Sustainability Index: A Tool to Measure Environmental Performance of an Indian City

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Abstract. This paper aims at measuring and assessing the Indian Cities on the environmental performance criteria across a broad range of categories and supporting indicators. A unique tool is devised for the stakeholders to address the common environmental issues faced by a lot of Indian cities and to help them learn from each other. Metropolitan cities have various Environmental issues such as urban sprawl, loss of green and natural spaces, inadequate water supply, wastewater, solid-waste, pollution of soil and air. In order to counter these problems, the cities have been changing by introducing smart sustainable techniques. Because of these changes, there is competition not amongst various nations but also among various cities in terms of investors, tourists, workmen etc. As a result, recent trends focus on rating system. There are a number of benefits directly attached to the sustainability rating tool like to minimize the city’s environmental footprint, accommodate population growth, and safeguard quality of life of urban dwellers today and in future. It also helps investors to make a choice of their location, helps cities by being a guiding spirit to enlist various strengths and weaknesses of the cities and thereby assisting them in improvement by working on their weaknesses and in defining and planning their goals and to strategize aimed at bolstering their occupied position and to develop plan for the future.

Keywords. Sustainability; Environmental Tool; Sustainability Index; Environment; Economic Index

1. Introduction

As the global population is growing at a rapid pace over the past few decades, cities encounter a number of problems, satisfying the mass, specifically with respect to infrastructure. The challenge is to address these issues and to meet the needs of each individual while providing quality of life and sustainable development. Further, various categories and Indicators were developed to establish a rating index with respect to Indian context and afterwards, 110 indicators were obtained.[1] These indicators were considered difficult to implement for the creation of an Indian Smart City Rating Index as most of the indicators were derived from the global indexes and the proposed index would not have produced accurate results. After a comprehensive research it was decided to work on a particular domain of various categories which would reveal any city’s environmental related condition and its negative impact, helping a city to understand where it’s missing and how it can be strengthen [2]. Hence, Sustainability was finalized, which is built on the principle of environment (planet), economic (profit) and social (people) [3].

The city rankings can also act as a platform to showcase the strength of a particular city and hence improving its international and national image. The various benefits related to the rankings are:

a) Ranking acts as a competitive platform for comparison.
b) It can act in determining various strengths and weaknesses.

c) Act as a tool for future upgradation and enhancements.

The research work began with a thorough study of the smart city and its parameters, also studying and analyzing various indexes available worldwide relating to the context of city ratings[4]. Since most of the indicators were obtained from worldwide indices, it was concluded that their adoption for the creation of an Indian Smart City Rating Index could not produce adequate results as the data related to most of the indicators were hardly in Indian context, hence it was finalized that it will be much beneficial if the focus stays in one particular domain of various categories finalized for the Smart City Rating Index and the finalized category was selected as Sustainability[5]. Hence Asian Green City Index was selected as a reference Index system as it incorporated major factors and indicators related to the Asian Context, further help was taken from BIS Index and various Indicators related to sustainability was taken from it to develop a Green City rating Index for the Indian Context.

Arora & Singh [6] A smart city is a city which emphasize on the inclusive development through the sustainability reduction in the pollution, implementation of Information Technology to the maximum extent, good transport connectivity or smart mobility and also provide sufficient business and job opportunity to its residents. Smart cities are the future and shaping it requires efforts from both, Government as well as from citizens.

M. Sethi [7] The research reveals that in spite of having a standard definition of a smart city in India, it has scope to withdraw maximum benefit in terms of sustainability, efficiency, economic growth and governance and this could be done if the upcoming smart cities focus on sustainable urbanization, good governance, transparent metrics, reporting keeping people at the front.

V. Upadhyaya [8] The author discusses the need for development to accommodate the rapidly increasing population and hence explained the basic idea of smart cities with its component and applicability in our cities. The various components for development of smart cities have been identified and these are smart transport management, waste management, water recycling, smart education, smart governance, smart energy, smart buildings, smart street lightings and smart IT and communications system. It concludes that a smart city is not only about digitization but is about providing cost efficient, affordable and sustainable solutions to its residents.

2. Research methodology

The Green City Indices measures the current environmental performance of Indian cities, as well as cities efforts in reducing future environmental impact. This rating system will be the first step towards the development of successful Smart City.

The methodology developed is based on the work of earlier Asian Green City Index developed by the EIU in cooperation with Siemens, which is already covered in the literature review chapter. To be most applicable to India, the structure has been adapted to accommodate variations in data quality and availability, and environmental challenges specific to the country [9]. To further enhance the data quality and to seek perfection the indices in Indian context, BIS (Bureau of Indian Standards) smart city indicators, specific to environment, water, waste, sanitation is also considered. BIS provides benchmark for customer satisfaction and confidence on a product or service. Hence BIS proves to be a reliable source of indicators which can be used to measure cities performance and further benchmark.

Combining all the indicators from Asian Green City Index and BIS, a comprehensive Index is developed which scores cities across seven categories – Energy and Co2, Land use, transport, waste, water, and sanitation and air quality. [10] All the categories comprise of a total of 22 individual indicators, after careful selection and sorting on the basis of data quality and availability. For the ease of data collection and to ensure maximum dependency on secondary data, all the indicators are strictly maintained as quantitative data for example Cities water consumption per capita [11]. The Indicators are selected and designed in such a way that the Data collection for the city to be scored could be easily available on Government websites of Local authorities and Survey specific websites such as national and regional statistics. The three strategies which have been adopted are as follows:
2.1 Maxi-Mini Method
This method is used for those indicators for whom the data of the minimum value and maximum value could be obtained from the authorised government and survey websites, using these minimum and maximum values (among all the Indian Cities) an Interval marks scale has been formulated which is further used to calculate the marks corresponding to the desired indicator using statistical method of Interpolation to deduce final marks to that indicator[12]. For example Co2 emissions per capita, 0 is the minimum Value for net 0 buildings and the maximum value which was found out was 4.79 tonnes per capita for Chennai, so when the maximum and the minimum value of all the Indian cities have been defined, interval scale of marks can be decided easily, as per the interval scale the inference can be deduced as to what 0-20 marks means and so on, further suppose the city emits 2.8 tonnes of co2 per capita, using the maximum and minimum values and interpolation, the marks corresponding to 2.8 can be calculated easily.

2.2 Benchmarking
This method is followed for the indicators which can be easily transformed into percentage, as per this method a maximum of 100% is taken and correspondingly minimum of 0% is taken, marks are allotted as per the percentage obtained by the city and corresponding to that percent, marks are allotted.[13] For example percentage of solid waste recycled, the indicator in itself is self-explanatory and it can be easily inferred that as per the ideal condition it should be 100%, so 100 marks are allotted to 100% and 0 marks are allotted to 0%, further the percentage that is obtained by any city can easily give the corresponding marks against it and hence marks are obtained[14].

2.3 Predefined category by government websites
As per this method various categories have been already defined by government, then as per the number of categories, the interval scale is prepared corresponding to that category and finally the data obtained for any city is calculated into marks by looking into the interval scale the data falls in. For example Nitrogen Dioxide concentration levels, the following categories are already defined by government, hence corresponding marks have been allotted to a specific category, and further interpolation is used by looking into the interval scale the data sets falls into:

| Category            | Marks |
|---------------------|-------|
| Good (0–50)         | 100   |
| Satisfactory (51–100) | 80    |
| Moderate (101–200)  | 60    |
| Poor (201–300)      | 40    |
| Very poor (301–400) | 20    |
| Severe (401-500)    | 0     |

2.4 Category Evaluation Techniques
With the help of the above-mentioned strategies, various parameters of the index are mapped and evaluated as classified below:

a) Energy and CO2: Considering the data availability and suitability as per the Indian Context, three indicators have been selected in this particular category, the first one is CO2 emissions per capita which has been taken from Asian Green city Index, the method which has been used is mini max for this indicator, the second indicator is Percentage of Total Energy Retrieved from Renewable Sources, as a City's Total Energy Consumption share, this indicator has been taken from BIS Index and Benchmarking has been used for marks allocation [15]. The third indicator is Total Electrical Energy Use per Capita (kWH/per Year) from the BIS Index for which mini max method has been used.

b) Land Use and Buildings: As per the relevancy in Indian context, two indicators have been selected under this category with Green Spaces per capita being the first one which has been taken from Asian Green City Index, the method of marks distribution taken is mini max, as per which maximum marks of
100 has been allotted to city having green space of 60 sqm per inhabitant while 0 marks to cities having an area of 0 sqm per inhabitant. The second indicator chosen is Population density which again has been taken from Asian Green City Index for which the method of mini max has been used yet again, giving minimum marks of 0 to city having maximum density of 10,000 people per sq. km whereas maximum marks of 100 to the city of Kapurthala with minimum density of 500.

c) Transport: Considering the data availability and suitability as per the Indian Context, three indicators have been selected in this particular category, the first one is Average Distance per car trip (Car Dependence) which has been taken from BIS Index, the method selected is mini max with the maximum marks of 100 allotted to the city having minimum dependency [16]. The second indicator selected is Number of personal automobiles per capita (motor vehicles per 1000 population) which is also taken from BIS Index, method followed is mini max with the minimum marks given to the city having maximum unit [1]. The third indicator selected is Public transport trips per capita per day which again is taken from BIS Index, method followed is mini max with the minimum marks given to the city having minimum unit of 0 while the maximum marks are given to the city with maximum unit of 2.

d) Waste: As per the suitability in Indian context, three indicators have been selected under this category with the first being Waste generated per capita, taken from Asian Green City Index, the marking scheme is based on mini maxi method with the maximum being 0.82 kg/cap but the marks have been allotted as 0 for 1 and 100 for 0. The second factor which is the Percentage of total collected municipal solid waste is taken from BIS Index with the ideal condition of 100% thereby giving max marks of 100 and 0 marks to 0%. The third factor which has been finalized by the BIS Index is Percentage of the city's solid waste that is recycled with the ideal condition of 100% thereby giving max marks of 100 and 0 marks to 0%.

e) Water: As per the availability of the data, two indicators have been selected under this category with the first being Water consumption per capita, taken from Asian green city index, the marking scheme is based on mini maxi method with the maximum limit and minimum limit being 500L/cap and 100 L/cap respectively, as specified in National Building Code (NBC) and the corresponding marks allotted for the maximum and minimum limit is 0 and 100 respectively. The second indicator which has been finalised from the BIS Index is Percentage of city population with portable water supply service with the ideal condition and benchmark of 100% thereby giving max marks of 100 and 0 marks to 0%.

f) Sanitation: Considering the data availability and suitability as per the Indian Context, three indicators have been selected in this particular category; the first one is Percentage of population with access to improved sanitation. The first indicator is evaluated with 100% benchmark marking scheme by allocating 100 marks to 100% and 0 marks to 0%. The second indicator which has been finalized from the BIS Index is Share of wastewater treated with the ideal condition of 100% thereby giving max marks of 100 and 0 marks to 0%. The third indicator is also finalised from BIS Index being Percentage of city population served by sewage (waste water) collection system. The last indicator of this category is also evaluated with 100% benchmark marking scheme by allocating 100 marks to 100% and 0 marks to 0%.

i) Air Quality: The quality of air is a measure of how polluted or pure the air is. Examining the air quality is important because the air which has been polluted can be bad for the health of the environment and the mankind. The Quality of air is based on the measurement of particulate matter (PM2.5 and PM10), Nitrogen Dioxide (NO2), Ozone (O3), Carbon Monoxide (CO) and Sulphur Dioxide (SO2) emissions as specified in Central Pollution Control Board (CPCB). Based on the above-mentioned guidelines, six indicators have been finalised under this category which were common in both Asian green city index and BIS Index[17]. The Six indicators namely, NO2 concentration levels, SO2 concentration levels, PM2.5 concentration, PM10 concentration, CO (Greenhouse gas emission), Air Quality Index. The marking scheme of all the six indicators are based on the Min- Max method of
evaluation, in which maximum limit is specified as 500 and minimum limit is 0 as per the CPCB Guidelines. The maximum limit is allotted 0 marks and the minimum limit is allotted 100 marks. On the basis of the above factors, the comparison of sustainability index of Delhi and Chandigarh is shown in Table 1.

Table 1. The sustainability index comparison of Delhi and Chandigarh

| CATEGORY | INDICATOR | MARKS DISTRIBUTION | DELHI SOURCES | MARKS OBTAINED | CHANDIGARH SOURCES | MARKS OBTAINED |
|----------|-----------|--------------------|---------------|----------------|-------------------|---------------|
| Energy and CO2 | CO2 emissions per capita | (Emission Tonnes/cap) - Marks | http://citycarbfootprints.info/GGMCF_top500cities.txt | 2.6 | Chandigarh.go.in | 48 |
| | Percentage of Total Energy Derived from Renewable sources, as a share of the City’s Total Energy Consumption | (Percentage Share (%) - Marks) | Ministry of statistics and Program Implementation | 27.7 | Government of India Ministry of New and Renewable Energy | 843 |
| | Total Electrical Energy Use per Capita (KWH/Per Year) | (KWh/Per year - Marks) | CSE (Center for Science and Commerce) | 39.33 | Minister of State for Power, Coal and New & Renewable Energy | 38.047619 |
| | Green spaces per capita | (SqM per inhabitant - Marks) | 19% of the total urban land area of 44,777 ha (MPD 2021) | 36.6666667 | Chandigarh.go.in | 91.666666 |
| Land use and Buildings | Population density | (Persons/Per sqkm - Marks) | http://censusindia.gov.in/Census_Data_2001/India_at_glance/density.aspx | 11,900 | Census.india.gov.in | 0 |
| | Average Distance per car trip (Car Dependence) | | | 12.74 | CSE (Center for Science and Commerce) | 15.066 |


|                        |                                                                 | Value | Description                                                                 |
|------------------------|-----------------------------------------------------------------|-------|-----------------------------------------------------------------------------|
| **Number of personal automobiles per capita**                  | (Vehicles Per 1000 people - Marks)                               |       | 556                                                                          |
|                        | 50 - 100 : 100                                                   |       | Economic Survey (2017-2018)                                                 |
|                        | 100-200:80                                                     |       | State of Environment Report(SeE R)-2016, Chandigarh                         |
|                        | 200-300:60                                                     |       |                                                                             |
|                        | 300-400:40                                                     |       |                                                                             |
|                        | 400-500:20                                                     |       |                                                                             |
|                        | 500 & above : 0                                                |       |                                                                             |
| **Public transport trips per capita per day**                   | (Trips per capita per day- Marks)                               |       | 74                                                                           |
|                        | 1.6 - 2 : 100                                                  |       | Chandigarh.govt.in                                                          |
|                        | 1.2-1.6:80                                                    |       |                                                                             |
|                        | 0.8-1.2:60                                                   |       |                                                                             |
|                        | 0.4-0.8:40                                                   |       |                                                                             |
|                        | 0 - 0.4: 20                                                   |       |                                                                             |
|                        | 0: 0                                                           |       |                                                                             |
| **Waste generated per capita**                                  | (waste generated(Kg/cap- d) - Marks)                            |       | 486                                                                         |
|                        | 0-100                                                          |       | TPD/10.6lak h=45.82TPD - Municipal corporation, Chandigarh                  |
|                        | 0.2 – 80                                                      |       |                                                                             |
|                        | 0.4 – 60                                                      |       |                                                                             |
|                        | 0.6 – 40                                                      |       |                                                                             |
|                        | 0.8 – 20                                                      |       |                                                                             |
|                        | 1- 0                                                          |       |                                                                             |
| **Waste**                                                        | (Percentage share- Marks)                                      |       | 23.33                                                                      |
|                        | 100- 100                                                      |       | Municipal corporation, Chandigarh                                            |
|                        | 80- 80                                                        |       |                                                                             |
|                        | 60-60                                                         |       |                                                                             |
|                        | 40-40                                                         |       |                                                                             |
|                        | 20- 20                                                        |       |                                                                             |
|                        | 0 – 0                                                         |       |                                                                             |
| **Percentage of the city's solid waste that is recycled**       |Percentage of the city's solid waste                             |       | 23.33                                                                      |
|                        | (Percentage share(%)- Marks)                                  |       | Municipal corporation, Chandigarh                                            |
|                        | 100- 100                                                      |       |                                                                             |
|                        | 80- 80                                                        |       |                                                                             |
|                        | 60-60                                                         |       |                                                                             |
|                        | 40-40                                                         |       |                                                                             |
|                        | 20- 20                                                        |       |                                                                             |
|                        | 0 – 0                                                         |       |                                                                             |
| **Water Consumption Per capita (litres/day)**                   | (Water consumption(L/ca p-d) - Marks)                           |       | 227                                                                         |
|                        | 100 – 100                                                      |       | DJB(Delhi Jal Board)                                                        |
|                        | 200 – 80                                                      |       | Chandigarh.govt.in                                                          |
|                        | 300 - 60                                                      |       |                                                                             |
|                        | 400 - 40                                                      |       |                                                                             |
|                        | 500 – 20                                                      |       |                                                                             |
|                        | 500 & above-0                                                 |       |                                                                             |
| **Percentage of city population with portable water supply service** | (Percentage share(%)- Marks)                                  |       | 82                                                                           |
|                        | 100- 100                                                      |       | DJB(Delhi Jal Board)                                                        |
|                        | 80- 80                                                        |       | Municipal corporation, Chandigarh                                            |
|                        | 60-60                                                         |       |                                                                             |
|                        | 40-40                                                         |       |                                                                             |
|                        | 20- 20                                                        |       |                                                                             |
|                        | 0 – 0                                                         |       |                                                                             |
| SANITATION | Percentage of population with access to improved sanitation |
|------------|-------------------------------------------------------------|
|            | (Percentage share(%)- Marks)                               |
|            | 100-100                                                     |
|            | 80-80                                                      |
|            | 60-60                                                      |
|            | 40-40                                                      |
|            | 20-20                                                      |
|            | 0–0                                                        |
|            | 63 DJB(Delhi Jal Board)                                     |
|            | 63 82.9 Data.govt.in                                       |
|            | 75.13                                                      |
|            | 71.04                                                      |

| AIR QUALITY | Share of waste water created | (Percentage share(%)- Marks) |
|-------------|------------------------------|-----------------------------|
|             | 80-80                        |
|             | 60-60                        |
|             | 40-40                        |
|             | 20-20                        |
|             | 0–0                          |
|             | 65 DJB(Delhi Jal Board)       |
|             | 65 68.9 Data.govt.in         |
|             | 82.9                         |

| AIR QUALITY | Percentage of city population served by sewage (waste water) collection |
|-------------|------------------------------------------------------------------------|
|             | (Percentage share(%)- Marks)                                           |
|             | 100-100                                                                |
|             | 80-80                                                                  |
|             | 60-60                                                                  |
|             | 40-40                                                                  |
|             | 20-20                                                                  |
|             | 0–0                                                                    |
|             | 65 DJB(Delhi Jal Board)                                                 |
|             | 65 95 Chandigarh Master Plan                                             |
|             | 82.27                                                                  |

| AIR QUALITY | Sulphur dioxide concentration n levels |
|-------------|----------------------------------------|
|             | Range : Marks                           |
|             | Good (0–50) : 100                       |
|             | Satisfactory (51-100):80                |
|             | Moderate (101-200):60                   |
|             | Poor (201–300) : 40                     |
|             | Very poor(301-400):20                   |
|             | Severe(401-500):0                       |
|             | 34 CPCB ENVIS (Central Pollution Control Board)                           |
|             | 93.2 10 CPCC                        |
|             | 98.8                                   |

| AIR QUALITY | Fine Particular Matter (PM2.5) Concentration |
|-------------|----------------------------------------------|
|             | Range : Marks                               |
|             | Good (0–50) : 100                           |
|             | Satisfactory (51-100):80                    |
|             | Moderate (101-200):60                       |
|             | Poor (201–300) : 40                         |
|             | Very poor(301-400):20                       |
|             | Severe(401-500):0                           |
|             | 352 CPCB ENVIS (Central Pollution Control Board) |
|             | 29.6 18 CPCC                                |
|             | 96.4                                       |
### 3. City Category Results

| Particular Matter (PM10) Concentration | CPCB ENVIS (Central Pollution Control Board) | CPCC |  
|--------------------------------------|---------------------------------------------|------|
| Range: Marks                        | 227                                         | 54.6|
| Good (0–50): 100                    | Satisfactory (51–100): 80                   | 36.6 |
| Moderate (101–200): 60              | Poor (201–300): 40                         | 0.0  |
| Very poor (301–400): 20             | Severe (401–500): 0                        |     |
| Range: Marks                        | 58                                          | 88.4|
| Good (0–50): 100                    | Satisfactory (51–100): 80                   | 3.0  |
| Moderate (101–200): 60              | Poor (201–300): 40                         | 0.0  |
| Very poor (301–400): 20             | Severe (401–500): 0                        |     |
| Range: Marks                        | 352                                         | 29.6|
| Good (0–50): 100                    | Satisfactory (51–100): 80                   | 62.0 |
| Moderate (101–200): 60              | Poor (201–300): 40                         | 0.0  |
| Very poor (301–400): 20             | Severe (401–500): 0                        |     |

Green House Gas Emission Measured in Tones per Capita (CO):  

| CPCB ENVIS (Central Pollution Control Board) | CPCC |
|---------------------------------------------|------|
| 54.6                                        | 36.6 |

Air Quality Index:  

| CPCB ENVIS (Central Pollution Control Board) | CPCC |
|---------------------------------------------|------|
| 88.4                                        | 99.4 |

https://air-quality.com/pl ace/india/ch an digarh/50e51 ed?lang=en &standard=aqi 

| Energy and CO2 | Air Quality | Land Use and Buildings | Transport | Sanitation | Water | Waste |
|----------------|-------------|------------------------|-----------|------------|-------|-------|
| 38.4           | 65.4        | 18.3                   | 29.69     | 64.33      | 75.13 | 23.3  |
| Poor           | Satisfactory| Poor                   | Satisfactory | Satisfactory | Poor |

![Figure 1. Delhi](https://air-quality.com/pl ace/india/ch an digarh/50e51 ed?lang=en &standard=aqi)
Environmental Sustainability is defined as the interaction with the environment to avoid resources available in nature and also to improve environmental quality. For example, renewable energy, like solar, wind and power rather than depending on non-renewable energy sources which cause a lot of pollution. Environment healthcare and sustainability are indigenously interrelated as the environmental quality directly affects public health. With the help of the Sustainability Index, stakeholders can rate and rank any Indian city with respect to the seven categories namely: Energy and CO2, Water, Transport, Waste, Land use and building, Sanitation and Air quality. All the categories form the basic pillar of any city’s sustainability. It will prove to be a beneficial tool targeting various weaker domains of a city in order to enhance quality of standard of living and healthcare of the society. This tool can be used by the stakeholders to benchmark any best performing city and to set a goal for other Indian cities to achieve. This tool can also be used by various government authorities and municipal department of the city, to formulate policies and strategies for the category in which the city has scored least marks.

With the help of the tool, any Indian city can be assessed on environmental sustainability and the domain in which there is a scope of improvement can be determined. For example, in this paper, we compared two cities Delhi and Chandigarh and concluded that Delhi needs to rely more on renewable sources of energy production and Chandigarh has to come up with new strategies to reduce its CO2 production by huge vehicle density.

4.1 Contribution of Research
The Sustainability Index will be a rating and benchmarking tool for the green cities on the same lines as LEED (Leadership in Energy and Environment), which is also a benchmarking tool for the green building. The LEED scope is confined to buildings where a particular platinum building rating is deemed desirable and all other buildings are designed on the same lines. Similarly, highly rated city in the sustainability Index will also be considered an ideal one and the growth of all other cities will follow the same lines. In this way it effectively contributes to the Industry by giving it a first ever tool to measure the environmental performance of a city. For the stakeholders, it becomes a prime necessity to get to know about the environmental conditions and various factors and domains which affect a city’s health prior to investing in that particular city, various other measures are taken into account but the sustainability aspect is hardly looked after. This tool equips them with all that information which helps them in taking a logical decision by comparing all the available options of all other cities.
4.2 Limitation and Recommendation

The Design of the sustainability Index includes number of limitations which should be taken care of before conducting further research on the tool. Firstly, the sustainability tool is specific to Indian cities and the categories and indicators are finalised as per Indian context. Secondly, factors and indicators are filtered and sorted as per data availability and reliability. Also, equal weightages are given to all the indicators irrespective of their effectiveness to specific cities. Thirdly, all the research work rely primarily on secondary data and no primary data is collected and analysed for finalising the category and supporting indicators. As primary data collection will require a huge capital, time and human resource and collection and analysis. It is recommended that for further research, primary data should be collected from wide sources to reach more reliable factors and to establish the authenticity of the results achieved. Lastly, linear interpolation is used in the scale for the allotment of marks to each indicator but in some of the category, linear interpolation will not be the authentic method of calculation. For example, in the category air quality, data will form a S curve, hence linear interpolation will not give true results. It is recommended to carry out intensive field research of the city to be scored to collect primary data rather than depending on the secondary data.

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