

## Developing an Index: Performance Assessment of Public Services provided by Nagar Palikas of Saurashtra and Kutch (Gujarat)

Neelkanth J. Bhatt<sup>1</sup> & Dr. Pradeep Kumar Majumdar<sup>2</sup> & Dr. Rajesh M. Acharya<sup>3</sup>

<sup>1</sup>Research Scholar, C.U. Shah University, Wadhwan & Assistant Professor of Civil Engineering, Lukhdhirji Engineering College, Morbi.

<sup>2</sup>Professor Emeritus, C.U. Shah University, Wadhwan.

<sup>3</sup>Lecturer in Civil Engineering, Department of Civil Engineering, Lukhdhirji Engineering College, Morbi.

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### ABSTRACT

*Gujarat state, located in the western part of India is one of the important industrialized states. In cities of Gujarat urban water and sanitation services are being provided by Nagar Palikas and Maha Nagar Palikas. In this context, performance assessment of public services provided by the respective Nagar Palikas of the state is vital in improving the quality of service provided by them. Though, the Handbook on Service Level Benchmarking published by the Ministry makes it mandatory for all the Urban Local Bodies (ULBs) to assess their performance based on 26 'Performance Indicators', it is seldom collected by the NPs. Contrary to benchmarking by numerous performance indicators, Indices can draw more effectively the public attention than a long list of many indicators. The present study aims to propose an Index that would make collection of data easier. It will also facilitate information to the policy makers in much simpler form. 09 Class-A Nagar Palikas having population in excess of 100,000 from Saurashtra were selected for the study. Lorenz Curve technique and Gini Co-efficient was used to develop 'Financial Index' and Pareto Analysis technique was employed to develop 'Service Index'. 'Performance Index' was developed using both these Indices. All the Nagar Palikas were ranked according to their Performance Index. The performance of Porbandar Nagar Palika was found to be excellent whereas, performance of Jetpur Nagar Palika was worst. Analogous assessment for 'Municipal Corporations' and 'Gram Panchayats' at state and national level could be undertaken by the proposed methodology.*

**Keywords:**

### 1. INTRODUCTION:

Rapid increase in population due to the migration from rural areas is one of the critical issues of the urban growth. Urbanisation in India is drastically changing the land cover and often resulting in the sprawl. The sprawl regions often lack basic amenities such as treated water supply, sanitation, etc [1]. Like any government bodies, local governments also have the role in the providing essential services to its inhabitants. In Gujarat, urban water and sanitation services are being provided by Municipal Corporations (MCs) or Mahanagar Palikas and Nagar Palikas (NP) or Urban Local Bodies (ULBs). Adequate provision of urban water supply and sanitation is prone to become even more difficult in the near future due to numerous changes such as urbanisation, climate change and infrastructure deterioration [2]. Several vital factors like, lake of own income sources, non-transfer of all mandatory functions, weak administrative system, un healthy relations between elected representatives and officials of ULBs and unsatisfactory service delivery have emerged as crucial bottlenecks in the process of well-functioning of ULBs [3]. Urban strategy should therefore recognize these factors and will have to plan accordingly. If water and wastewater utilities are to meet these increasing demands and expectations in both developed and developing countries, they must first take stock of their performance over time; Comparisons with similar utilities elsewhere in the country or region or with standards of international good practice can shed light on how well a utility is performing, identify areas for improvement, and help indicate a plan of action [4].

Benchmarking and Performance Assessment Systems are effective management tools for evaluating and improving performance as has been demonstrated throughout their systematic use in numerous industries for decades [5]. However, their application to the water sector mostly in developing countries is still limited [6]. Benchmarks are somewhat restrained as they work with particular measurement one at a time, it is not easy to evaluate an organization's performance when there is multiple performance matrices coupled to its system [7].

On the contrary, Indices are widely used by policy makers as a tool for the evaluation of achievement on multifarious issues. Their prime advantage is that they recapitulate more than one measure in a single number. As contended by Pual Streeten (1994) "Indices are helpful in focusing attention and make simpler the problem and also have substantial political appeal. Indices can draw effectively the

attention of the public than a long list of numerous indicators, combined with a qualitative discussion. They are eye-catching.” [8]

In this context, the present study seeks to establish a framework for evaluation of public service systems offered by 09 Nagar Palikas (NPs) of Saurashtra and Kutch Region of Gujarat state. NPs selected for the present study are Bhuj, Gandhidham, Morbi, Jetpur, Gondal, Porbandar, Botad, Surendranagar and Veraval-Patan. The Salient Features of Nagar Palikas of Saurashtra and Kutch is presented at Table 1.

Table 1 Salient Features of Nagar Palikas of Saurashtra and Kutch

Name	Status	District	Population (Census)			Area Sq. Km.	Latitude, Longitude
			1991	2001	2011		
Bhuj	Municipality with Outgrowth	Kutch	102,176	102,637	148,834	09.48	23.2420° N, 69.6669° E
Botad	Municipality	Bhavnagar	64,603	100,194	130,327	10.36	22.1704° N, 71.6684° E
Gandhidham	Municipality	Kutch	104,585	151,693	247,992	29.58	23.0753° N, 70.1337° E
Gondal	Municipality	Rajkot	80,584	97,506	112,197	25.00	21.9619° N, 70.7923° E
Morvi (Morbi)	Municipality with Outgrowth	Morvi	90,357	153,828	210,451	24.84	22.8120° N, 70.8236° E
Porbandar	Municipality with Outgrowth	Porbandar	116,671	149,768	152,760	20.30	21.6417° N, 69.6293° E
Surendranagar Dudhrej	Municipality	Surendranagar	106,110	156,161	177,851	39.59	22.7201° N, 71.6495° E
Veraval	Municipality with Outgrowth	Junagadh	93,976	149,571	171,121	38.40	20.9159° N, 70.3629° E
Jetpur	Municipality	Rajkot	73,560	104,312	118,302	36.00	21.7615° N, 70.6276° E

There are numerous indicators which various agencies are suggesting for measuring the performace of a public systems. Present study aims to reduce the number of indicators that are suggested to a bare minimum by employing ‘Pareto Analysis Technique’, making collection of the data easier, and by proposing a single index, cater information in an easy to interpret way to the policy makers.

**2. BENCHMARKING-INDIAN INITIATIVES [9]:**

During the year 2006, the Minsitry of Urban Development, Government of India had commenced an exercise for development of standardised service level benchmarks that can be employed on national level in respect of four basic municipal services viz., Water Supply, Sewerage, Solid Waste Management and Strom Water Drainage. The Minsitry of Urban Development as a result of two year’s rigorous brain-storming by the experts of Indian Institutes of Chartered Accountants of India (ICAI), the Public Record of Operations and Finance (PROOF), the Water and Sanitation Program (WSP) and the Municipal Commissioners of Pune, Banglore, Jaipur, Hyedrabad and Kolkata, released a Handbook on Service Level Benchmarking during 2008. It was expected that the handbook would prove to be a valuable reference document for continuous improvement in service-delivery across Urban Local Bodies in our country.

Recently, the Ministry of Urban Development, initiated a nationwide rollout programme to operationalize service level benchmarking process and build capacities across states and ULBs; specifically Municipalities/Nagar Palikas and Municipal Corporations. This is one of the nine conditions, the accomplishment of which would allow the States to access performance grants recommended by the 13th Finance Commission. About 1,800 municipalities/ Nagar Palikas, municipal corporations and parastatals will come under the ambit of the SLB rollout programme.

**3. METHODOLOGY:**

**3.1 Data Collection:**

Because of the exploratory but demonstrative nature of the study a quantitative research approach was employed for the study. A desk study was undertaken to prepare an inventory of data that could be collected from secondary sources. The data of year 2005 to 2017, pertaining to the income and expenditure of selected 09 NPs were obtained from the website of Gujarat State Third Finance Commission [10]. The data about Performance Indicators (PIs) of these 09 NPs were obtained from website: <http://www.pas.org.in> [11]. With a view to ascertain the accuracy and overall distribution of the observations in the data-sets, statistical analysis was performed on the collected data and also on the data that was to be used for the calculation of Indices.

**3.2 Framework:**

**3.2.1 Financial Index:**

The Financial data regarding income of respective NPs of Saurashtra and Kutch were used to draw 'Lorenz Curve' of income. 'Gini co-efficient' which is extensively used world over to show inequality in income was then calculated from the respective Lorenz Curve for all the NPs. Since, the Gini co-efficient was subsequently considered as Financial Index (FI) for the respective NPs, the range of FI would also be 0-1.

**3.2.2 Service Index:**

Though, the Handbook on Service Level Benchmarking published by the Ministry makes it mandatory for all ULBs to assess their performance based on 26 'Performance Indicators', it is seldom collected by the NPs. The collection of data by the respective NPs is also always not possible due to staff shortage &/or availability of time and fund required for the same. Therefore, considering these limitations of NPs in data collection only those PIs were selected for the study for which the data-set was available for all the 09 NPs. The PIs considered for the present study is presented at Table 2.

Table 2 Performance Indicators (PIs) considered for the study

Sl. No.	PIs	Notations
1	Quality of Water (%)	W1
2	Cost Recovery O & M in Water Supply Service (%)	W2
3	Extent of Non-Revenue Water (%)	W3
4	Coverage of Water Supply Connections (%)	W4
5	Per Capita Supply of Water (LPCD)	W5
6	Continuity of Water Supply - 24 Hrs	W6
7	Efficiency in Redressal of Consumer Complaint (%)	W7
8	Efficiency in Collection of Water Supply Related Charges (%)	W8
9	Coverage of Storm Water Drainage (%)	SW1
10	Incidence of Water Logging -Nos.	SW2
11	Coverage of Toilets (%)	WW1
12	Coverage of Waste Water Network (%)	WW2
13	Collection of Efficiency of Waste Water Network (%)	WW3
14	Extent of Cost Recovery in Waste Water Management (%)	WW4
15	Efficiency in Redressal of Customer Complaint (%)	WW5
16	Efficiency in Collection of Sewerage Related Charges (%)	WW6
17	House Hold Level Coverage of SWM Services (%)	SWM1
18	Efficiency of Collection Of Municipal Solid Waste (%)	SWM2
19	Extent of cost Recovery O & M In SWM Charges (%)	SWM3
20	Efficiency of Redressal of Customer Complaint SWM (%)	SWM4
21	Efficiency in Collection of SWM Related Charges (%)	SWM5

Pareto Analysis technique was employed on the data of respective NPs to find out most vital PIs of the system. Predominant PIs were then identified from the Pareto chart of the respective NPs using the "80/20" rule. Only those 10 vital PIs that were common to at least 05 NPS were subsequently used to work out the average value of all PIs. The 'Service Index' (SI) of the respective NPs was then calculated as:

$$SI = (S_i - S_{max}) / (S_{max} - S_{min}) \dots \dots \dots \text{Eq. (1)}$$

Where,

$S_i$  = Service Index

$S_i$  = Average value of 10 vital PIs of respective NP

$S_{max}$  = Maximum value of vital PI of respective NP

$S_{min}$  = Minimum value of vital PI of respective NP

The SI will be having a range of 0-1.

**3.2.3 Correction for Operation Disruption:**

Urban infrastructure systems could not be operated due to natural and anthropogenic circumstance beyond control of respective municipal body, such as, Earthquake, Tsunami, Floods, and Riots and alike.

Certain municipal bodies during the assessment period may be facing such situations whereas the other would not be. This could introduce a bias in the above framework. To compensate this bias a correction known as ‘Operation Disruption Correction’ (ODC) is introduced. ODC for respective NPs was calculated as:

$$ODC = [(O_i - O_{max}) / (O_{max} - O_{min})] \times 100 \dots\dots\dots (VI)$$

Where,

ODC = Operation Disruption Correction

$O_i$  = Actual No. of days for which the respective Nagar Palika provided services to the dwellers,

$O_{max}$  = Maximum No. of days for which all respective Nagar Palika provided services to the dwellers

$O_{min}$  = Minimum No. of days for which all Nagar Palika provided services to the dwellers

The ODC will be having a range of 0-100. As such, the disruption if any would tend to reduce the PI of a Nagar Palika, the correction in form of ODI is positive in nature.

**3.2.4 Performance Index:**

The ‘Performance Index’ (PI) for respective NPs was calculated as:

$$PI = FI + SI + ODC \dots\dots\dots Eq. (2)$$

Both indices have their value between 0 & 1, accordingly, each of the two component was multiplied by 50 to get the ‘Performance Index’ which ranges from 0 - 100. All the NPs were then accordingly assessed based on the score of PI.

**4. RESULTS AND DISCUSSION:**

**4.1 Financial Index:**

The ‘Lorenz Curve’ showing inequality in income of respective NPs is presented at Fig. 1. The distribution of income of Porbandar Nagar Palika showed highest inequality over a period of 2008 to 2017, whereas during the period 2008 to 2017 the Jetpur Nagar Palika showed the best equality in terms of Income distribution. During the same duration, the income of Morbi Nagar Palika was highly erratic. The Gini coefficient in this case is a measure of inequality of income distribution of all the NPs of Saurashtra and Kutch. It is a ratio with values between 0 and 1: the numerator is the area between the Lorenz curve of the income distribution and the uniform income distribution line; the denominator is the area under the uniform income distribution line. The Financial Index and the Rank for all the NPs is presented at Table 3.

The data on revenue income and expenditure of all these NPs may suffer from problems due to different methods of keeping accounts and also due to the fact that different heads of revenue expenditure at times may be clubbed together by some NPs and other NPs may not do so. Standardization of record keeping all over Gujarat state by all the Public service providers would thus help to overcome such difficulties. The prime reason for poor Financial Index of all these NPs could be attributed to the fact that Sanitation and Solid Waste Management services have a profound expenditure with very meager revenues. Cost recovery from all the services, at present, is gloomy with only a fraction of the expenditure on the service being recovered. Therefore, expenditure norms, based on performance norms, should be fixed by the government in order to guide the NPs in improving its performance.

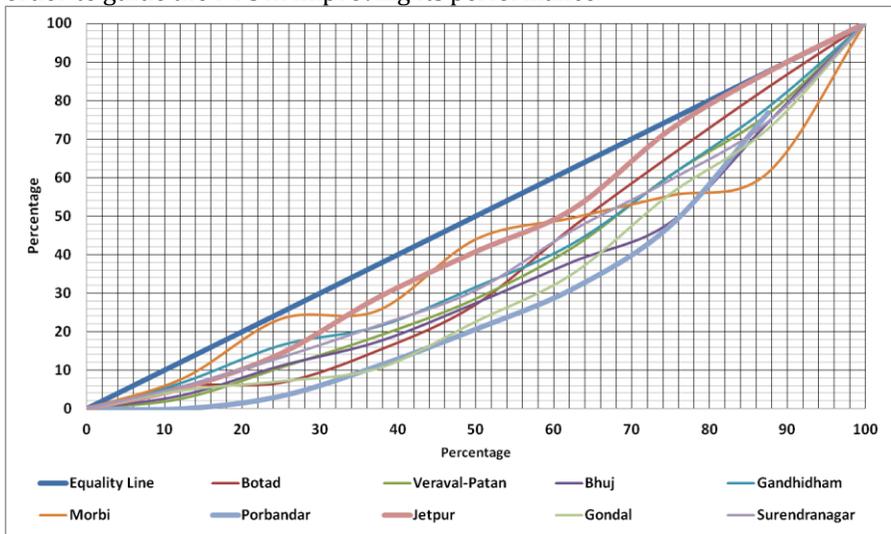


Figure 1 Lorenz Curve of Income of Nagar Palikas of Saurashtra and Kutch

Table 3 Financial Index of NPs of Saurashtra and Kutch

Nagar Palika	Financial Index	Rank
JETPUR	0.122	1
MORBI	0.207	2
GANDHIDHAM	0.23	3
SURENDRANAGAR	0.245	4
BOTAD	0.247	5
VERAVAL-PATAN	0.275	6
BHUJ	0.324	7
GONDAL	0.353	8
PORBANDAR	0.398	9

**4.2 Pareto Analysis:**

The Pareto principle is widely used in the field of quality control and is also a basic tool for total quality control and six-sigma. Accordingly, in order to assess the performance of services offered by NPs in Water Supply, Sewerage, Solid Waste Management and Storm Water Drainage sectors this technique was employed. Collection of vital few numbers of data for less number of PIs would save time and money of respective NPs.

The Pareto chart for Morbi Nagar Palika is presented at Fig. 2 Similar charts for rest 08 NPs were also prepared and resulting vital PIs are presented at Table 4.

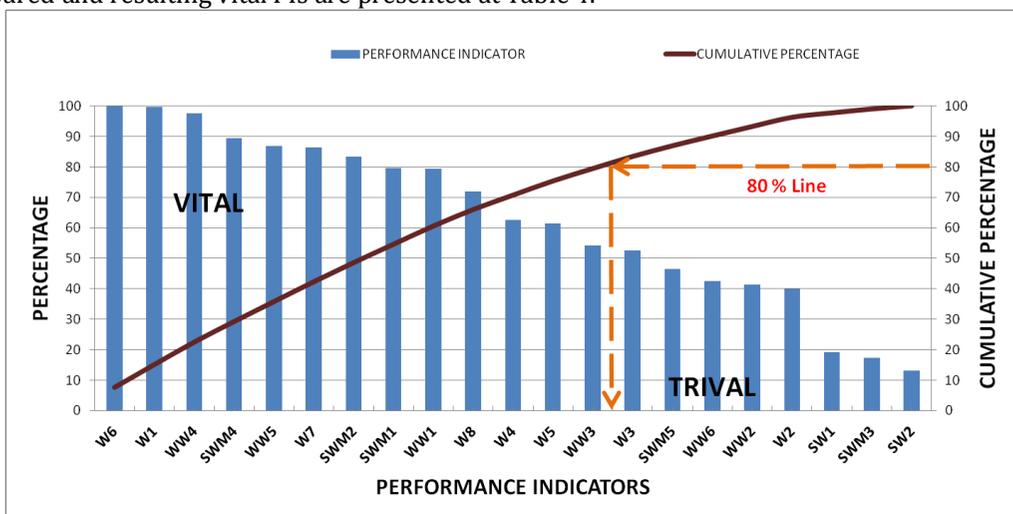


Figure 2 Pareto Chart for Morbi Nagar Palika  
Table 4 Vital PIs based on Pareto Analysis

BHUJ	GANDHI-DHAM	JETPUR	GONDAL	MORBI	SURENDR-ANAGAR	POR-BANDAR	BOTAD	VERAVAL-PATAN
1	1	1	1	1	1	1	1	1
2	2	4	4	4	2	2	2	4
4	4	7	7	5	6	5	6	5
5	6	8	8	6	7	7	7	6
6	7	15	11	7	9	9	11	7
7	11	17	15	8	10	11	14	11
11	12	18	17	11	11	15	15	15
14	14	20	18	13	15	17	17	17
15	15	21	20	14	20	18	18	18
18	17		21	15		20	20	20

20	18			17				
	20			18				
				20				

(The figures in the cells corresponds to PIs corresponding SL. No. shown at Table 1)

**4.3 Service Index:**

In assessing the performance of these NPs there are several factors that ought to be considered. Firstly, the social context of Gujarati cities is very heterogeneous with different caste groups and there are large disparities between rich and poor. Secondly, the crucial social constraints such as high levels of illiteracy in some cities especially among women and the poor should also be acknowledged in this context. In addition, the size of NPs too, varies significantly in present case. The smaller sized NPs are easier to plan for and easier to administrate but are less practicable whereas larger units require more administrative and organizational infrastructure but are more pragmatic and effective.

Unreliable Pattern of water supply in Jetpur, Gondal and Porbandar was vital in reduction of service performance of these NPs. The coverage of Water Supply connections was also less than 50 % for Porbandar and Botad. The coverage of toilets in these 09 NPs except for Veraval-Patan, Gandhidham and Bhuj was less than 80 %. The coverage of toilets for poor performing NPs can be represented as Morbi > Surendranagar > Porbandar > Gondal > Jetpur. The Service Index and Rank of NPs is presented at Table 5.

Table 5 Service Index of NPs of Saurashtra and Kutch

Nagarpalika	Service Index	Rank
BHUI	0.815	1
BOTAD	0.788	2
GONDAL	0.784	3
SURENDRANAGAR	0.772	4
JETPUR	0.775	5
PORBANDAR	0.782	6
VERAVAL	0.752	7
GANDHIDHAM	0.807	8
MORBI	0.700	9

**4.4 Correction for Operation Disruption:**

Based on the data availability regarding disruptions caused in normal operations of municipal services the corrections to be applied are presented in Table 6. Data of 2012 -2017 was used to calculate the ODC. The maximum number of days during which the services could have been made available to the respective municipal users was 1827, the minimum number of days during which municipal services was catered was 1804 for Jetpur Nagar Palika. Porbandar Nagar Palika had to deal disruptions in the services only for 3 days and served for the maximum number of days, i.e. 1824 days out of 1827 days.

Table 6 ODC for NPs of Saurashtra and Kutch

Nagarpalika	Correction
PORBANDAR	0.87
BHUI	0.78
GONDAL	0.65
GANDHIDHAM	0.57
BOTAD	0.52
VERAVAL	0.48
SURENDRANAGAR	0.39
MORBI	0.17
JETPUR	0

**4.5 Performance Index:**

The PI and Rank of all the NPs are presented at Table 7. Improvement in Water Supply sector by Jetpur Nagar Palika, improvement in Water Supply and Solid Waste Management sector by Surendranagar

Nagar Palika and improvement in Water Supply sector by Morbi Nagar Palika will help these NPs to improve their overall performance. Similarly, there is scope of improvement for all four sectors for Porbandar, Bhuj and Gondal Nagarpalika.

Growing population would pose a challenge of providing higher levels of service with sustainable sources and systems for these NPs. Even more, due to relentless pressure of Climate change and rapid urbanization it is extremely important that all NPs across the state boost their Performance Index to at least 80 %.

Table7 Performance Index of NPs of Saurashtra

Nagarpalika	Performance Index (0-100)	Rank
PORBANDAR	59.91	1
BHUJ	57.76	2
GONDAL	57.52	3
GANDHIDHAM	52.45	4
BOTAD	52.29	5
VERAVAL	51.84	6
SURENDRANAGAR	51.24	7
MORBI	45.56	8
JETPUR	44.87	9

## 5. CONCLUSIONS:

Regular performance assessment is vital in improving the quality of service provided by various Nagar Palikas and Municipal Corporations of Gujarat. This can also help to identify best practices and thereby serve as knowledge-exchange platform and can play a significant role in achieving higher effectiveness and efficiency in operations and delivery of public services.

In this paper, an effective, easy to draw and meaningful index (Performance Index) is developed by employing Lorenz Curve, Gini Co-efficient and Pareto Analysis techniques. This 'Performance Index' facilitates quick comparison of performance of public utility services offered by Nagar Palikas. This index also reduces the Performance Indicators that should be monitored by service providers for a quick assessment of its performance.

Of the 09 NPs of Saurashtra and Kutch the performance of Porbandar Nagar Palika was found to be excellent; whereas, performance of Jetpur Nagar Palika was worst.

Analogous assessment for 'Municipal Corporations' and 'Gram Panchayats' at state and national level could be undertaken by the proposed framework.

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