 Transition of existing governance system into e-government

To convert any existing government system into an e-government, certain infrastructure and capacity building are needed. The phases that a government needs have been identified by several authors and experts. In the first phase, electronic cataloguing of information is the focus. During this stage, government agencies build websites that offer details on services, downloadable forms, papers, and contact information. The creation of more complex websites connecting internal processes with online presence, moving toward "two-way" communication, and enabling citizens to communicate with government make up the second phase. For instance, a lot of activities, like paying penalties, signing up for services, and filing taxes, will be done electronically. Here, security concerns and technical specifics require strict consideration. For example, systems for online transactions must be created to secure public trust. The proper internal systems must automatically get data as well. The third phase, which is frequently referred to as "vertical integration," involves connecting local agencies and their services to central systems so that any interactions with local services are immediately forwarded to pertinent central agencies. During this stage, "portal" websites are created, highlighting connected services from a variety of central and local agencies. Examples include welfare and health, customs and immigration, and financial and business services, which involve both the public and private players. Genuine "horizontal integration" of government services occurs in the fourth phase. Given that systems are now completely connected and interactive, clients will not be able to distinguish between services provided by different agencies. These take on a seamless quality, with consumers having 'one stop' access to services, rather than the citizen needing to navigate agencies (or portals) to get or transact with multiple services.

1.4 Governance in India

India has a parliamentary system of government with many components. It is a sovereign, socialist secular, democratic republic country. The Prime Minister serves as the head of the Council of Ministers, which then advises the President, who is the entire nation's constitutional leader. The Chief Minister serves as the chairperson of the Council of Ministers in each state, and his or her responsibility is to advise the Governor [5].

Cities and towns play a significant role in the nation's economic growth. The citizens and their elected representatives must actively participate in the formulation and execution of the programs at the urban local level in order to maintain the economic change in line with requirements and gets implemented at the grassroots level. The roots of democracy must extend into every town, village, and city where people live if it is to remain stable in this nation's Parliament and State Legislatures.

1.4.1 74th Amendment Act

The Constitution and its Seventy Forth Amendment Act of 1992 has introduced a new part, in the Constitution itself, which addresses the power given to municipalities.

As the lowest level of government in India's small cities, the formation of an Urban Local Body is allowed under this constitution for municipalities. According to the size and area of the settlement, it allows for the formation of three different types of municipalities which are Nagar Panchayats for areas that are currently transitioning from being rural to urban; Municipal Councils are for smaller urban areas; and Municipal Corporations are for comparatively larger urban areas. The key influencing elements for forming a certain sort of governing body, such as a municipality, are demographics and other circumstances, which vary significantly from state to state. Therefore, it has been entirely left up to individual State Legislatures to determine which sort of municipality should be there for that area [6].

1.4.2 E-Governance in India

In India, e-Governance has quickly advanced from projects that merely automated bureaucracies to those that serve as models for the more nuanced nuances of governance, such as people centricity, service orientation, and transparency. The nation's expanding e-Governance strategy has been greatly influenced by the lessons learned from earlier e-Governance efforts. The idea that a program, driven by a shared vision and strategy, is required to has undergone rigorous examination in order to speed up the deployment of e-Government across the various levels of government at the national, state, and local levels. By combining the core and its support infrastructure, fostering interoperability through standards, and giving citizens a seamless view of government, this idea has the potential to result in significant cost savings [7].

The National e-Governance Plan (NeGP) is an initiative by the Government of India to make all government services available to the citizens of India via electronic media [8]. The National e-Governance Plan (NeGP) implements a thorough strategy for e-Government initiatives in the country, incorporating them into a single vision. A substantial national infrastructure that covers even the most remote areas is being built around this idea, and major record digitization is taking place to offer quick, dependable access online. The ultimate objective, as stated in NeGP's Vision Statement, is to increase inhabitants' access to public services.

2 ASSESSMENT INDICES

Since e-governance has evolved in both the public and private spheres, numerous internal and citizen-targeted surveys conducted by international public and private organizations have been conducted to assess the process and progress of e-government, and many of the indexes have been created as a result. Using various methods, indices, and perspectives, several surveys evaluate time to time development of various e-government project types. Evaluating the success of e-government initiatives is a complicated process because the projects range from supporting infrastructure to core software and many of the times, they are influenced by political goals based on the political geography of the implementing ULB. The continual demand for improvement and development in the current system is brought on by the daily emergence of new ideas and technology. The process must be continuously monitored, and problems must be resolved in order to make it more visible, safe, and quick.

2.1 Assessment index

There are assessment indexes at all levels of governance with different methodologies and approaches in place throughout the world scenario of e-governance. The United Nations and World Bank have throughout the year developed and matured their indexes to better assess and rank the implementation and further development of the scenario of e-government in different countries. The GovTech Maturity Index (GTMI) was created to provide a gauge of the maturity of government technology in four key areas: supporting central government systems, improving service delivery, mainstreaming citizen engagement, and fostering enablers of government technology [9].

The 12th iteration of the evaluation of the state of digital government across all its 193 Member States of the United Nations E-Government Survey, which was published in 2022. The UN E-Government Survey publishes a single, publicly accessible dashboard with a database of all national portal websites of UN members [10]. The E-Government Development Index (EGDI) is a composite measure of three important dimensions of e-government, namely: provision of online services, telecommunication connectivity and human capacity [10]. In comparison to the 2020 and 2018 versions, the 2022 version has enhanced parameters and a greater emphasis on human factors. In Indian context, the National e-Governance Service Delivery Assessment is the assessment index which attempts to assess India at state level. The NeSDA framework, introduced in August 2018, was designed with the overarching goal of evaluating the breadth and efficiency of current e-Governance service delivery methods. This framework was developed specifically for the Indian administrative structure and the e-governance level of the States and UTs. It is based on the Online Service Index (OSI) of the United Nations' eGovernment Survey. An extensive national dashboard with group-by-group evaluation and results is produced by the framework. The GovTech Development Index (GTMI) was created to provide a gauge of government technology maturity across 198 economies supporting central government systems, enhancing service delivery, mainstreaming public participation, and fostering enablers which are the four core areas. This index contains certain factors from the UN E-Gov Survey but focuses more on technology and back-end infrastructure.

2.2 United Nations E-Government Survey

The E-Government Development Index's biannual evaluation of e-government development enables Member States to monitor survey results and start reforms following each measurement. In order to take into account, all the recommendations driven by external evaluations, the outcomes of expert group meetings, the evolution of the most recent technological and policy developments in digital government, as well as the input and feedback from United Nations' Member States, the EGDI methodology has undergone constructive improvements for each edition of the Survey. Though the overall methodology has not changed, these modifications may make it more difficult to make thorough comparisons with earlier editions, however this is still possible for the majority of all indicators and comparisons with past scenarios can be done with historical references [11].

The United Nations E-Government Development Index is used by the survey to monitor and evaluate a nation's progress in e-government development (EGDI). The EGDI is an index based on the weighted average of three unique normalized variables and measures the growth of e-government at a national level.

Table 1 E-Gov components and weightage

Dimensions of evaluation index	Weightage	Components	Weightage
OSI – Online Service Index	1/3	Institutional Framework	10%
		Service Provision	45%
		Content Provision	5%
		Technology	5%
		E-participation	35%
TII-Telecommunication Infrastructure Index	1/3	Mobile-cellular subscriptions per 100 inhabitants	25%
		Internet users (% of population)	25%
		Fixed broadband subscriptions per 100 inhabitants	25%
		Active mobile broadband subscriptions per 100 inhabitants	25%
HCI-Human Capital Index	1/3	Expected years of schooling	22.22%
		Mean years of schooling	22.22%
		Gross enrolment ration (%)	22.22%
		Adult literacy (%)	33.33%

2.2.1 India's score in UN E-Gov survey results

UN has analyzed the MSQ (Member State Questionnaire) which was sent to all the member states of UN in order to assess their development in E-Governance and publish the results as a ranking across various categories. India has scored EGDI of 0.58830 in the 2022 survey and ranked 105th in the list, which was five rank lower than the 2020's rankings. The overall score of India in EGDI has developed and increased over the last 20 years but at the same time the ranking among other member states has varied subsequently.

The ranking of India has gone down after 2014 due to the change in the methodology of the survey. The EGDI score keeps changing in accordance with evolution of the index and change in assessment parameters. Additions of new parameters shifts the weightage among the components and sub-components and if the member state is lacking in those particular parameters, it affects the score negatively and if the nation is excelling in the added parameters, the score raises in the assessment.

Across the three components of the EGDI (E-Governance Development Index), India has scored, 0.7934 in OSI (Online Service Index) 0.3954 in TII (Telecommunication Infrastructure Index) and 0.5761 in HCI (Human Capital Index). Which indicates that availability of online services at national level is marginally good but compared to that, the infrastructure and human capacity to avail those services is lacking in the country [11].

2.3 Local Online Service Index (LOSI)

Over the last several years, the United Nations E-Government Survey has monitored the global expansion of e-government. Over the publication of its eleven editions, the assessment's scope and breadth have expanded, and it now assesses how e-government services are provided in all 193 United Nations' Member States. The most recent important modification to the methodology of the E-Government Survey was the introduction and addition of the Local Online Service Index (LOSI) in 2018. The UN DESA's LOSI assessment accurately depicts how e-government service development is currently progressing at the local governance level throughout all United Nations' Member States [3].

Table 2 LOSI Components

Dimensions of evaluation index	Components
LOSI – Local Online Service Index	Institutional Framework (8) Content Provision (25) Service Provision (18) Participation and Engagement (17) Technical Technology (18)

Local-level e-government development is expected to be similar among cities that are members of the same LOSI group. This might facilitate the process through which city leaders determine what qualifies as satisfactory performance and/or develop a strategy around short-term and long-term goals [11].

3 LOSI METHODOLOGY

3.1 Problem statement

This study is driven by a problem that states that “What is the current level of maturity of Indian cities’ Municipal Governance Portals (MGPs) in terms of institutional framework, technology, provision of service and information, and features for local participation?”

The study aims to answer this problem with assessment of the Municipal Governance Portals (MGPs) available for the citizens as primary mode of public service delivery by the local government.

3.2 Hypothesis

The survey is started with hypothesis that upon the recent advancement in technology and efforts made by various public and private entities, the front end (citizen’s side) of online public service delivery under the e-governance domain is quite matured in India.

3.3 Assessment process

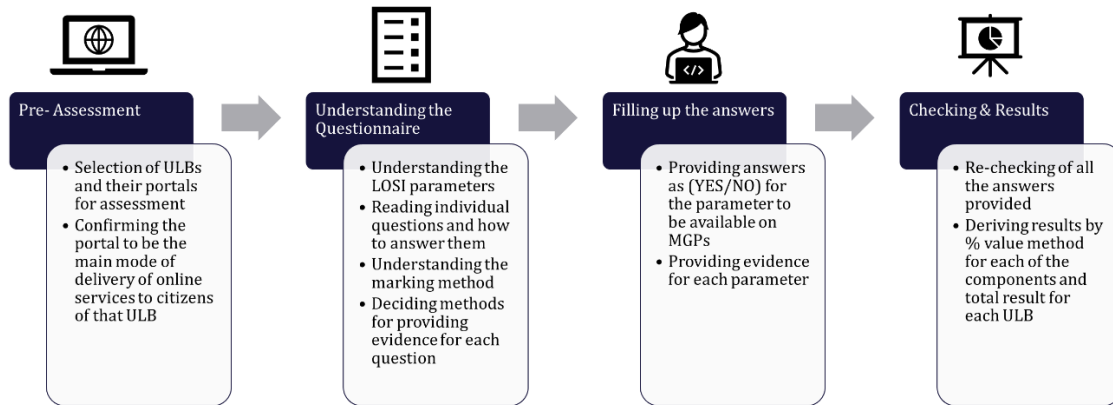


Figure 1 Assessment process for LOSI survey

The assessment process follows four steps to assess the cities and arrive at a final score to rank them on the index. These steps are as follows:

- i. **Pre-assessment:** This step deals with selection of ULBs and their municipal portals. There may be multiple portals for different services and functions in a given city, identification of the portal which caters to the ULB only and not part of a state or national scheme is crucial for this assessment.
- ii. **Understanding the questionnaire:** This step involves understanding the 87 parameters which form the questionnaire for the LOSI assessment. Question-wise understanding makes the consideration of different possible answers clearer. Moreover, every answer requires specific proof related to the presence and activeness of the feature on the MGP.
- iii. **Filling up the answers:** This step involves the actual filling of the questionnaire with provision of proof for every answer.
- iv. **Checking and results:** Re-checking of all the answers provided and derivation of results of them by percentage value method comes under this step. There can be multiple parameters from which the results can be derived. Such as, city wise results and component wise results.

3.3.1 Site selection

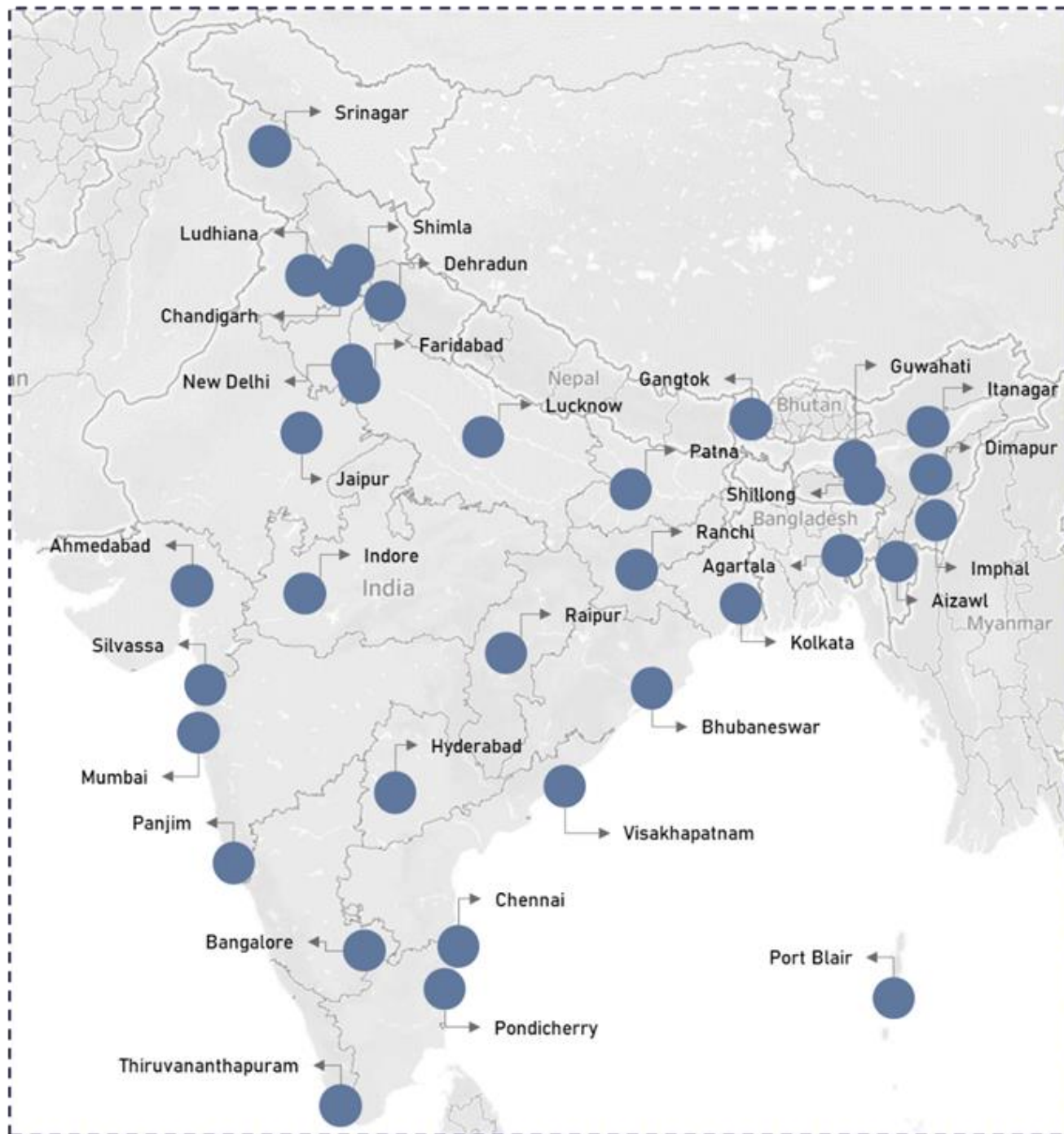


Figure 2 Selected cities for assessment

The process of site selection stands as a paramount pre-assessment procedure essential for validating derived scores based on logical and equitable principles. The chosen criteria for this study were designed to ensure a comprehensive representation of the country by selecting cities from all geographical regions. In adherence to this, one city with the highest population from each state and Union Territory was selected, thereby enhancing the population covered by the Municipal Governance Portals (MGPs) under evaluation. This encompassed cities with the highest populations across all 27 states and 9 Union Territories.

Various types of MGPs address the diverse needs of different Urban Local Bodies (ULBs), potentially hosted on national, state, or private data centers, and developed by either state government agencies or private entities. The primary requirement is that the portal should serve as the ULB's primary platform for online service delivery to its citizens. During the selection process, it was observed that two cities, namely Leh Municipality in Leh and Andrott in Lakshadweep, lacked MGPs in the list. Consequently, the final list comprised 34 cities selected from different regions of the country, featuring multiple official languages, varying population sizes, and cities designated as smart cities. The total population served by these portals constitutes approximately 17.5% of the total urban population of India. This selection approach ensures the study's diversity and fairness, aligning with the average Indian scenario. For a detailed list of cities, please consult Annexure I.

Table 3 List of selected cities for LOSI study

City	Zone	Smart City?	Consideration of E-Governance in Municipal Budget
Agartala	North-Eastern	Yes	No separate fund dedicated to e-governance initiatives
Ahmedabad	Western	Yes	Funds allocated for E-Governance initiatives
Aizawl	North-Eastern	Yes	No separate fund dedicated to e-governance initiatives
Bangalore	Southern	Yes	No separate fund dedicated to e-governance initiatives
Bhubaneswar	Eastern	Yes	No separate fund dedicated to e-governance initiatives
Chandigarh	Northern	Yes	No separate fund dedicated to e-governance initiatives
Chennai	Southern	Yes	Funds allocated for E-Governance initiatives
Dehradun	Central	Yes	Budget data not available
Dimapur	North-Eastern	No	Budget data not available
Faridabad	Northern	Yes	Budget data not available
Gangtok	North-Eastern	Yes	No separate fund dedicated to e-governance initiatives
Guwahati	North-Eastern	Yes	No separate fund dedicated to e-governance initiatives
Hyderabad	Southern	Yes	Funds allocated for E-Governance initiatives
Imphal	North-Eastern	Yes	Budget data not available
Indore	Central	Yes	Funds allocated for E-Governance initiatives
Itanagar	North-Eastern	Yes	Budget data not available
Jaipur	Northern	Yes	Funds allocated for E-Governance initiatives
Kolkata	Eastern	No	No separate fund dedicated to e-governance initiatives
Lucknow	Central	Yes	No separate fund dedicated to e-governance initiatives
Ludhiana	Northern	Yes	No separate fund dedicated to e-governance initiatives
Mumbai	Western	No	No separate fund dedicated to e-governance initiatives
New Delhi	Northern	Yes	No separate fund dedicated to e-governance initiatives
Panji	Western	Yes	No separate fund dedicated to e-governance initiatives
Patna	Eastern	Yes	No separate fund dedicated to e-governance initiatives
Pondicherry	Southern	Yes	Budget data not available
Port Blair	Southern	Yes	Budget data not available
Raipur	Central	Yes	No separate fund dedicated to e-governance initiatives
Ranchi	Eastern	Yes	No separate fund dedicated to e-governance initiatives
Shillong	North-Eastern	Yes	No separate fund dedicated to e-governance initiatives
Shimla	Northern	Yes	No separate fund dedicated to e-governance initiatives
Silvassa	Western	Yes	Budget data not available
Srinagar	Northern	Yes	Budget data not available
Thiruvananthapuram	Southern	Yes	Funds allocated for E-Governance initiatives
Visakhapatnam	Southern	Yes	No separate fund dedicated to e-governance initiatives

3.3.2 Understanding the questionnaire

Understanding the questionnaire and all of its components is crucial before beginning the assessment of the selected city MGPs. The LOSI questionnaire contains 87 parameters divided into 5 components.

i. Content Provision

Questions coming under Content Provision (CP) look at the information provided to citizens of the on the Municipal Governance Portal. For example, one of the questions asks if the information about municipality (about history, demographics, geographical region, economy, tourism) is available on MGPs?; another question inquiries about availability of health-related information on MGP. This component contains 25 parameters of the questionnaire.

ii. Technical Technology

Questions coming under Technical Technology (TEC) assesses MGP based on the technical development and features available. For example, Does the site provide advanced search options? Is MGP compliant with Web Content Accessibility Guidelines (WCAG2.0)?; and

can a person access his/her own data (that local government has on record)?, etc. This component contains 18 parameters of the questionnaire.

iii. Participation and Engagement

Questions coming under Participation & Engagement (EP) looks at the overall transparency and participatory efforts of municipality. For example, the question asking about availability of open data on the MGP; Does the municipality respond to a question sent by email / online form in less than 3 business days?; and are there any online tools available on the MGP to collect public opinion from citizens to inform policy deliberation processes?, etc. This component contains 17 parameters of the questionnaire.

iv. Institutional Framework

Questions coming under Institutional Framework (IF) focus on the policy interventions that affect the MGP and its features. For example, Is there a privacy policy or statement available on the MGP?; and Does the MGP provide information on citizens' rights to access government information? (Such as the Freedom of Information Act or Access to Information Act). This component contains 9 parameters of the questionnaire.

v. Service Provision

Questions coming under Service Provision (SP) assesses public services provided by government on MGP. For example, the questions look at the available online services related to building permits, municipal police, payment of fees and fines, etc. This component contains 18 parameters of the questionnaire.

3.3.3 Comparability of components

One of the dimensions of United Nations E-Government Survey is Online Service Index (OSI) which has five components namely institutional framework, service provision, content provision, technology, and e-participation. This can be correlated with LOSI index which comprises of the same components but at an ULB level. Given that the weightage of the components is different it cannot be directly compared but can be taken as a reference point for comparison of ULB level to National level.

3.3.4 Marking scheme

The answering method that is followed for these 87 parameters is binary. If the indicator is found in ULB's website (MGP), then the answer will be yes and the city will get 1 point and if the indicator is missing from the website, that particular question will score 0. The scoring method for the assessment is percentage value method. In which the total number of points scored by each city (a.k.a. "raw score") is divided by the maximum score of 87 to derive the LOSI value for a given city in the range of 0 to 1. There are some cases where the city portal does not provide certain services on their MGP since those services are delivered on state or national portal. In such cases, the city portals scored a point only if they provided a link to the national portal.

Table 4 Maturity level by range of score

Maturity Level	Range of score
Very High	0.75 to 1.00
High	0.50 to 0.75
Middle	0.25 to 0.50
Low	0.00 to 0.25

The final score determines the maturity level of the ULB. As indicated in the figure above, there are four maturity levels depending on the score ranging from 0 to 1. The cities can be divided into Low, Middle, High, or Very High maturity based on the results of the assessment [11].

3.4 Relevance to Indian context

The questionnaire includes parameters investigating Compliance of Municipal Governance Portal (MGP) with World Wide Web Consortium (W3C) standards under Technical Technology component which can be directly related to the guidelines published by National Informatics Center for Indian government websites. The Guidelines for Indian Government Websites (GIGW) suggests membership & participation in global consortia like W3C, and emulation of global standards like WCAG to adopt & align with the best in global standards [12].

Under the technology component, other questions inquire about Availability of helpdesk on MGP to assist citizens in availing of online services and under Engagement and Participation category, the questionnaire assesses the efforts and feature provided on MGP for enabling community participation and awareness in the ULB. These assessment parameters relate to the efforts made by NIC under Sustainable User-Centric Governance through Accessible and Managed websites (SUGAM Web). It has been developed to increase adherence with GIGW and rank of India in UN E-Gov Assessment.

Assessment of open data policy and privacy policy provision under Institutional Framework component and assessment of open data availability on MGP under Engagement and Participation component relates with similar vision and goals for Smart Cities Mission in India [13]. On smart city context, open data initiative seeks to promote better city governance, enhance transparency, analysis, planning, and reinforce citizen engagement and participation. Government of India has developed open data portal named data.gov.in for enabling such vision for the entire nation. The data is uploaded by governing bodies on public domain and can be viewed by everyone [13].

4 ASSESSMENT RESULT AND ANALYSIS

4.1 Datapoints

The datapoints captured came from multiple sources. Primary data about city demographics such as population, state, zone, designation of smart city and budget allocation for e-governance projects were collated from Census India 2011 [14] and Smart Cities database [13]. Whereas the availability of budget was checked manually from their respective Municipal Governance Portals.

The assessment results generated a database of city wise score, category wise score and parameter wise score. The city wise score consisted of final scores for each city based on all 87 parameters, the category wise score consisted of city wise LOSI score divided into 5 categories of parameters. Each individual score represented 5 components of the questionnaire. And the individual score was derived for all 87 parameters to further analyze every city for each granular detail [15].

4.2 Visualization and analysis

The amalgamation of data within the comprehensive database opens avenues for sophisticated visualization and in-depth analysis through interconnecting datasets. This visualization and analysis encompass a multifaceted approach, incorporating several techniques for deriving meaningful insights. One noteworthy aspect involves the creation of thematic maps, facilitating the identification of Urban Local Bodies (ULBs) sharing analogous characteristics based on their geographical location. These maps serve as powerful tools for spatial analysis, aiding in the discernment of patterns and trends across regions.

Bar charts play a pivotal role in the comparative assessment of scores across various parameters. They provide a visually intuitive representation, enabling stakeholders to grasp the relative performance of ULBs on different criteria at a glance. This method proves particularly effective in highlighting disparities and trends that may influence decision-making processes. For a nuanced understanding of data distribution, the utilization of box plots becomes instrumental. These plots offer insights into the central tendency, dispersion, and the presence of outliers within the dataset. Positive or negative outliers identified through box plots serve as focal points for detailed scrutiny, allowing for a deeper exploration of exceptional cases. Radar charts contribute to city-wise analysis and facilitate the comparison of multiple cities across different criteria. This graphical representation allows for the simultaneous examination of various performance indicators, providing a holistic view of each city's strengths and weaknesses. In summary, the potential for visualization and analysis within the combined database is extensive, leveraging diverse techniques such as thematic maps, bar charts, box plots, and radar charts. These methodologies collectively empower decision-makers and analysts to extract nuanced insights, fostering a comprehensive understanding of the data at hand.

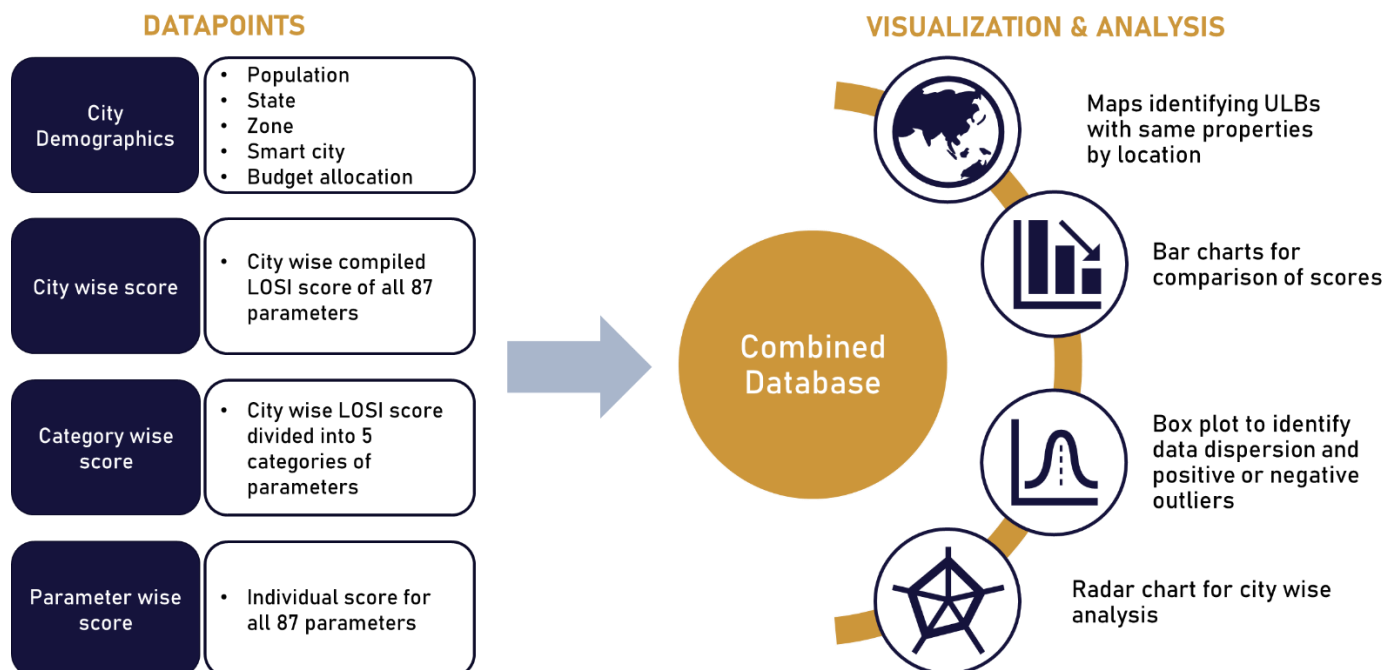


Figure 3 Analysis Process

4.2.1 Demographics

- City Population

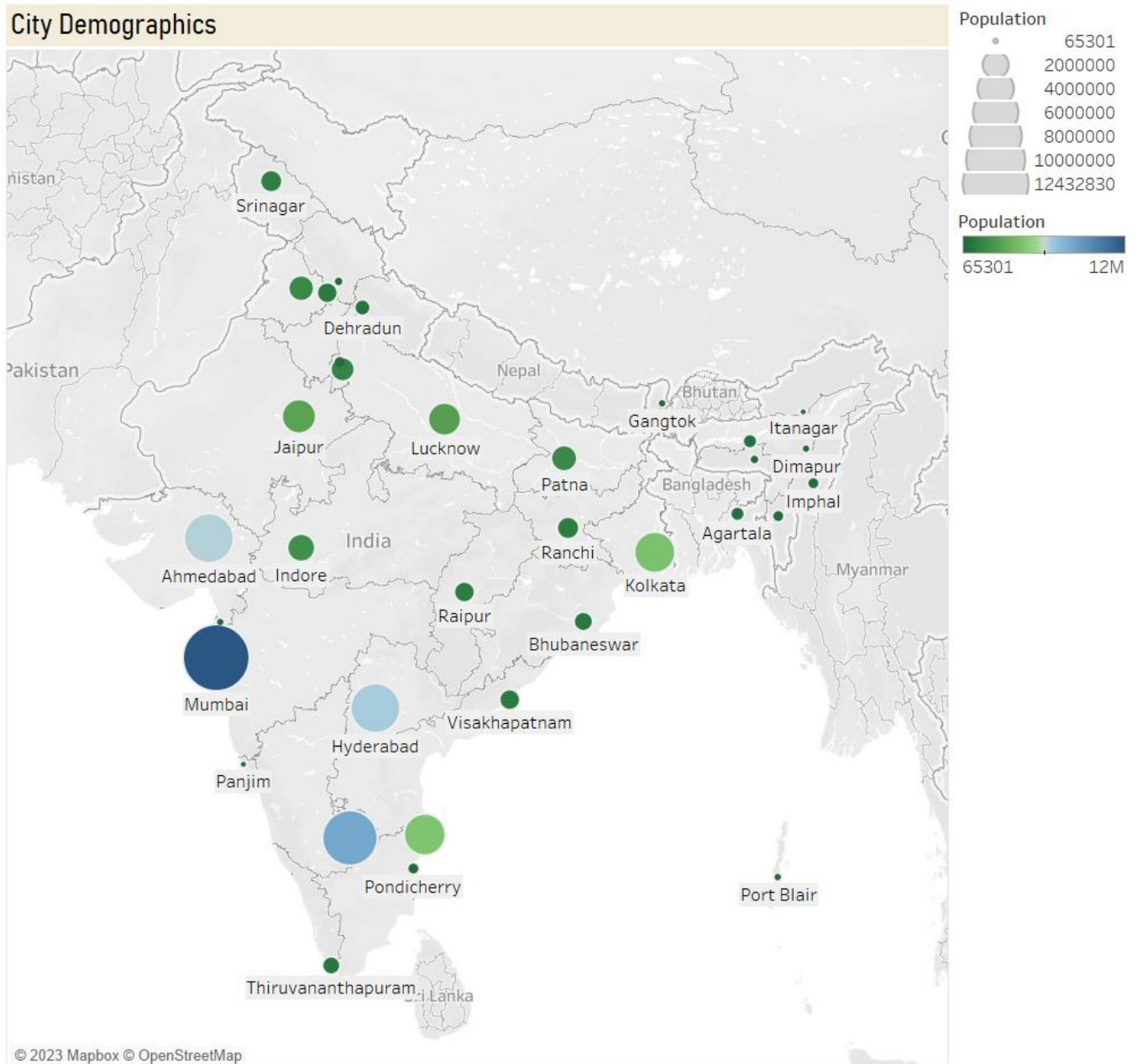


Figure 4 City Population

Within the dataset, there exists a notable range in the population sizes of the cities under consideration. At one end of this spectrum is Itanagar, standing as the smallest city in terms of population, with a modest count of 65,301 residents. This demographic characteristic makes Itanagar a unique case within the urban landscape, reflecting a more compact and localized community.

Conversely, at the other end of the population spectrum, it is Mumbai, a city that stands out for its sheer magnitude. Mumbai is identified as the largest city within the dataset, boasting a substantial population of 12,432,830 individuals. This sizable population underscores the metropolis's status as a major urban center, characterized by its diverse and dynamic demographic composition.

The contrast between Itanagar and Mumbai in terms of population size is indicative of the diverse urban fabric captured in the dataset. It highlights the spectrum of urban environments, ranging from smaller, tightly knit communities to sprawling metropolises with substantial and varied populations. This diversity in population sizes among cities is integral to understanding the multifaceted nature of urban demographics and the varied challenges and opportunities that cities of different sizes may face.

- Cities by population group

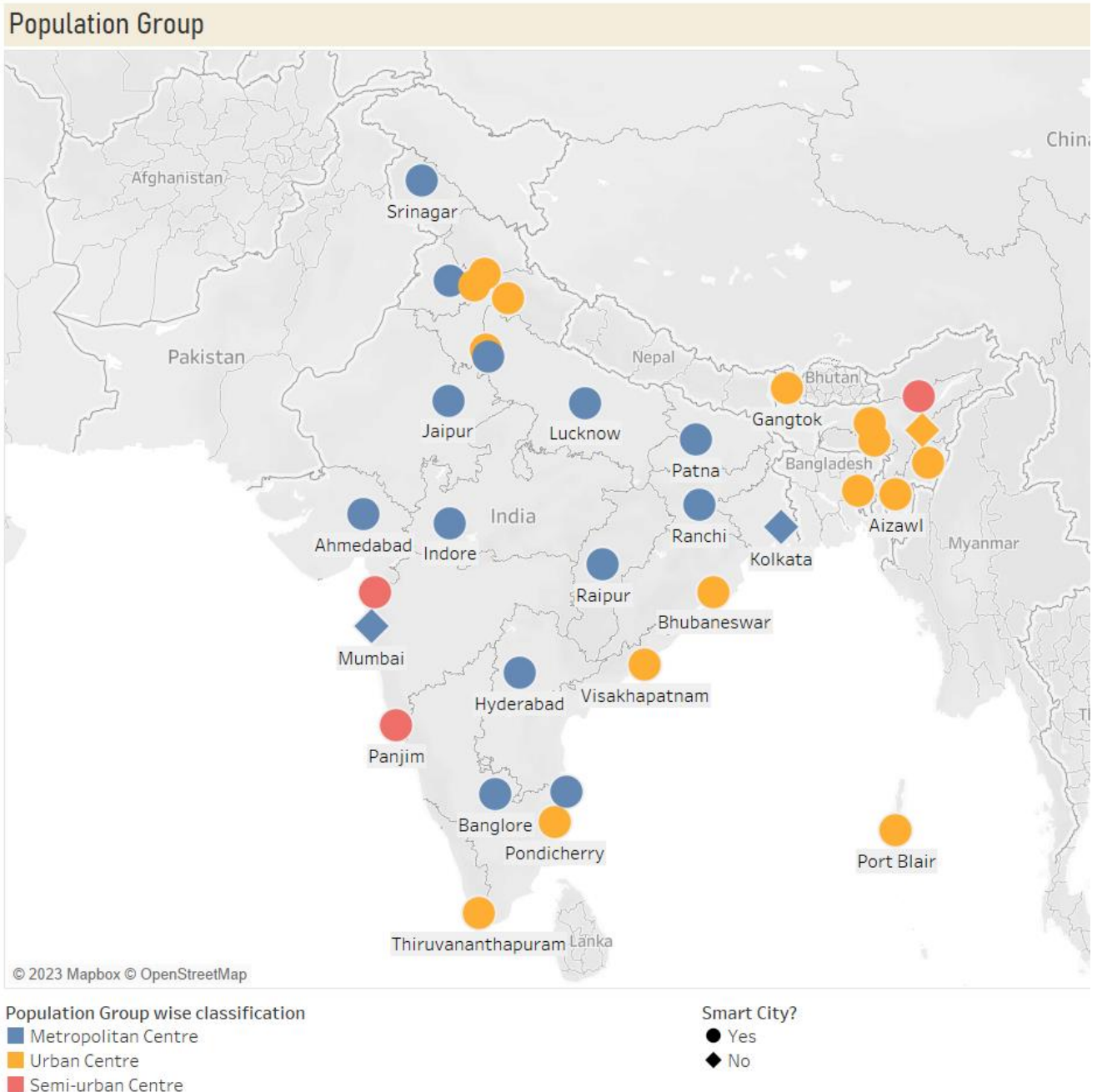


Figure 5 Population Group

The research encompasses a comprehensive analysis of urban landscapes, incorporating a diversified set of urban centers that collectively contribute to the overall understanding of the studied parameters. Specifically, the study incorporates 15 Metropolitan Centers, each representing a significant hub of economic, cultural, and administrative activities on a large scale. These Metropolitan Centers, characterized by their extensive infrastructure, substantial population, and economic significance, play a crucial role in shaping regional and national dynamics.

Furthermore, the research extends its scope to 16 Urban Centers, which, while not reaching the scale of the Metropolitan counterparts, remain pivotal in their contributions to urbanization. These Urban Centers exhibit notable characteristics of urban living, featuring a mix of residential, commercial, and industrial zones that collectively form vibrant urban communities.

In addition to the Metropolitan and Urban Centers, the study also includes an examination of 3 Semi-urban Centers. These centers represent a distinctive category, embodying elements of both urban and rural characteristics. Semi-urban Centers often serve as transitional zones where urbanization interfaces with rural landscapes, reflecting unique socio-economic dynamics and developmental patterns.

By encompassing Metropolitan, Urban, and Semi-urban Centers, the study embraces a holistic perspective on e-governance and dynamics in different scale of the cities. This approach ensures a nuanced understanding of the varying degrees of urbanization, from the bustling metropolises to the more intermediate and evolving urban and semi-urban environments. Such inclusivity in the study's scope enhances the depth and richness of the analysis, capturing the diversity in the urban fabric and contributing valuable insights to the broader discourse on urban e-governance.

- Budget Consideration for e-governance initiatives in the selected ULBs

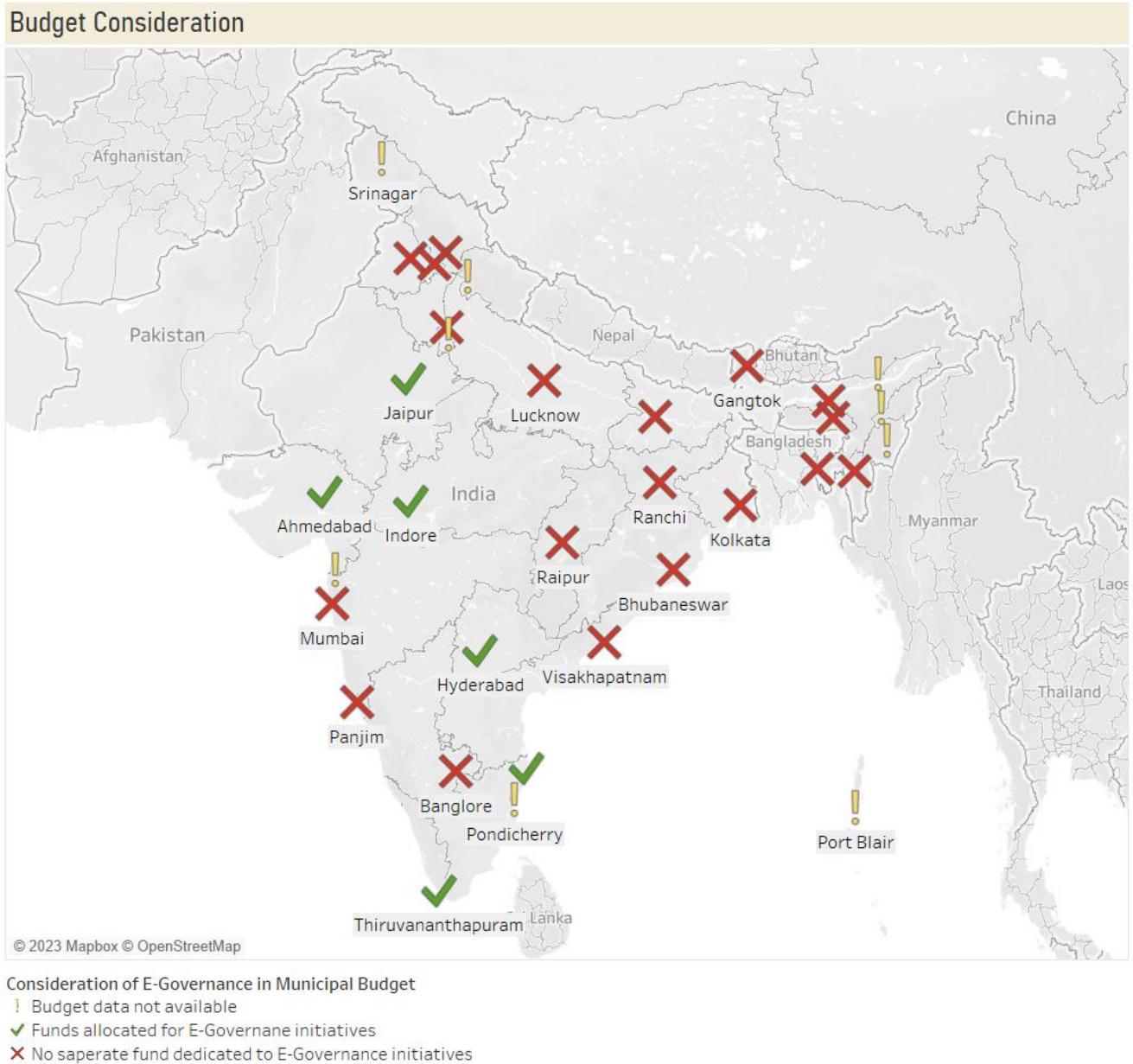


Figure 6 Budget Consideration

Only Within the dataset of 34 cities under scrutiny, a noteworthy observation emerges: a mere 6 cities have distinct financial allocations earmarked for E-Governance initiatives within their municipal budgets. These forward-thinking cities are identified as Ahmedabad, Chennai, Hyderabad, Indore, Jaipur, and Thiruvananthapuram. This distinctive approach of allocating separate funds expressly for E-Governance initiatives speaks to a strategic commitment to leveraging technology for enhanced civic administration.

The significance of this financial allocation becomes particularly evident when considering the development of city portals. The allocation of dedicated funds serves as a critical driver, fostering the integration of a multitude of features within Municipal Governance Portals (MGPs). These features and interventions, when effectively publicized, enhance the overall functionality and accessibility of the portal. A well-funded approach ensures that the Urban Local Body (ULB) administration works efficiently at the backend, effectively implementing technological advancements to streamline public services.

To ascertain the impact of this financial commitment on overall city performance, a detailed analysis is conducted. The study delves into the cities and their respective scores, focusing specifically on the correlation between the allocation of funds for E-Governance initiatives and the Local Online Service Index (LOSI) score. This correlation analysis serves as a valuable metric to gauge the effectiveness of financial investments in E-Governance in influencing the overall performance and service delivery capabilities of these cities.

In essence, the research examines the strategic financial decisions made by these six cities, emphasizing the importance of dedicated funds for E-Governance in shaping the trajectory of urban development. The correlation analysis aims to uncover insights into the potential impact of such financial allocations on the overall quality and efficiency of public services, providing valuable benchmarks for future urban governance strategies.

4.2.2 City wise LOSI score

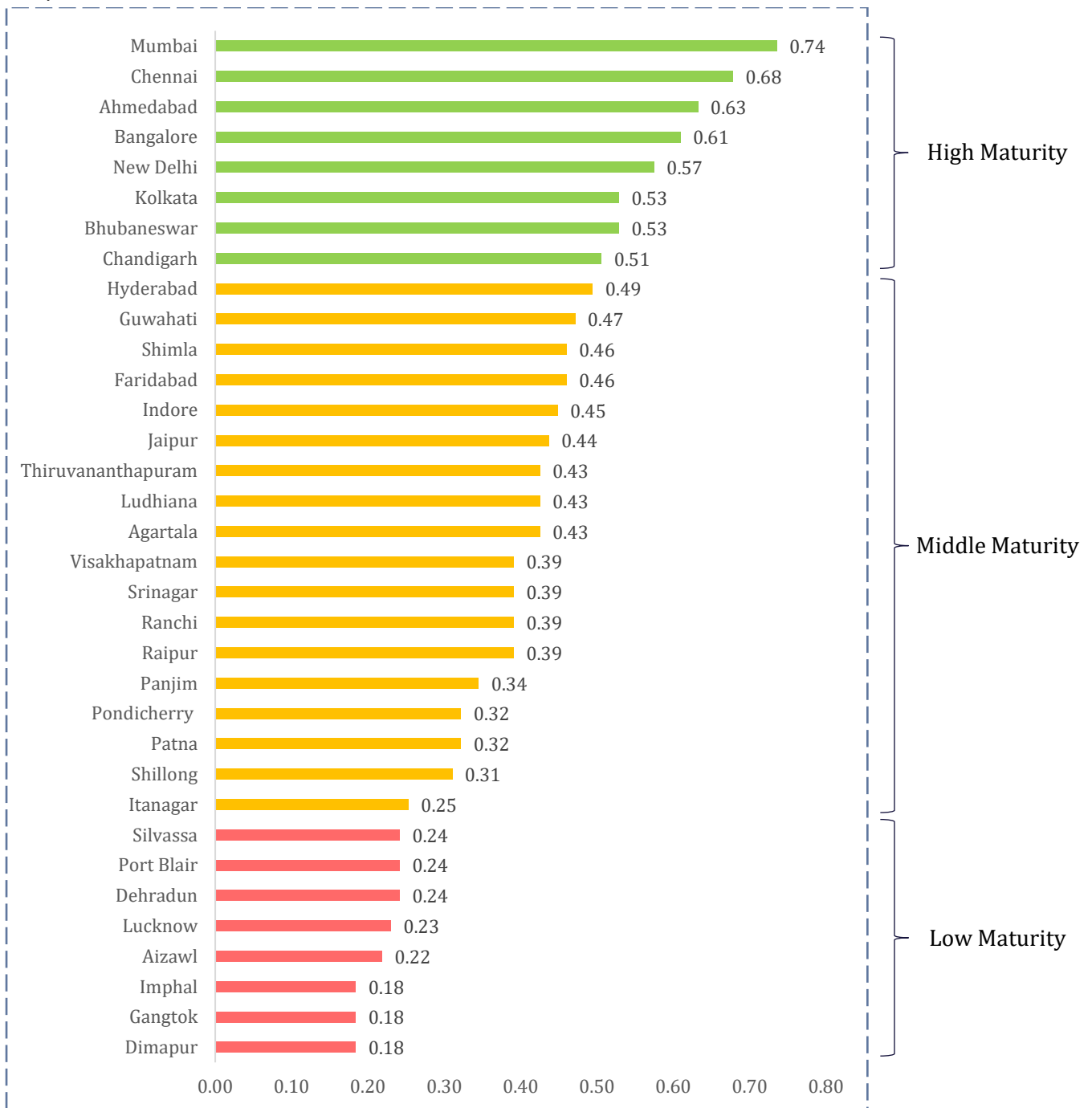


Figure 7 City wise LOSI Rankings

The assessment of cities within the dataset reveals a diverse distribution in terms of maturity levels across various parameters. A nuanced categorization showcases the following breakdown: eight cities emerge in the High maturity category, displaying a commendable score range of 0.50 to 0.75. These cities distinguish themselves by exhibiting a higher degree of sophistication and effectiveness in the evaluated dimensions. Moving beyond, a substantial portion of the cities, precisely eighteen, falls within the Middle maturity level, characterized by scores ranging from 0.25 to 0.50. These cities embody a balanced performance, showcasing a moderate level of maturity across the assessed criteria. Their positioning suggests a commendable, yet evolving, state of governance and service delivery. On the lower end of the spectrum, eight cities are situated in the Low maturity level, reflecting scores ranging from 0.00 to 0.25. These cities face challenges in achieving a higher level of maturity, indicating areas where improvements or interventions may be necessary to enhance their overall performance.

It is noteworthy that, in the current dataset, there is an absence of cities classified under the Very High maturity level, which encompasses scores exceeding 0.75. This absence underscores the scope for further advancement and refinement across cities, as none have yet attained the highest level of maturity in the assessed criteria.

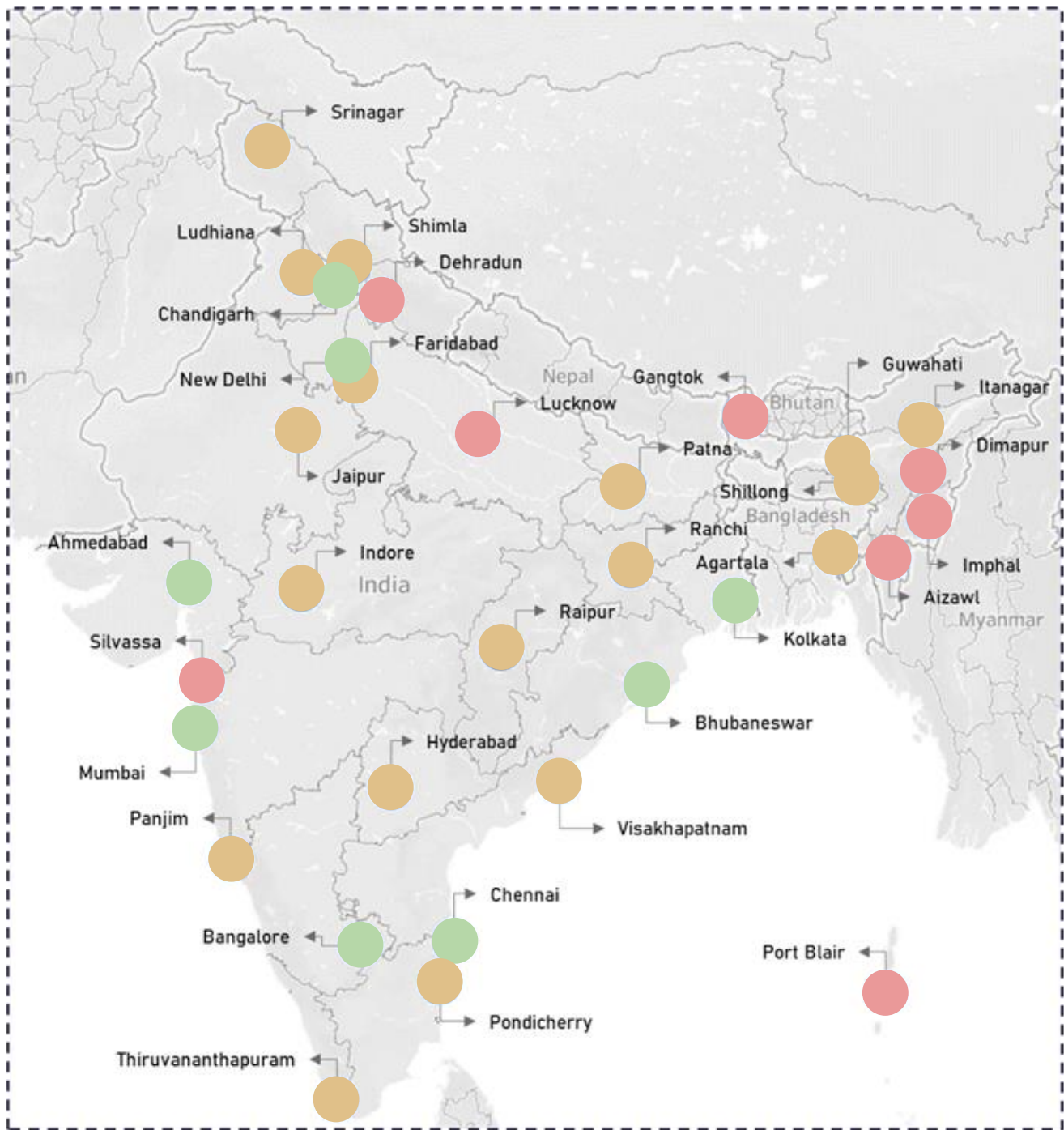


Figure 8 Spatial distribution of ULB wise LOSI Score

The spatial distribution of the final Level of Service Index (LOSI) Scores provides a valuable geographical perspective, revealing distinct patterns across the country. Notably, the northeastern region emerges with a prevalence of cities demonstrating low and middle levels of maturity. This observation points towards specific regional dynamics influencing the assessed criteria, prompting a deeper exploration into the factors contributing to this particular geographical trend.

Further examination of the semi-urban centers sheds light on an interesting correlation between population size and LOSI scores. It becomes evident that Urban Local Bodies (ULBs) with comparatively smaller populations tend to score lower in the LOSI assessment. This correlation suggests a potential connection between the scale of urban centers and their maturity levels, with smaller populations posing unique challenges in achieving higher levels of service delivery and governance maturity. However, within this context, an intriguing outlier is observed in the metropolitan center of Lucknow. Despite boasting a substantial population, Lucknow stands out as a city with low maturity, presenting a distinctive case that warrants in-depth analysis. Understanding the specific challenges faced by Lucknow in relation to its population size can provide valuable insights into the factors influencing urban maturity in this metropolitan center.

On a positive note, the cities that have allocated a dedicated portion of their annual budget for e-governance initiatives exhibit a noteworthy trend. All such cities, without exception, have secured scores falling within the middle or high categories of maturity. This underscores the positive impact of financial commitments to e-governance, suggesting that strategic investments in technological advancements contribute significantly to the overall maturity levels of cities.

4.2.3 Category wise box plot

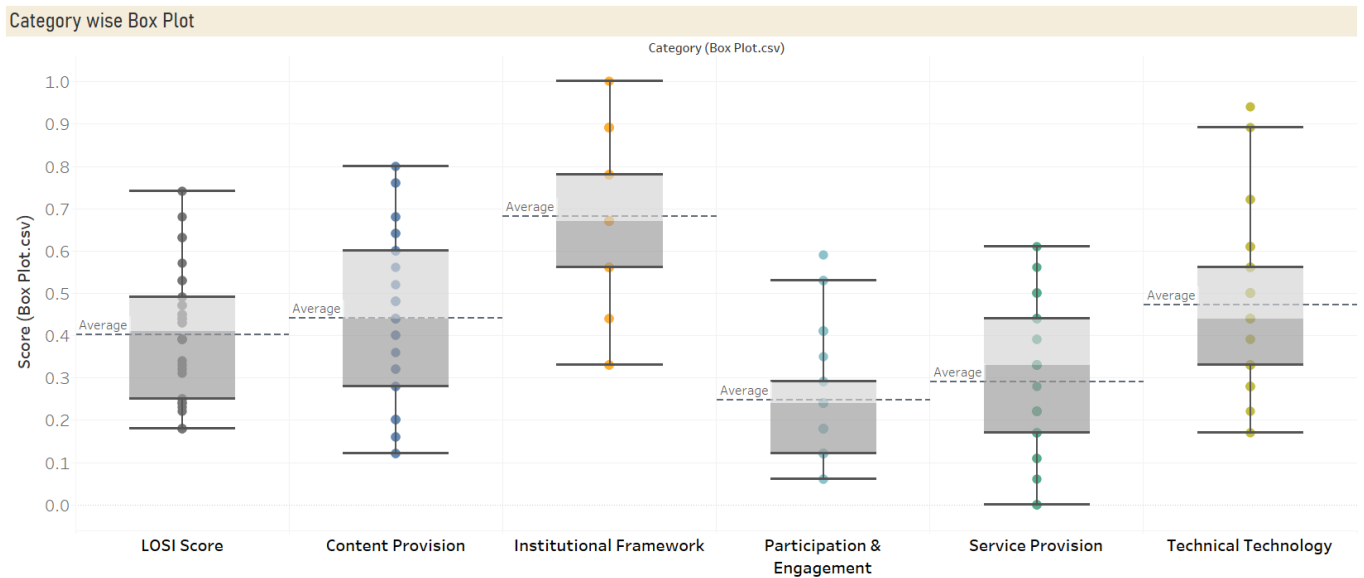


Figure 9 Category wise data spread

i. LOSI score

Maximum number of cities falls under 0.25 to 0.49 which is Middle category, and the average is 0.40 which represents the average score for all these 34 selected cities. The city-wise score ranges between 0.18 to 0.74.

ii. Content Provision

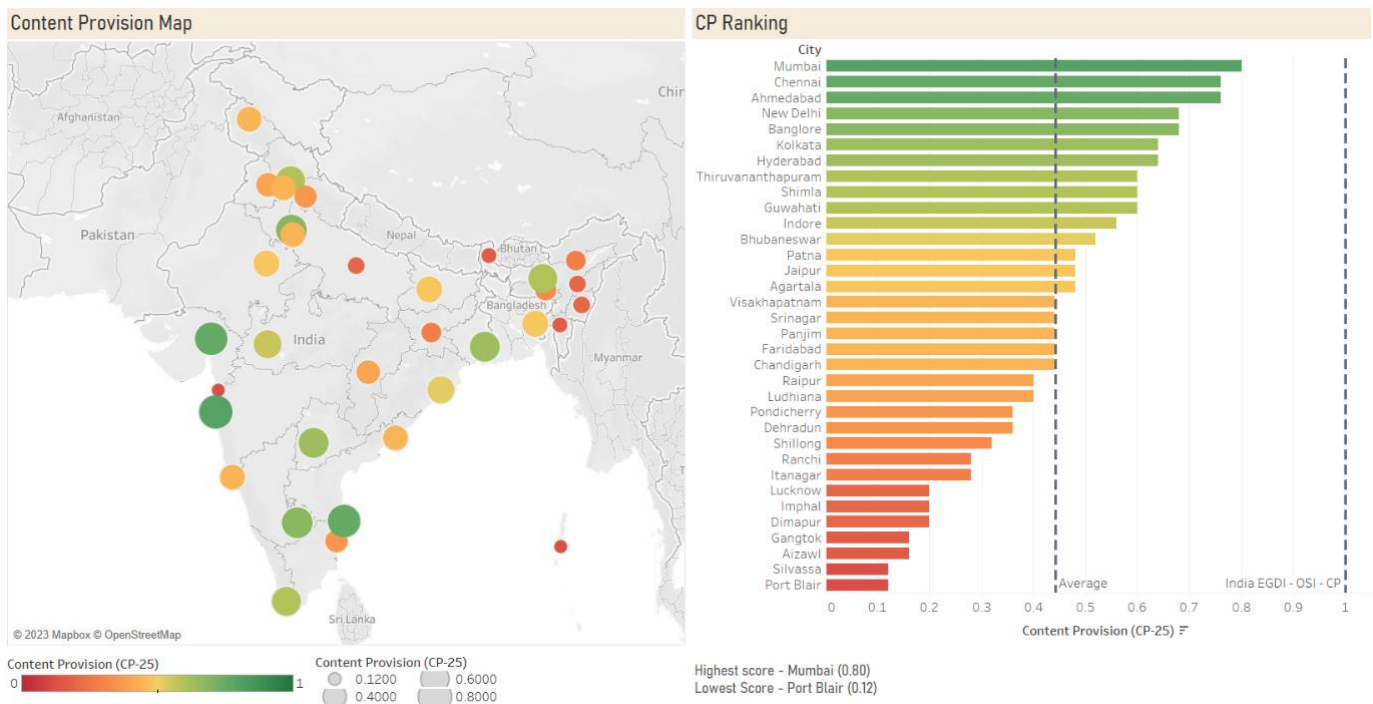


Figure 10 Content Provision Map and Ranking

Overall, an average scoring category for Indian ULBs. The spread of the scores is the highest ranging between 0.28 to 0.60. This means that there is a vast difference between different cities and their scores inferring to different amount of content provision on their MGP.

Mumbai is leading in content provision with 80% of parameters achieved whereas Port Blair and Silvassa are the cities with least score adhering to only 12% of total parameters. The average score for the category comprising of all 34 cities is 0.44. Compared to India EGDI - OSI - CP score, which is 1 [11], no city is scoring as par as that with Mumbai being the closest with 0.80.

iii. Institutional Framework

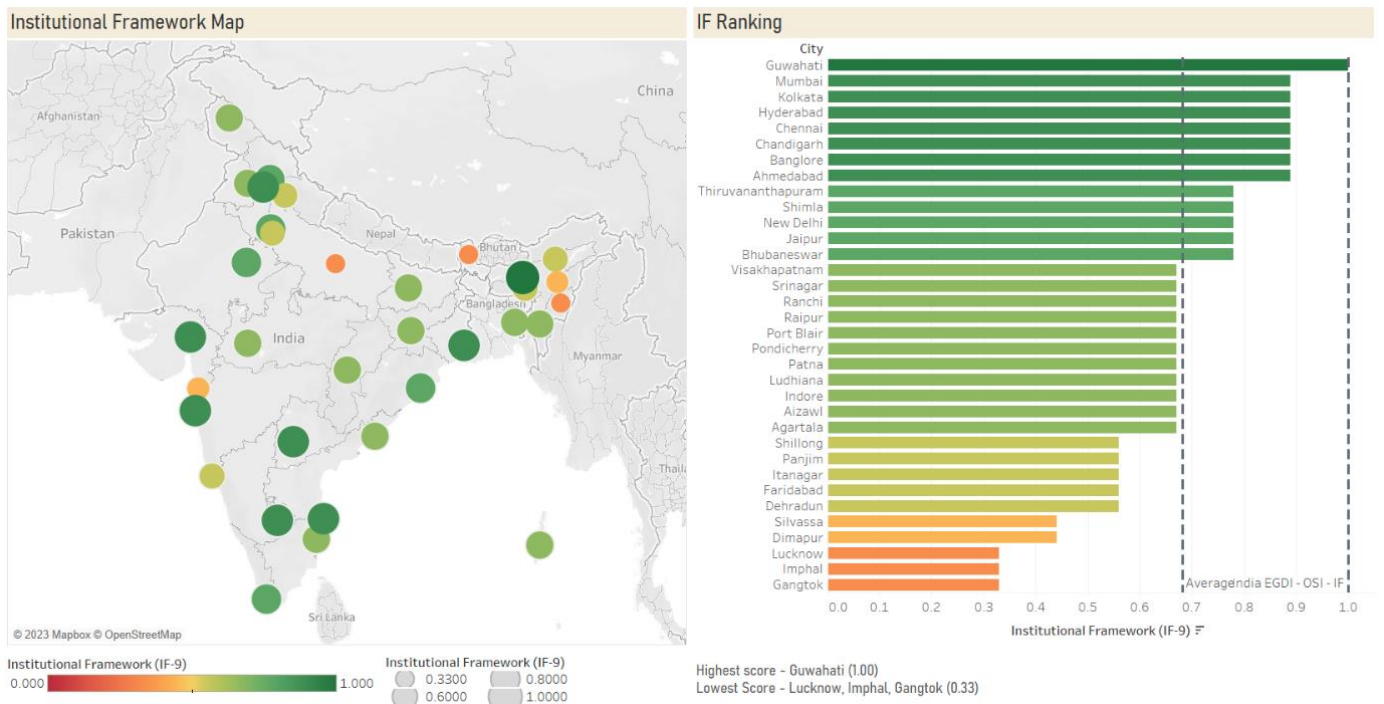


Figure 11 Institutional Framework Map and Ranking

Highest scoring category for Indian ULBs with most of the cities above 0.5. Guwahati scored 1 in Institutional Framework.

Institutional framework is the only category where a city has scored full one. The city of Guwahati adheres to all the parameters under this component. It is on par with India's EGD – OSI – IF. This is the category with the highest average score of 0.68 across all thirty-four cities. The lowest scoring cities in this category are Gangtok, Imphal and Lucknow all with adherence to 33% of all the criteria.

iv. Participation and Engagement

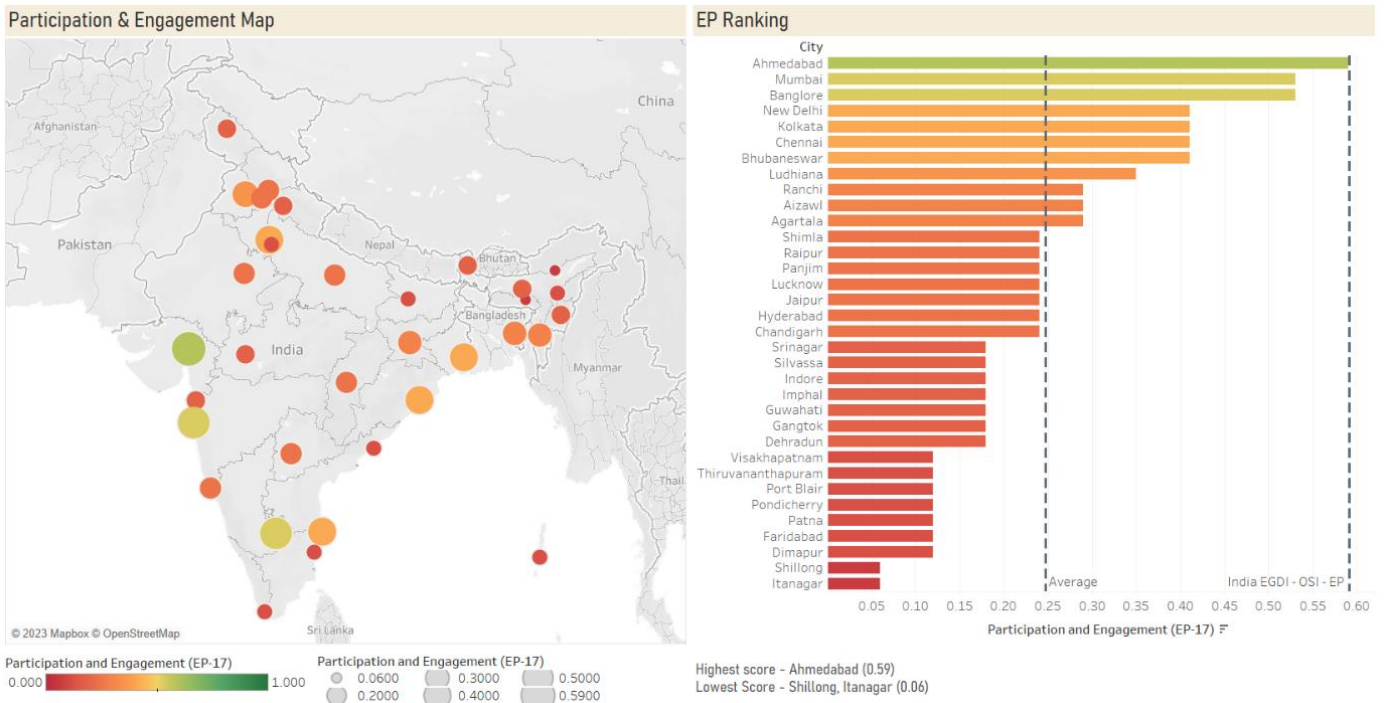


Figure 12 Participation & Engagement Map and Ranking

Lowest overall score & lowest median scores ranging between 0.2 to 0.3. Ahmedabad is the positive outlier scoring 0.59. Which can be inferred as Ahmedabad having better initiatives and provisions for citizen participation and maintaining transparency in governance.

Ahmedabad is excelling in this category even though on average this is the lowest scoring category amongst all five. Ahmedabad is scoring almost on par with India EGD – OSI – EP with adherence to 59% of the given parameters. While the average score comprising of all thirty-four cities is 0.25. The lowest scoring cities in this category are Itanagar and Shillong with score of 0.06.

v. Service Provision

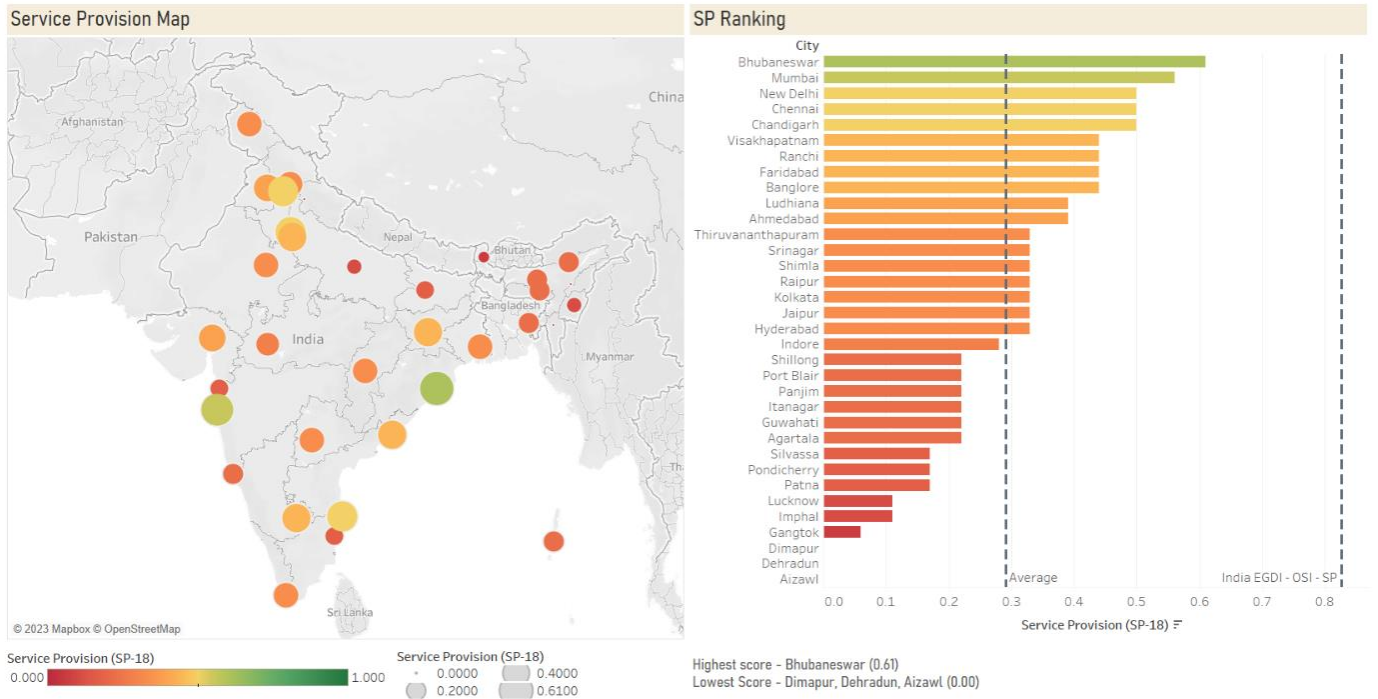


Figure 13 Service Provision Map and Ranking

Category which has lowest absolute scores for 3 cities. Dimapur, Dehradun and Aizawl scored 0 in Service Provision pulling the overall spread of score down.

Service provision component has the lowest absolute scores for three cities Dimapur, Dehradun and Aizawl which do not adhere to any criteria in this category and score zero. Bhubaneswar is the highest scoring city with adherence to 61% of the criteria. The India EGD - OSI - SP is far ahead with 0.82. Whereas the average of all thirty-four cities is 0.29.

vi. Technical Technology

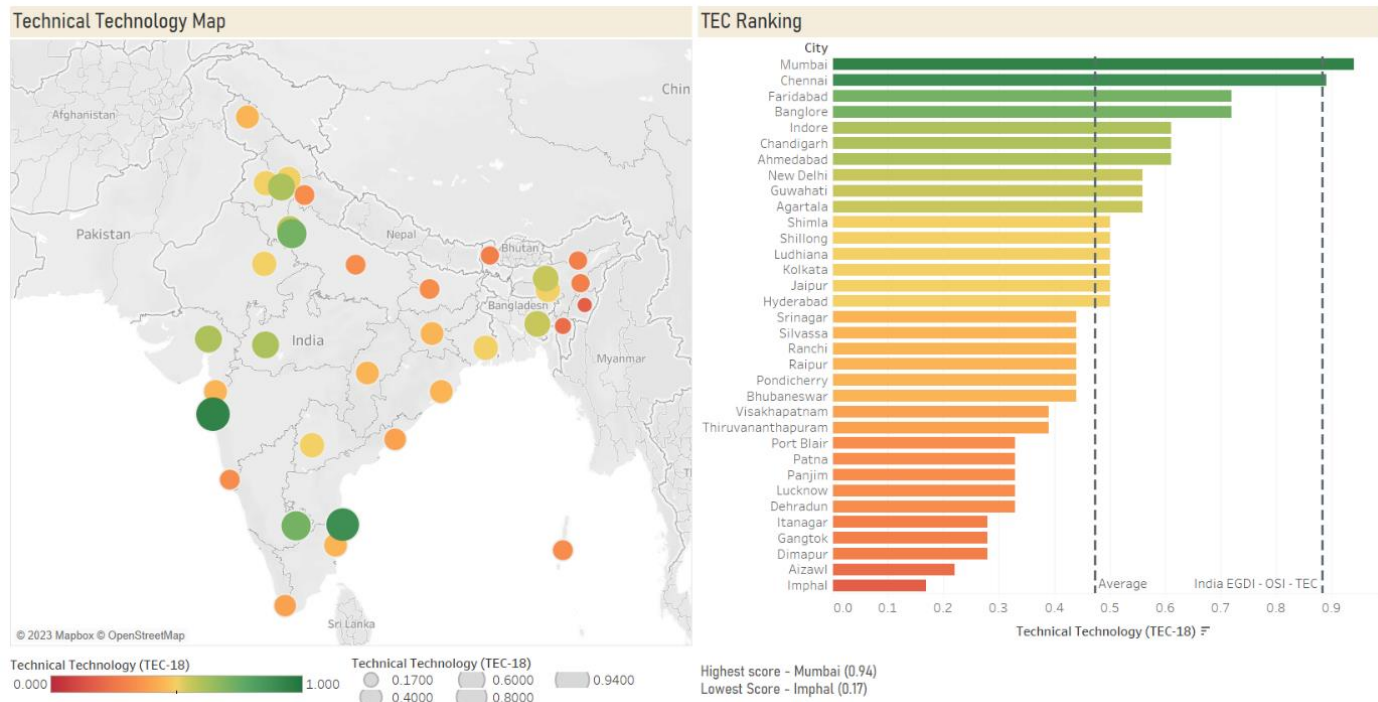


Figure 14 Technical Technology Map and Ranking

Almost similar spread across middle and high range of score. Mumbai is the positive outlier, scoring 0.94 in this category which is exceptional that other cities.

Technical technology is the only category among five that has cities scoring more that the India EGD - OSI - TEC. Where Mumbai and Chennai are scoring slightly more that the India EGD score in the relevant component. While Mumbai is the best scoring city out of thirty-

four with 0.94 score, Chennai is scoring 0.89 and both are ahead of India's EGDI – OSI – TEC of 0.88. The average of this entire category is 0.47 and the lowest scoring city is Imphal with the score of 0.17.

4.3 Achieved parameters

Some of the parameters out of all eighty-seven had all or most of the city's compliance. Which pointed out the areas in which Indian cities are excelling at.

- Ninety one percent of the selected ULBs publish information about the services provided by the municipality on the MGP.
- Ninety seven percent of the MGPs have contact us feature on their webpage providing information about how to contact the administration and different departments of the municipality
- Eighty five percent of the municipalities announce the upcoming bidding or procurement process beforehand for the applicants.
- Eighty two percent of the selected MGPs provide information about the municipality such as history of the town, demographics, geographics, economy and tourism.
- Seventy six percent of the MGPs have the municipality's social networking presence informed and lined on the site
- All the selected MGPs are compatible with the top three browsers used in India and they are designed to work in laptop, and mobile devices
- Eighty five percent of the MGPs have provision of Login IDs to avail services

4.4 Missing parameters

Some of the parameters out of all eighty-seven had very few or no city compliance. Which pointed out the areas which required most improvement amongst all.

- Only two out of all thirty-four cities provide open data on the MGP while some of the cities have provided the national open data portal link on the MGP.
- None of the Municipal Governance Portals are compliant with Web Content Accessibility Guidelines (WCAG2.0)
- Only one out of thirty-four cities have provision of notifying government about changing address online
- Only one of the MGPs have provision of the service related with applying residence permit online
- Only one of the MGPs have provision of applying driving license online
- None of the Municipal Governance Portals provide information about 'Road Safety'
- There is no category of complaint for users to report any form of discrimination under public grievance.

4.5 Key inferences

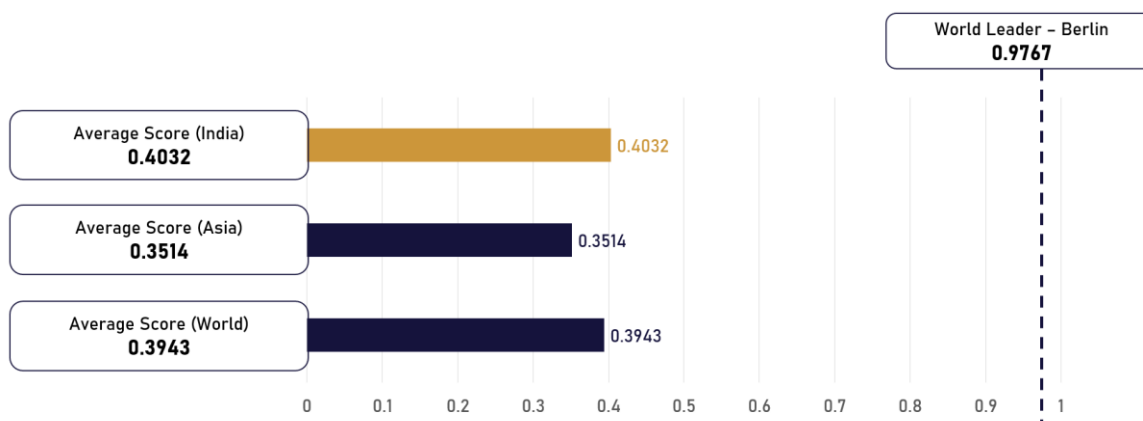


Figure 15 Score comparison

According to the survey, India is scoring higher than Region and World average as shown in figure 5 which indicates that average Indian city is ahead than average of Asia and world. Berlin is the world leader in terms of published LOSI score which is 0.97. Mumbai the highest scoring city in India is at 0.74.

Some of the key inference suggested that all the cities with a separate fund allocated to E-Governance in municipal budget are in High or Middle categories which can be related to better efforts and resources allocated to e-governance initiatives from ULB administration. Apart from Lucknow, all the metropolitan centers have scored in High or Middle category. This can be because of overall size of ULB's economy and own funds being more than that of urban and semi-urban centers. It has been noticed that being a smart city does not affect the LOSI score of the ULB as apart from 3 non-smart cities, all the cities assessed were smart cities which scored in the range of all low, middle, and high level of maturity. It has been noticed that the ULBs in North-Eastern zone have the lowest average score.

5 PARAMETER ANALYSIS OF THE QUESTIONNAIRE

In the comprehensive evaluation of thirty-four Indian cities through the Level of Service Index (LOSI) questionnaire, instances arose where certain Municipal Governance Portals (MGPs) did not adhere to specific parameters. This deviation was attributed to the nature of the functions not being obligatory for Urban Local Bodies (ULBs) within the framework of the Indian governance system. This raised a requirement of studying the LOSI questionnaire by each parameter and related functions in accordance with the Indian governance system.

Out of all eighty-seven parameters, four parameters come under national subjects which are residency permits for tourists or visitors of the country [16], registration of vehicles like car, truck, and motorcycle online [17], filing of business tax for companies [18] and provision of online platforms for road safety. Seven parameters come under state subjects. Some of them include provision of information about educational matters, social welfare matters, labor matters and vacancy positions online. Provision of open data policy is encouraged for all smart cities of India under digital India program but as the current scenario goes, it is being developed and published as a state subject [19]. Application for drivers' license is also a state subject. For e-procurement related to government projects is done on the state procurement portals. Certain functions, typically managed by parastatals or private entities, such as electricity or gas services, fall outside the purview of MGPs, with payment transactions for these utilities being handled directly by the respective suppliers. Furthermore, specific parameters are designated under district subjects, encompassing the provision of information about justice matters, enabling users to submit declarations to municipal police online, and facilitating user participation in the revision process of land management and the conversion of areas for different purposes.

This nuanced examination underscores the intricacies and variations in the alignment of parameters with the jurisdictional responsibilities of different levels of governance in India. It underscores the need for a meticulous understanding of the regulatory framework to effectively gauge the performance and compliance of MGPs across diverse parameters.

Table 5 Parameter analysis of the questionnaire

Subject	Parameters
National	4
State	7
Parastatal	1
District	3
Urban Local Body	72

This observation results in a new questionnaire with seventy-two questions under ULB subject. Upon re-calculating the scores for all the selected ULBs after eliminating questions which do not fall under ULB subject, the average score came out to be 0.45 which is 0.05 more than the old average of 0.40. This indicated that customizing the questionnaire according to the country which is being assessed can increase the relevance of the index with the local governance system and in result provide more cred it to the efforts being done where they are required in the space of local online service delivery.

6 GOOD PRACTICES

The cities which scored in between 0.5 and 0.75 and placed in High maturity level have many features in place on their MGPs which adheres to the parameters under LOSI assessment. Some of the key highlights of their features can be considered as good practices and can be taken into consideration for other cities as well to improve their MGP.

6.1 Mumbai

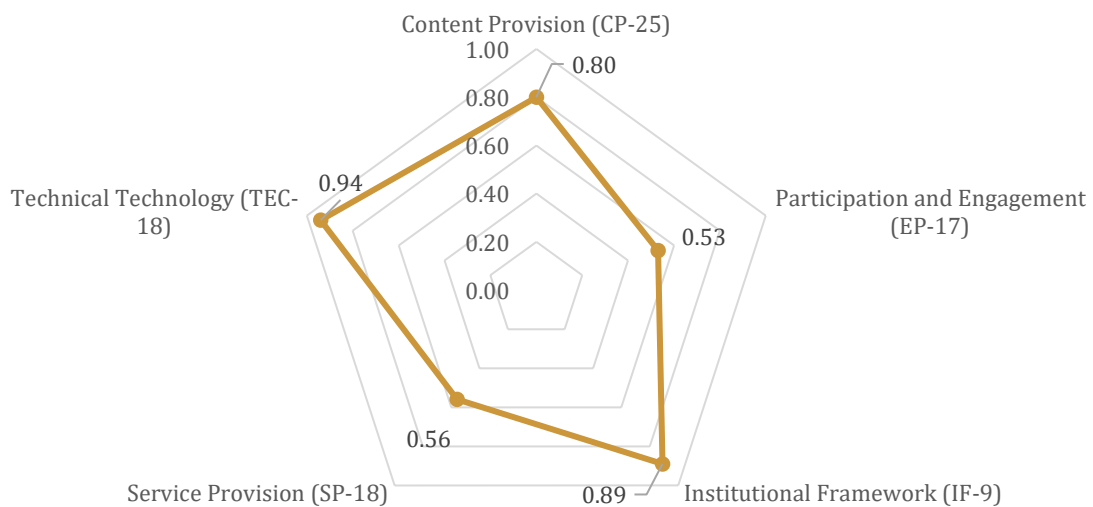


Figure 16 Mumbai city score analysis

- Highest scoring ULB in India with a score of 0.74
- Highest scoring ULB in Western zone
- Leader in Content Provision with 80% of the parameters achieved
- Leader in Technical Technology with 94% of the parameters achieved
- Only city with published outcomes of e-participation activities on MGP
- Only city with information about participatory budgeting published on MGP (Brihanmumbai Municipal Corporation, 2023)

6.2 Chennai

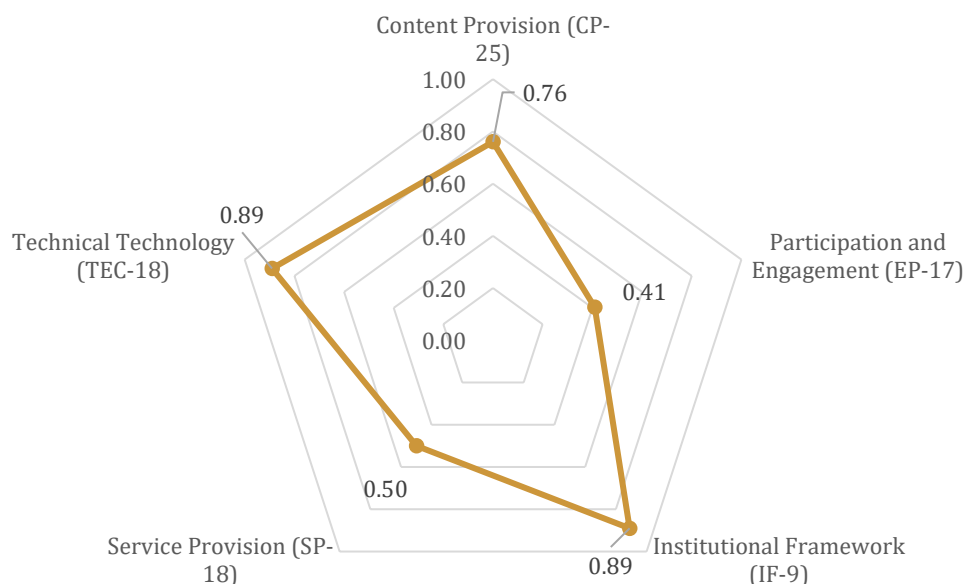


Figure 17 Chennai city score analysis

- Highest scoring ULB in Southern zone with a score of 0.68
- Second in Content Provision adhering to 76% of parameters
- Second in Technical Technology adhering to 89% of parameters
- One of the 6 cities with separate fund allocated to e-governance initiatives in its municipal budget

- One of the 2 cities with provision of information about justice matters on MGP
- Only city to have Blockchain policy published on MGP (Commissionerate of e-Governance, Tamil Nadu e-Governance Agency, 2020)

6.3 Bangalore

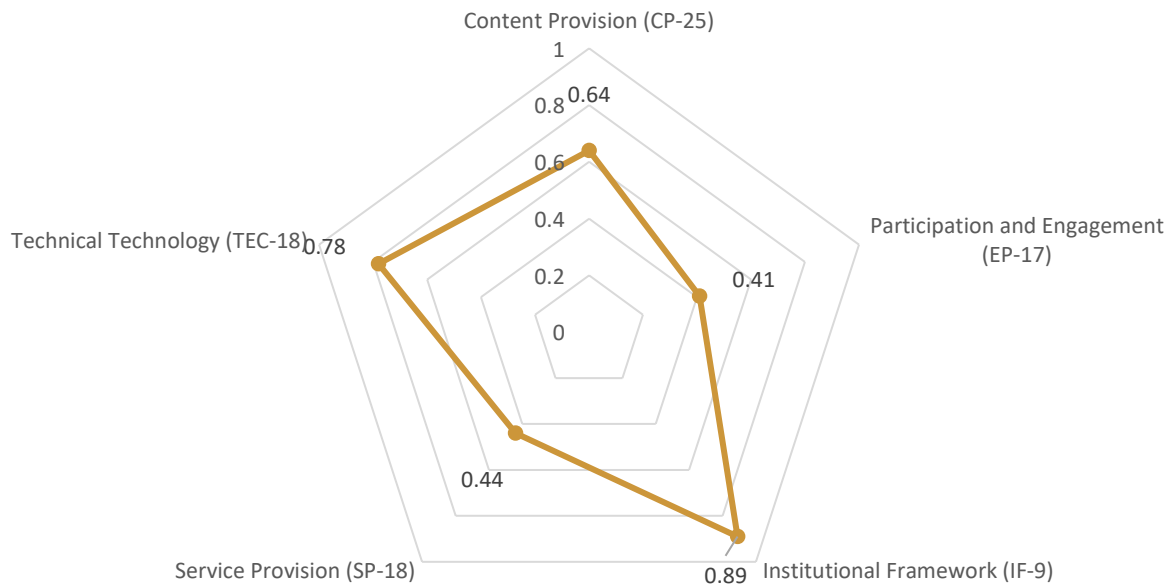


Figure 18 Bangalore city score analysis

- Bangalore scored 0.61 making it third ranking city in the list
- One of the 2 ULBs complying with markup validity standards by W3C
- Second in Institutional Framework with 89% of the parameters achieved
- One of the 3 ULBs where citizens can make declarations to municipal police online

6.4 Ahmedabad

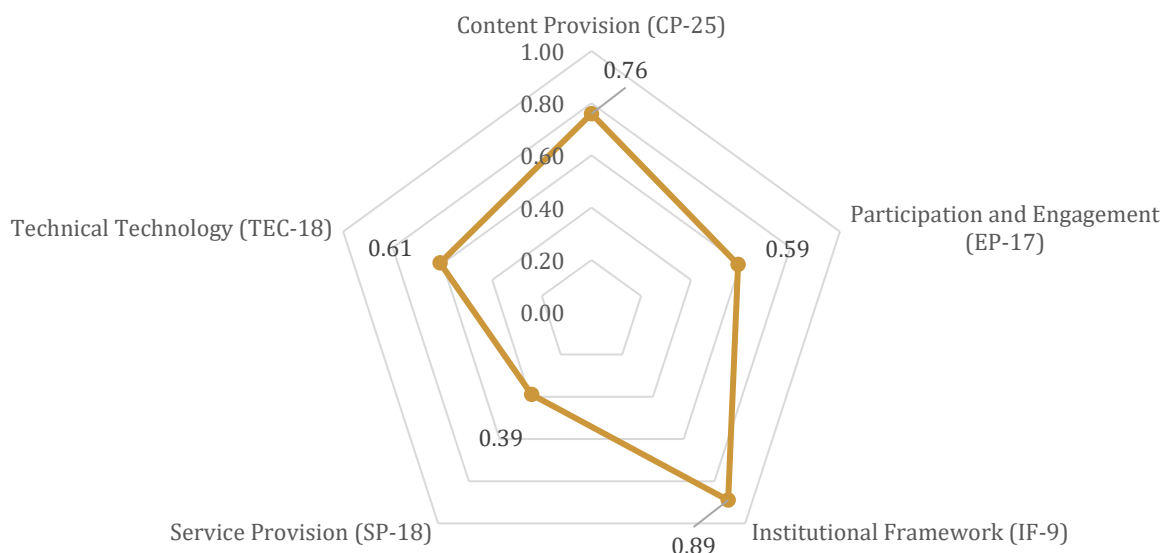


Figure 19 Ahmedabad city score analysis

- Ahmedabad scored 0.63 in the LOSI assessment
- Highest scoring city in Engagement and Participation category with 59% of the parameters achieved
- One of the 6 cities with separate fund allocated to e-governance initiatives in its municipal budget
- Second in Content Provision category with 76% of parameters achieved
- One of the 2 cities with active e-mail ID for any citizen to inquire about information

6.5 New Delhi

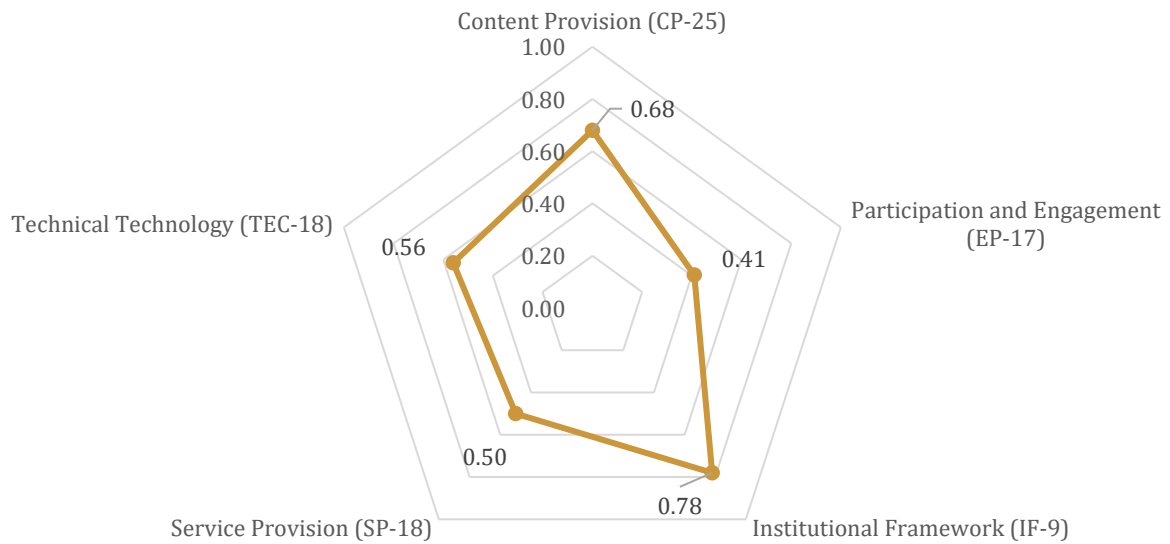


Figure 20 New Delhi city score analysis

- New Delhi scored 0.57 in LOSI assessment
- One of 3 cities which enables users to pay online for electricity/gas bills

6.6 Kolkata

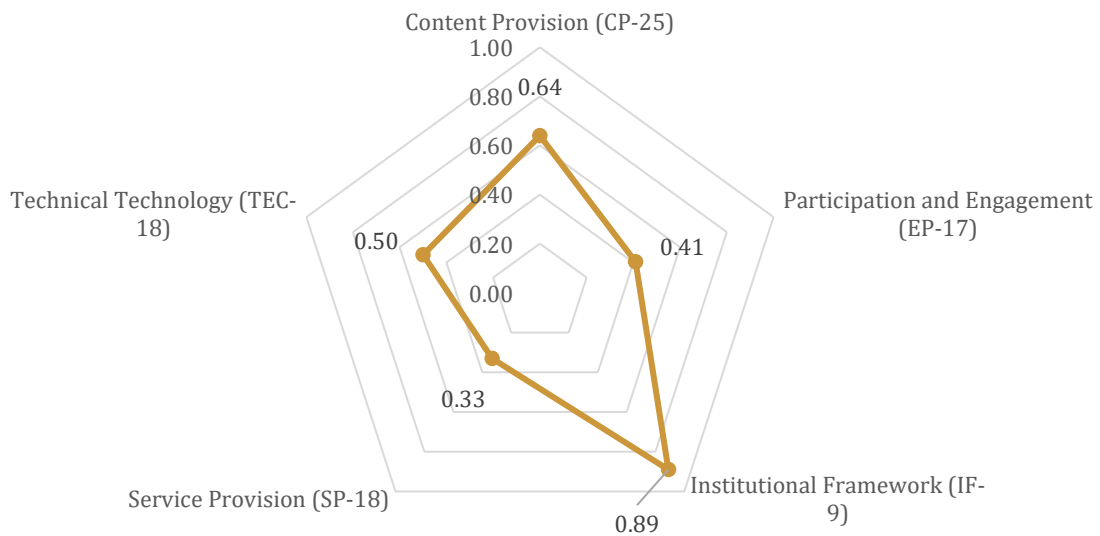


Figure 21 Kolkata city score analysis

- Highest scoring ULB in Western zone with a score of 0.53
- Second in Institutional Framework with 89% of the parameters achieved
- One of 3 cities providing live chat functionality on MGP

6.7 Bhubaneswar

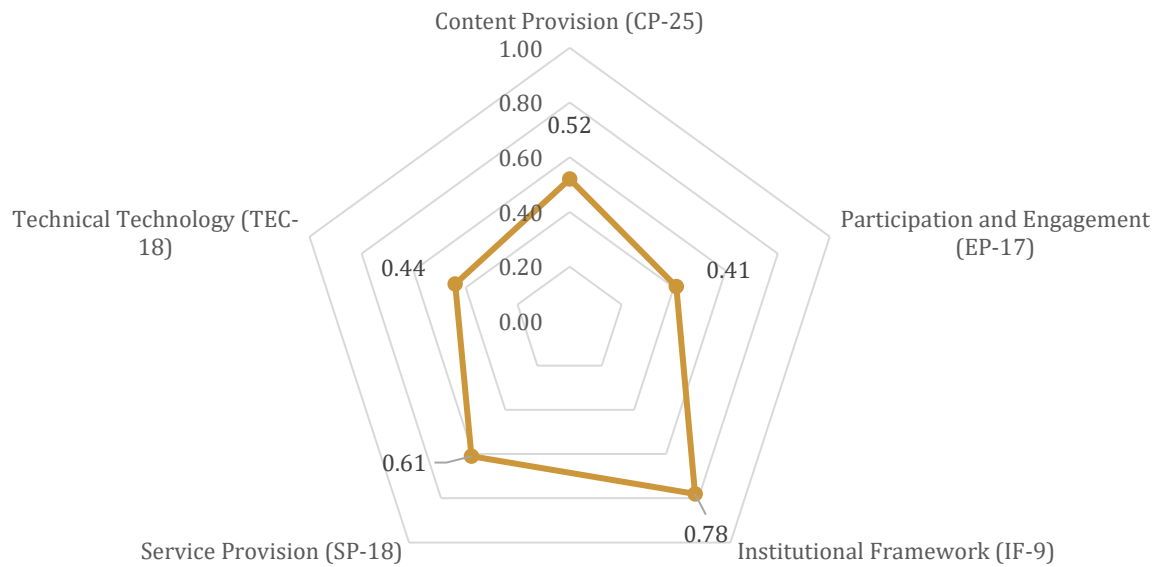


Figure 22 Bhubaneswar city score analysis

- Highest scoring ULB in Western zone with score of 0.53
- Highest scoring city in Service Provision category with 61% of the parameters achieved
- Only city where the link is provided for users to apply for driving license online
- One of the 2 cities where users can register vehicles for special purposes on MGP
- One of the 2 cities where users can apply for land title registration on MGP

6.8 Chandigarh

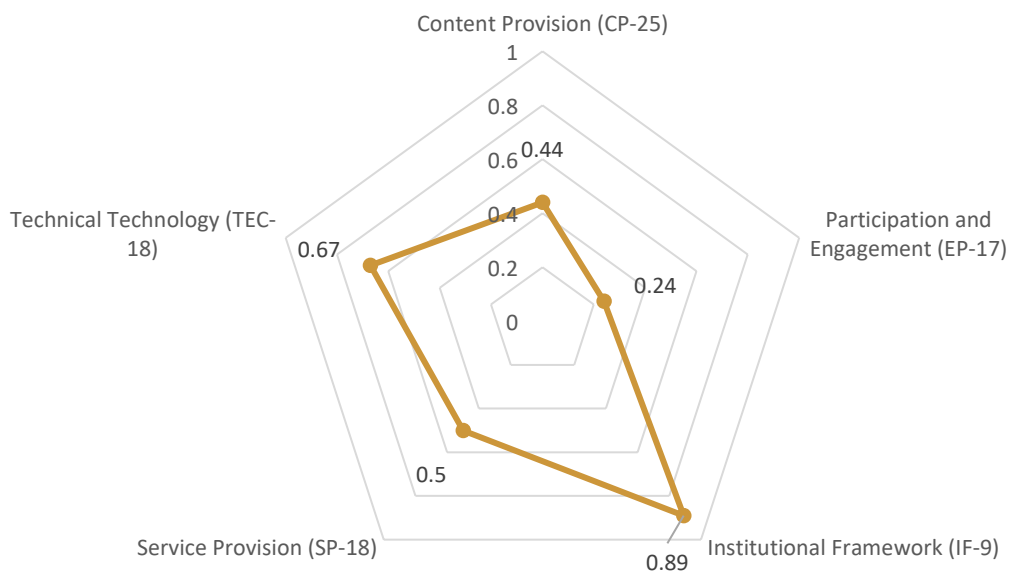


Figure 23 Chandigarh city score analysis

- Second Highest scoring ULB in Union Territories with score of 0.51
- Among the highest scoring ULBs in Institutional Framework with 89% of the criteria met

7 CITIES WITH LOW SCORE

The cities which score less than 0.25 in LOSI assessment have a lot to improve upon and the MGP provided by ULB administration has a lot of parameters missing from them. Some of the highlights from the city assessment can bring out the areas of improvement for these cities to work upon.

7.1 Dimapur

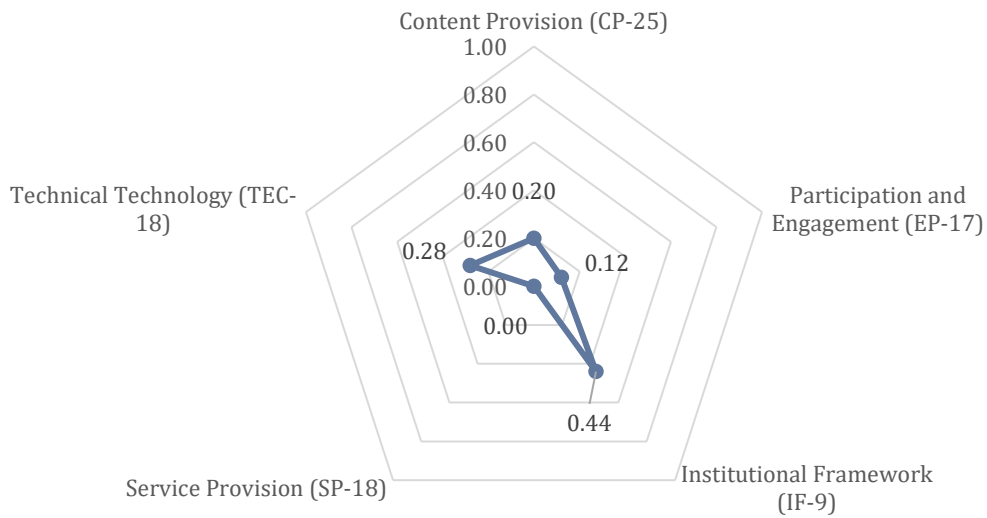


Figure 24 Dimapur city score analysis

- Lowest scoring ULB in North-Eastern zone with a score of 0.18 in LOSI index
- One of the three non-smart city in the assessment list
- Scored zero in Service Provision
- No published budget data available

7.2 Gangtok

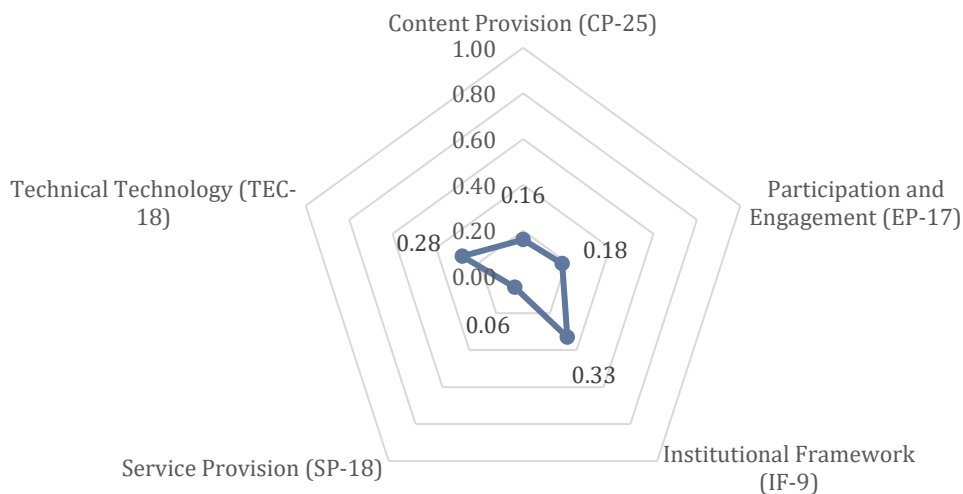


Figure 25 Gangtok city score analysis

- Gangtok scored 0.18 in LOSI assessment
- Least scoring city in Institutional Framework category with only 33% adherence to parameters

7.3 Imphal

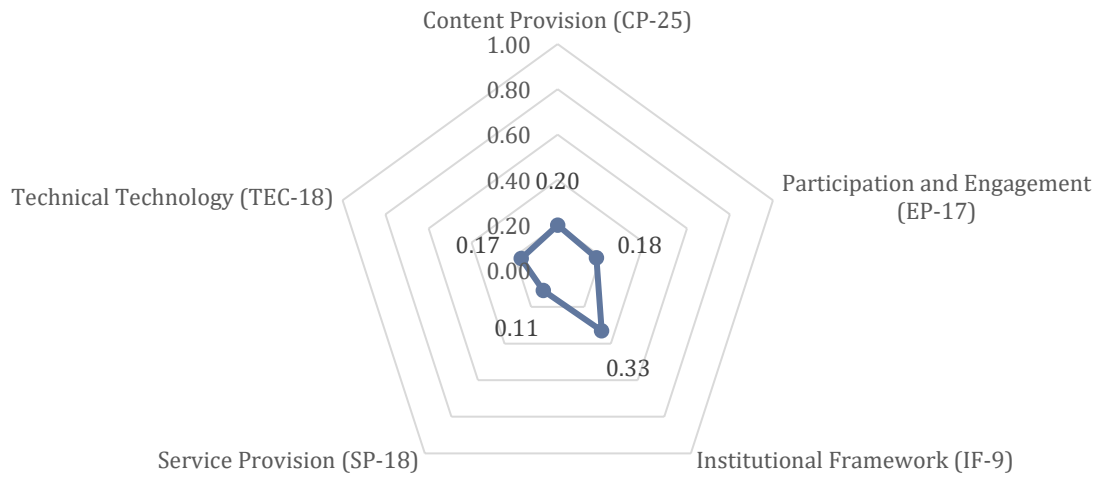


Figure 26 Imphal city score analysis

- Imphal scored 0.18 in LOSI assessment
- Least scoring city in Technical Technology category with only 17% adherence to parameters
- Least scoring city in Institutional Framework category with only 33% adherence to parameters
- No published budget data available

7.4 Aizawl

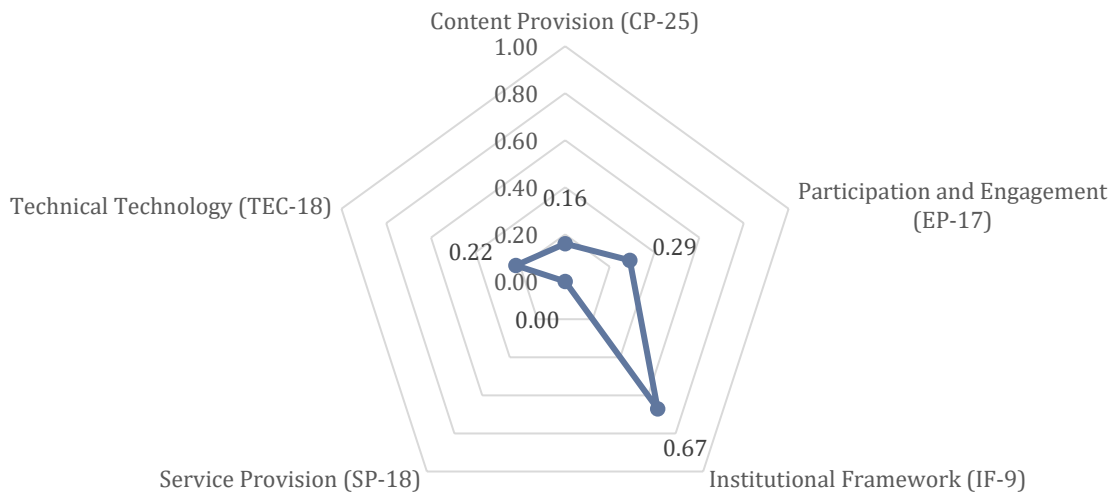


Figure 27 Aizawl city score analysis

- Aizawl scored 0.22 in LOSI assessment
- Scored zero in Service Provision

7.5 Lucknow

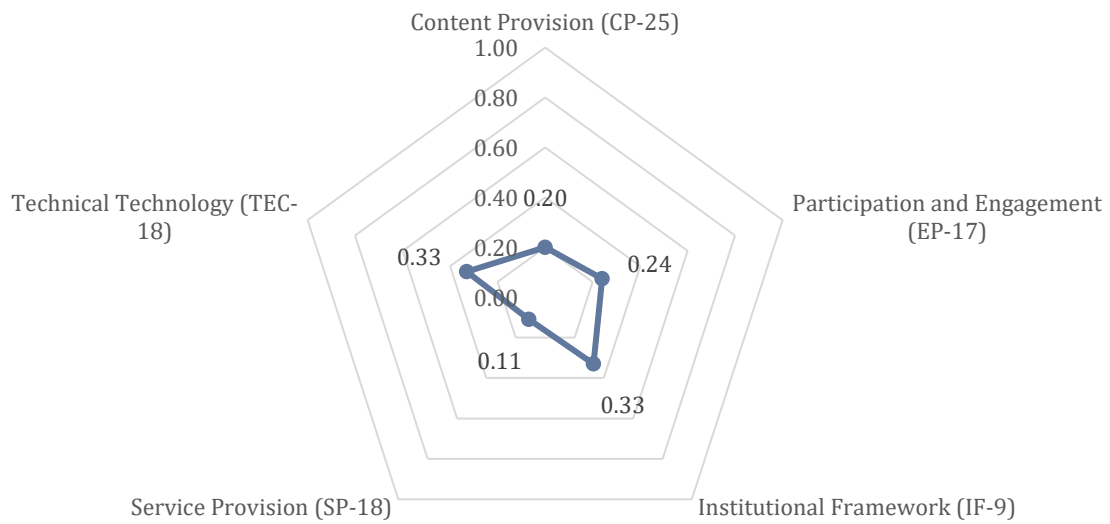


Figure 28 Lucknow city score analysis

- Lowest scoring ULB in Metropolitan Centre category with a LOSI score of 0.23
- Least scoring city in Institutional Framework category with only 33% adherence to parameters

7.6 Port Blair

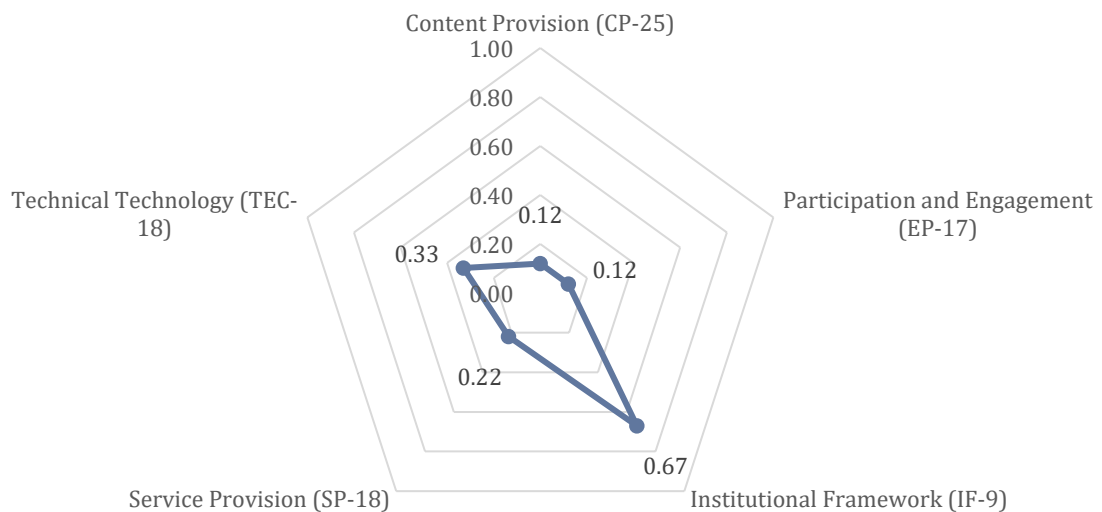


Figure 29 Port Blair city score analysis

- Least scoring ULB under Union Territory with a score of 0.24
- Lowest scoring ULB in Southern zone
- Least scoring city in Content Provision category with only 12% adherence to parameters
- No published budget data available

7.7 Silvassa

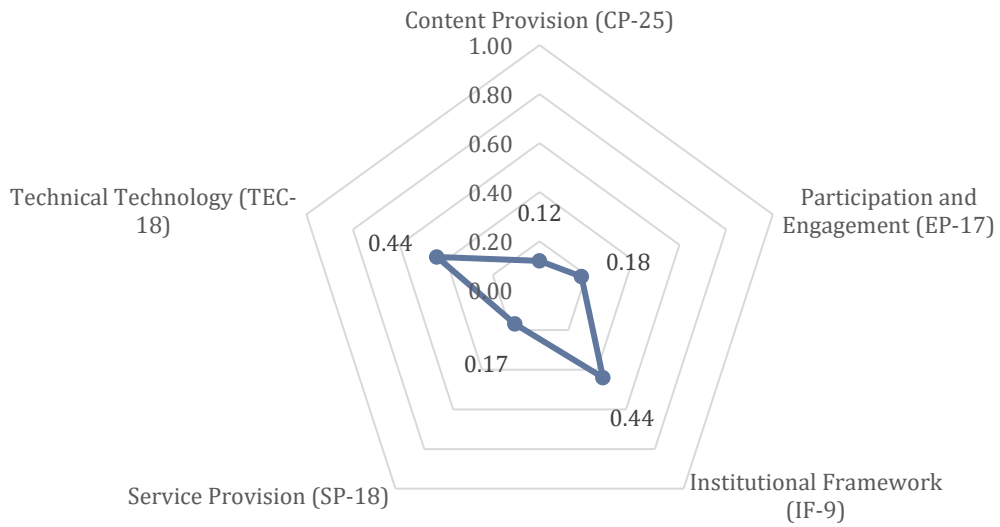


Figure 30 Silvassa city score analysis

- Least scoring ULB under Union Territory with LOSI score of 0.24
- Lowest scoring ULB in Western zone
- Least scoring city in Technical Technology category with only 17% adherence to parameters

7.8 Dehradun

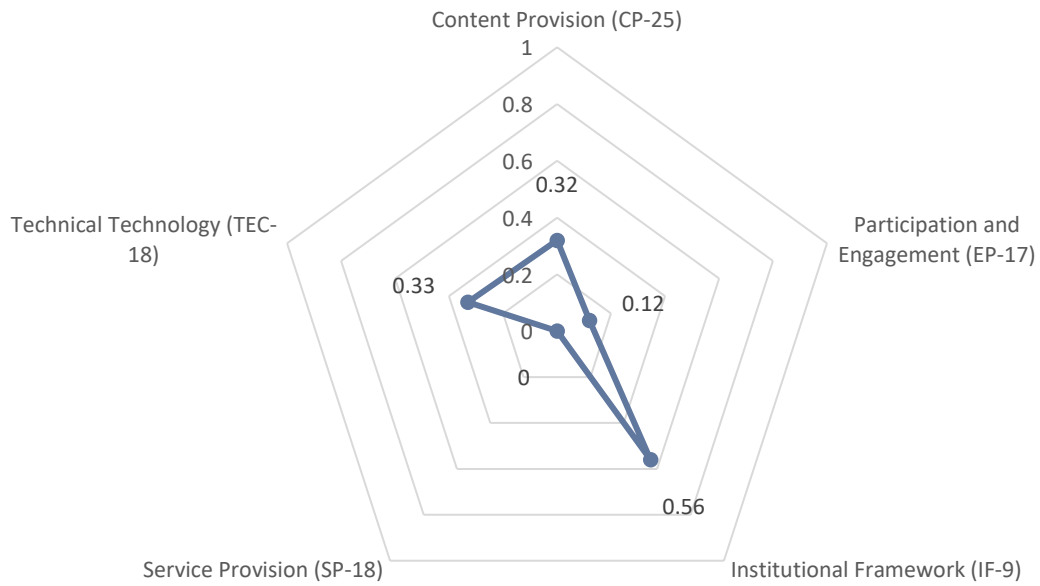


Figure 31 Dehradun city score analysis

- No adherence to the service provision criteria
- One of the lowest scoring cities in Participation and Engagement category with only 12% adherence to criteria

8 RECOMMENDATIONS

The study focuses mainly on the assessment of selected cities with various parameters related to the local online services. Prime objective of this study is to get an overall scenario of the maturity of cities in terms of their Municipal Governance Portals. It does not aim towards giving detailed solutions for any of the problems identified. The study just gives high level recommendations for the areas of improvement identified for each component under the assessment methodology.

i. Recommendations under content provision

Provision of information about functions that do not fall under municipality's purview. E.g., transport, traffic, justice, disaster, etc. should be provided on the MGP. Information related to infrastructure facilities provided by municipality should be published on the MGP. This will make users more aware about the efforts of municipality.

ii. Recommendations under institutional framework

Online publications of open government data policy should be done in every city. Municipality should publish their e-governance strategy online on their MGPs. These will increase the transparency between ULB administration and citizens. It will also help in enabling innovation and increasing economic value in the city.

iii. Recommendations under participation and engagement

Participatory decision making and tools for the same (forms, polls, etc.) should be made available online on the MGP. Publication of data related to municipal works and surveys in open data form on MGP with relevant metadata. This will help ULB administration to have better understanding of citizen needs and it will improve public service delivery by perception and need driven decisions.

iv. Recommendations under service provision

Compilation of all the service portals as hyperlinks on one single webpage should be done and kept on city MGP. This will enable a single stop public service delivery to citizens.

v. Recommendations under technical technology

Adherence to World Wide Web Consortium (W3C) standards for markup validity, style sheet and Web Content Accessibility Guidelines (WCAG2.0). This will ensure prevention of errors and improved accessibility for the users of the MGP [20].

8.1 Recommendations for the questionnaire

The questionnaire is designed by United Nation's Department of Economic and Social Affairs (UN-DESA) by reiterating and improving upon the study and year on year findings. It is a standardized questionnaire made with a vision of rating all the UN member states under one ranking system. Therefore, there can be some suggestions made to include some parameters which are important for Indian context.

- i. The questionnaire should be contextualized according to the Indian governance system which will increase its relevance to the context of e-governance development in the country.
- ii. Under the service provision, payment of property tax / house tax should be assessed as property tax is the most essential service in India for all the ULBs as property tax revenue is their major source of income.
- iii. Under the institutional framework, availability of copyright and hyperlinking policy should be assessed as they are important to declare data ownership on the MGP.
- iv. Under the content provision, provision of maps related to services derived from GIS mapping of the city should be assessed. As smart cities are mapping their services on GIS, citizens should get some information out of it.

9 CONCLUSION

The research outcomes spotlight a prevailing challenge faced by cities, indicating a collective constraint in the provision of features and efforts associated with the participation and engagement component of the Local Online Service Index (LOSI). Despite persistent initiatives by both public and private sectors aimed at elevating public service delivery standards, the majority of cities find themselves positioned at a middle level of maturity in LOSI assessment. This underscores a significant stride in progress, yet a subset of cities lags behind, experiencing a noticeable shortfall in anticipated effectiveness and thus demonstrating a lower level of maturity. On a positive note, certain cities have distinguished themselves by successfully establishing fully operational Municipal Governance Portals (MGPs), achieving a high level of maturity in LOSI assessment. However, the overall landscape suggests that there is still considerable room for improvement in the realm of online service delivery for city administrations.

This study emerges as a crucial instrument for pinpointing areas demanding focused attention and strategic guidance to enhance various components. The outcomes affirm the hypothesis that recent initiatives by both public and private sectors to augment e-governance and public service delivery have propelled the local e-governance scenario beyond its previous state. In a breakdown of the thirty-four selected cities across their respective states and union territories, seven are positioned in the high category of maturity according to the Local Online Service Index (LOSI), twenty fall within the middle category, and seven are classified as having a low level of maturity. This distribution provides a current snapshot of online public service delivery at the local level in India, with the majority of cities falling within the middle maturity level and only a limited few in the low maturity category. The assessment pinpoints several sectors where improvements are imperative for these cities.

A noteworthy revelation from the study is that, on average, Indian cities excel in the Institutional Framework and content provision component. However, the technology component and engagement and participation component are identified as areas of deficiency, exerting a downward impact on the overall average for the cities. The service provision component is noted to be relatively balanced across the selected cities.

In conclusion, the study underscores the urgency for targeted interventions in cities with low maturity levels. It emphasizes that, overall, the engagement and participation aspect of online public service delivery has matured from the citizen's perspective at the front end in India. This recognition paves the way for strategic interventions geared towards further enhancing the overall maturity of online public service delivery throughout the country.

ANNEXURE

I. List of selected cities for LOSI main study

Sr. No.	State	City with the most population in that state	Zone	Official Languages	Smart city?
Selected cities from States					
1	Andhra Pradesh	Visakhapatnam	Southern	Telugu	Yes
2	Arunachal Pradesh	Itanagar	North-Eastern	English	No
3	Assam	Guwahati	North-Eastern	Assamese	Yes
4	Bihar	Patna	Eastern	Hindi	Yes
5	Chhattisgarh	Raipur	Central	Hindi	No
6	Goa	Panjim	Western	Konkani	Yes
7	Gujarat	Ahmedabad	Western	Gujarati	Yes
8	Haryana	Faridabad	Northern	Hindi	Yes
9	Himachal Pradesh	Shimla	Northern	Hindi	No
10	Jharkhand	Ranchi	Eastern	Hindi	No
11	Karnataka	Bangalore	Southern	Kannada	Yes
12	Kerala	Thiruvananthapuram	Southern	Malayalam	No
13	Madhya Pradesh	Indore	Central	Hindi	Yes
14	Maharashtra	Mumbai	Western	Marathi	No
15	Manipur	Imphal	North-Eastern	Meitei	Yes
16	Meghalaya	Shillong	North-Eastern	English	Yes
17	Mizoram	Aizawl	North-Eastern	English, Hindi, Mizo	Yes
18	Nagaland	Dimapur	North-Eastern	English	No
19	Odisha	Bhubaneshwar	Eastern	Odia	Yes
20	Punjab	Ludhiana	Northern	Punjabi	Yes
21	Rajasthan	Jaipur	Northern	Hindi	Yes
22	Sikkim	Gangtok	North-Eastern	English, Nepali	Yes
23	Tamil Nadu	Chennai	Southern	Tamil	Yes
24	Telangana	Hyderabad	Southern	Telugu	No
25	Tripura	Agartala	North-Eastern	Bengali, English, Kokborok	Yes
26	Uttarakhand	Dehradun	Central	Hindi	Yes
27	Uttar Pradesh	Lucknow	Central	Hindi	Yes
28	West Bengal	Kolkata	Eastern	Bengali, Nepali	No

Sr. No.	State	City with the most population in that state	Zone	Official Languages	Smart city?
Selected cities from Union Territories					
1	Andaman and Nikobar Islands	Port Blair	Southern	Hindi	Yes
2	Chandigarh	Chandigarh	Northern	English	Yes
3	Dadra and Nagar Haveli and Daman and Diu	Silvassa	Western	Gujarati, Marathi, English	No
4	The Government of NCT of Delhi	New Delhi	Northern	Hindi, English	Yes
5	Jammu and Kashmir	Srinagar	Northern	Urdu, English	Yes
6	Puducherry	Puducherry	Southern	Tamil, English	No

II. Final scores for selected ULBs after the assessment

Sr. No.	City Name	LOSI Score (Total-87)	LOSI Category	Content Provision (CP-25)	Participation and Engagement (EP-17)	Institutional Framework (IF-9)	Service Provision (SP-18)	Technical Technology (TEC-18)
1	Agartala	0.43	Middle	0.48	0.18	0.67	0.28	0.61
2	Ahmedabad	0.63	High	0.76	0.59	0.89	0.39	0.61
3	Aizawl	0.22	Low	0.16	0.29	0.67	0.00	0.22
4	Bangalore	0.61	High	0.64	0.41	0.89	0.44	0.78
5	Bhubaneswar	0.53	High	0.52	0.41	0.78	0.61	0.44
6	Chandigarh	0.51	High	0.44	0.24	0.89	0.50	0.67
7	Chennai	0.68	High	0.76	0.41	0.89	0.50	0.89
8	Dehradun	0.24	Low	0.32	0.12	0.56	0.00	0.33
9	Dimapur	0.18	Low	0.20	0.12	0.44	0.00	0.28
10	Faridabad	0.46	Middle	0.44	0.12	0.56	0.50	0.72
11	Gangtok	0.18	Low	0.16	0.18	0.33	0.06	0.28
12	Guwahati	0.47	Middle	0.60	0.18	1.00	0.22	0.56
13	Hyderabad	0.49	Middle	0.64	0.24	0.89	0.33	0.50
14	Imphal	0.18	Low	0.20	0.18	0.33	0.11	0.17
15	Indore	0.45	Middle	0.56	0.18	0.67	0.28	0.61
16	Itanagar	0.25	Middle	0.28	0.06	0.56	0.22	0.28
17	Jaipur	0.44	Middle	0.48	0.24	0.78	0.33	0.50
18	Kolkata	0.53	High	0.64	0.41	0.89	0.33	0.50
19	Lucknow	0.23	Low	0.20	0.24	0.33	0.11	0.33
20	Ludhiana	0.43	Middle	0.40	0.35	0.56	0.39	0.50
21	Mumbai	0.74	High	0.80	0.53	0.89	0.56	0.94
22	New Delhi	0.57	High	0.68	0.41	0.78	0.50	0.56
23	Panjim	0.34	Middle	0.44	0.24	0.56	0.22	0.33
24	Patna	0.32	Middle	0.48	0.12	0.67	0.17	0.28
25	Pondicherry	0.32	Middle	0.36	0.12	0.67	0.17	0.44
26	Port Blair	0.24	Low	0.12	0.12	0.67	0.22	0.33
27	Raipur	0.39	Middle	0.40	0.24	0.67	0.33	0.44
28	Ranchi	0.39	Middle	0.28	0.29	0.67	0.44	0.44
29	Shillong	0.31	Middle	0.32	0.06	0.56	0.22	0.50
30	Shimla	0.46	Middle	0.60	0.18	0.78	0.33	0.50
31	Silvassa	0.24	Low	0.12	0.18	0.44	0.17	0.44
32	Srinagar	0.39	Middle	0.44	0.18	0.67	0.33	0.44
33	Thiruvananthapuram	0.43	Middle	0.60	0.12	0.78	0.33	0.39
34	Visakhapatnam	0.39	Middle	0.44	0.12	0.67	0.44	0.39

III. Summary of LOSI assessment for all selected cities

City	Inference
Agartala	Agartala from state Tripura situated in North-Eastern zone of India and categorised as Urban Centre has No separate fund dedicated to E-Governance initiatives. It scored 0.43 in LOSI Assessment
Ahmedabad	Ahmedabad from state Gujarat situated in Western zone of India and categorised as Metropolitan Centre has Funds allocated for E-Governance initiatives. It scored 0.63 in LOSI Assessment
Aizawl	Aizawl from state Mizoram situated in North-Eastern zone of India and categorised as Urban Centre has No separate fund dedicated to E-Governance initiatives. It scored 0.22 in LOSI Assessment
Bangalore	Bangalore from state Karnataka situated in Southern zone of India and categorised as Metropolitan Centre has No separate fund dedicated to E-Governance initiatives. It scored 0.61 in LOSI Assessment
Bhubaneswar	Bhubaneswar from state Odisha situated in Eastern zone of India and categorised as Urban Centre has No separate fund dedicated to E-Governance initiatives. It scored 0.53 in LOSI Assessment
Chandigarh	Chandigarh from state Chandigarh situated in Northern zone of India and categorised as Urban Centre has No separate fund dedicated to E-Governance initiatives. It scored 0.51 in LOSI Assessment
Chennai	Chennai from state Tamil Nadu situated in Southern zone of India and categorised as Metropolitan Centre has Funds allocated for E-Governance initiatives. It scored 0.68 in LOSI Assessment
Dehradun	Dehradun from state Uttarakhand situated in Central zone of India and categorised as Urban Centre has Budget data not available. It scored 0.24 in LOSI Assessment
Dimapur	Dimapur from state Nagaland situated in North-Eastern zone of India and categorised as Urban Centre has Budget data not available. It scored 0.18 in LOSI Assessment
Faridabad	Faridabad from state Haryana situated in Northern zone of India and categorised as Metropolitan Centre has Budget data not available. It scored 0.46 in LOSI Assessment
Gangtok	Gangtok from state Sikkim situated in North-Eastern zone of India and categorised as Urban Centre has No separate fund dedicated to E-Governance initiatives. It scored 0.18 in LOSI Assessment
Guwahati	Guwahati from state Assam situated in North-Eastern zone of India and categorised as Urban Centre has No separate fund dedicated to E-Governance initiatives. It scored 0.47 in LOSI Assessment
Hyderabad	Hyderabad from state Telangana situated in Southern zone of India and categorised as Metropolitan Centre has Funds allocated for E-Governance initiatives. It scored 0.49 in LOSI Assessment
Imphal	Imphal from state Manipur situated in North-Eastern zone of India and categorised as Urban Centre has Budget data not available. It scored 0.18 in LOSI Assessment
Indore	Indore from state Madhya Pradesh situated in Central zone of India and categorised as Metropolitan Centre has Funds allocated for E-Governance initiatives. It scored 0.45 in LOSI Assessment
Itanagar	Itanagar from state Arunachal Pradesh situated in North-Eastern zone of India and categorised as Semi-urban Centre has Budget data not available. It scored 0.25 in LOSI Assessment
Jaipur	Jaipur from state Rajasthan situated in Northern zone of India and categorised as Metropolitan Centre has Funds allocated for E-Governance initiatives. It scored 0.44 in LOSI Assessment

City	Inference
Kolkata	Kolkata from state West Bengal situated in Eastern zone of India and categorised as Metropolitan Centre has No separate fund dedicated to E-Governance initiatives. It scored 0.53 in LOSI Assessment
Lucknow	Lucknow from state Uttar Pradesh situated in Central zone of India and categorised as Metropolitan Centre has No separate fund dedicated to E-Governance initiatives. It scored 0.23 in LOSI Assessment
Ludhiana	Ludhiana from state Punjab situated in Northern zone of India and categorised as Metropolitan Centre has No separate fund dedicated to E-Governance initiatives. It scored 0.43 in LOSI Assessment
Mumbai	Mumbai from state Maharashtra situated in Western zone of India and categorised as Metropolitan Centre has No separate fund dedicated to E-Governance initiatives. It scored 0.74 in LOSI Assessment
New Delhi	New Delhi from state The Government of NCT of Delhi situated in Northern zone of India and categorised as Urban Centre has No separate fund dedicated to E-Governance initiatives. It scored 0.57 in LOSI Assessment
Panjim	Panjim from state Goa situated in Western zone of India and categorised as Semi-urban Centre has No separate fund dedicated to E-Governance initiatives. It scored 0.34 in LOSI Assessment
Patna	Patna from state Bihar situated in Eastern zone of India and categorised as Metropolitan Centre has No separate fund dedicated to E-Governance initiatives. It scored 0.32 in LOSI Assessment
Pondicherry	Pondicherry from state Puducherry situated in Southern zone of India and categorised as Urban Centre has Budget data not available. It scored 0.32 in LOSI Assessment
Port Blair	Port Blair from state Andaman and Nikobar Islands situated in Southern zone of India and categorised as Urban Centre has Budget data not available. It scored 0.24 in LOSI Assessment
Raipur	Raipur from state Chhattisgarh situated in Central zone of India and categorised as Metropolitan Centre has No separate fund dedicated to E-Governance initiatives. It scored 0.39 in LOSI Assessment
Ranchi	Ranchi from state Jharkhand situated in Eastern zone of India and categorised as Metropolitan Centre has No separate fund dedicated to E-Governance initiatives. It scored 0.39 in LOSI Assessment
Shillong	Shillong from state Meghalaya situated in North-Eastern zone of India and categorised as Urban Centre has No separate fund dedicated to E-Governance initiatives. It scored 0.31 in LOSI Assessment
Shimla	Shimla from state Himachal Pradesh situated in Northern zone of India and categorised as Urban Centre has No separate fund dedicated to E-Governance initiatives. It scored 0.46 in LOSI Assessment
Silvassa	Silvassa from state Dadra and Nagar Haveli and Daman and Diu situated in Western zone of India and categorised as Semi-urban Centre has Budget data not available. It scored 0.24 in LOSI Assessment
Srinagar	Srinagar from state Jammu and Kashmir situated in Northern zone of India and categorised as Metropolitan Centre has Budget data not available. It scored 0.39 in LOSI Assessment
Thiruvananthapuram	Thiruvananthapuram from state Kerala situated in Southern zone of India and categorised as Urban Centre has Funds allocated for E-Governance initiatives. It scored 0.43 in LOSI Assessment
Visakhapatnam	Visakhapatnam from state Andhra Pradesh situated in Southern zone of India and categorised as Urban Centre has No separate fund dedicated to E-Governance initiatives. It scored 0.39 in LOSI Assessment

REFERENCES

- [1] UNESCO International Bureau of Education, "General Education System Quality Analysis/Diagnosis Framework (GEQAF)," 03 August 2005. [Online]. Available: <http://www.ibe.unesco.org/en/general-education-system-quality-analysisdiagnosis-framework-geqaf>.
- [2] Y. Saito, "Is good governance a necessary precursor to peace?," 15 January 2021. [Online]. Available: <https://www.undp.org/blog/good-governance-necessary-precursor-peace>. [Accessed 04 February 2023].
- [3] United Nations, "E-Government Overview," 2023. [Online]. Available: <https://publicadministration.un.org/egovkb/en-us/Overview>.
- [4] Unisys, "Digital Government Services," 2023. [Online]. Available: <https://www.unisys.com/glossary/digital-government-services/#:~:text=Digital%20government%20refers%20to%20the,the%20governments'%20goals%20a%20reality..>
- [5] Press Information Bureau, "Governance & Administration," 18 01 2023. [Online]. Available: <https://www.india.gov.in/topics/governance-administration>.
- [6] MoHUA, "The Constitution (74th Amendment) Act, 1992," MoHUA, 1992.
- [7] Ministry of Electronics & Information Technology, "National e-Governance Plan," 07 06 2021. [Online]. Available: <https://www.meity.gov.in/divisions/national-e-governance-plan>.
- [8] Second Administrative Reforms Commission, "Promoting E-Governance The Smart Way Forward," Government of India, 2008.
- [9] World Bank, "GovTech Maturity Index, 2022," 2022. [Online]. Available: <https://openknowledge.worldbank.org/entities/publication/10b535a7-e9d4-51bd-96ed-6b917d5eb09e>. [Accessed 21 08 2023].
- [10] UN-DESA, "UN E-Government Knowledgebase," Division for Public Institutions and Digital Government, 2023. [Online]. Available: <https://publicadministration.un.org/egovkb/Data-Center>. [Accessed 21 08 2023].
- [11] United Nations Department of Economic and Social Affairs, "United Nations E-Government Survey 2022," United Nations, New York, 2022.
- [12] National Informatics Center (NIC), "Guidelines for Indian Government Websites (GIGW)," March 2023. [Online]. Available: <https://guidelines.india.gov.in/introduction/>.
- [13] Ministry of Housing and Urban Affairs, "Empowering cities through data," February 2019. [Online]. Available: https://smartcities.data.gov.in/sites/default/files/DataSmart_Cities_Strategy_Print.pdf.
- [14] Census of India , "District Census Handbook- Sabar Kantha, Series-25, Part XII-B," Directorate of Census Operations, 2011.
- [15] S. Mehta and G. Doctor, "Assessing the maturity of online service delivery by," *IEEE Xplore*, pp. 314-318, 2023.
- [16] Ministry of Home Affairs, "Regulations applicable to Foreigners in India," [Online]. Available: https://www.mha.gov.in/PDF_Other/Annex%20II_01022018.pdf. [Accessed 23 09 2023].
- [17] Ministry of Road Transport and Highways, "Vehicle Registration," 19 09 2023. [Online]. Available: <https://parivahan.gov.in/parivahan//en/content/vehicle-registration>. [Accessed 23 09 2023].
- [18] Income Tax Department, Government of India, "e-Filing," 23 09 2023. [Online]. Available: <https://www.incometax.gov.in/iec/foportal/help/individual-business-profession>. [Accessed 23 09 2023].
- [19] Ministry of Electronics and Information Technology, "data.gov.in," National Informatics Centre, 23 09 2023. [Online]. Available: <https://data.gov.in/>. [Accessed 23 09 2023].
- [20] S. Mehta and G. Doctor, "Assessing the maturity of online service delivery by," in *International Conference on Information Technology (ICIT)*, Amman, Jordan, 2023.
- [21] J. L. Karen Layne, "Developing fully functional E-government: A four stage model," *Government Information Quarterly*, vol. 18, no. 2, pp. 122-136, 2001.
- [22] R. Chetia, "Historical Background of E-Governance," 2019.
- [23] Brihanmumbai Municipal Corporation, "Public appeal for participation in budget suggestions," February 2023. [Online]. Available: <https://www.mcgm.gov.in/irj/go/km/docs/documents/HomePage%20Data/Budget%20Suggestions%20Press%20Release.pdf>.
- [24] Commissionerate of e-Governance, Tamil Nadu e-Governance Agency, "Greater Chennai Corporation," 2020. [Online]. Available: https://chennaicorporation.gov.in/gcc/pdf/Blockchan_Policy_TamilNadu.pdf.