



सत्यमेव जयते

Ministry of Ports, Shipping and Waterways
Government of India

“SAGAR AANKALAN”

National Benchmarking
Guidelines - Mapping Logistics
Performance of Indian Ports
(February 2024, Rev-0)





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1. Introduction:

- 1.1 PM Gati Shakti National Master Plan (NMP) envisioned by the Hon'ble Prime Minister fosters a transformative approach for integrated and holistic logistics planning in the country.
- 1.2 Under the PM Gati Shakti National Master Plan (NMP) and National Logistics Policy (NLP), the maritime sector plays a key role in accelerating productivity and economic growth while ensuring competitive service delivery to the customers.
- 1.3 Policy initiatives undertaken by the Government of India have led to operational improvements in the maritime sector which is reflected in global recognition and acclaim by leading international agencies. According to the Logistics Performance Index (LPI) published by the World Bank (2023), India's ranking in the "International Shipments Category" has jumped from 44th to 22nd rank and Indian Ports have outperformed several global peers on various operational parameters including container turn-around time and dwell time.
- 1.4 To develop and calibrate India's maritime competencies with other global competitors in the maritime sector, the Ministry of Ports, Shipping and Waterways (MoPSW), Government of India, has developed a benchmarking methodology, on the lines of globally adopted procedures, for assessing Logistics Port Performance Index (LPPI) for inter-port comparison based on their operational performance.

2. Objective:

- 2.1 Assessing logistics performance of Indian ports through operational performance based inter-port comparison.
- 2.2 Improving efficiency, competitiveness and overall performance of Indian ports.
- 2.3 Aligning evaluation and assessment procedures followed nationally with global norms, standards and definitions.

3. Applicability:

- 3.1 All Indian Ports (major & non-major) notified under Indian Ports Act (1908).
- 3.2 Assessment under two categories i.e. Bulk (including Dry & Liquid) and Container.
- 3.3 Assessment to be done annually (in April for the preceding financial year).

4. Definitions:

- 4.1 **Cargo Handled:** Cargo handled is the total of cargo loaded, cargo unloaded and cargo transshipped during the year from 1st April to 31st March.
- 4.2 **Container Traffic:** Container traffic is the aggregate of containerized cargo and the tare weight of containers in TEUs. In this case, container moves on account of shifting must not be included.
- 4.3 **Average Pre-berthing Waiting Time:** Total time[^] between arrival and berthing for all berthing ships, divided by number of berthing ships (*refer UNCTAD definitions*)

(^This is the time taken by a ship from its arrival at the anchorage (reporting station) till it is berthed to the operational berth.)

4.4 **Average Turn Around Time:** Total time* between arrival and departure for all ships, divided by number of ships (*refer UNCTAD definitions*)

(*The total time spent by a vessel at the port from its arrival at the reporting station till its departure from the reporting station for onward journey. It, thus, includes pre-berthing delay, time taken for cargo operations, and idle time. However, the detention/idle time due to litigation, fire, repair/dry docking, delay in the decision regarding dismantling, etc. may be deducted.)

4.5 **Average Ship Berth Day Output:** The Average Ship Berthday Output is aggregate cargo handled divided by the total number of berth days spent by the cargo ships during the year from 1st April to 31st March.

4.6 **Percentage of Idle Time at Berth:** The total idle time spent by cargo ships at berths expressed as a percentage of the total time spent at berths.

4.7 **Port Dwell Time (Container):** Dwell time is the time spent by a container inside a Port before gated out (in import) or loaded on a vessel (in export) (*refer NLDC- Performance Indicators and Definition of Analytics Report*)

$$\text{Average Container Dwell Time} = \frac{\{(\text{Share of Export Container in \%} / 100 \times \text{Export Dwell Time}) + (\text{Share of Import Container in \%} / 100 \times \text{Import Dwell Time})\}}{2}$$

4.8 Percentage Share of Renewable Energy (RE) is defined as the ratio of RE consumption to the total Energy consumption. (Consumption should also take into account power consumption in terminals/ berths being operated on PPP or Captive operator)

5. Metrics & Methodology:

5.1 LPPI (Logistics Port Performance Index) shall be derived using a standard multi-criteria selection and evaluation algorithm (quantitative and qualitative input-based) used widely in the industry (refer Annexure I).

5.2 Operational KPIs used as criteria in the algorithm are tabulated along with their respective impact factors as under:

(i) Bulk Cargo Category:

Sr. No.	KPI	Weightage	Impact
1.	Customer Satisfaction	0.20	+
2.	Cargo Handled	0.20	+
3.	Idle Time at Berth as percentage of total time	0.10	-
4.	Average Turn Around Time	0.15	-
5.	Average Pre-Berthing Waiting Time	0.10	-
6.	Average Ship Berth-Day Output	0.15	+
7.	Share of Renewable Energy	0.10	+

(ii) Container Cargo Category:

Sr. No.	KPI	Weightage	Impact
1.	Customer Satisfaction	0.20	+
2.	Cargo Handled	0.20	+
3.	Idle Time at Berth as percentage of total time	0.10	-
4.	Average Turn Around Time	0.07	-
5	Average Container Dwell Time	0.08	-
6.	Average Pre-Berthing Waiting Time	0.10	-
7.	Average Ship Berth-Day Output	0.15	+
8.	Share of Renewable Energy	0.10	+

5.3 For all the criteria (KPIs) mentioned above (except for the criteria related to Customer Satisfaction and Share of Renewable Energy), the total weightage would be apportioned such that 50% would apply to the absolute performance data and the balance 50% to the incremental improvement in performance data year on year. However, for “Customer Satisfaction” and “Share of Renewable Energy (RE)” the total weightage would be applied to absolute data only.

5.4 Evaluation of the criteria related to “Customer Satisfaction” shall be done based on a survey questionnaire to be filled by port users/shipping lines/stakeholders (exporters/

importers)/ industry/ logistics service providers/ regulatory bodies etc. The outcome of the survey would be quantified on a scale of 1 to 5 which would be then used as an input criterion in the evaluation algorithm. An indicative questionnaire for Customer Satisfaction survey is annexed to the instant Guidelines (refer Annexure II).

6. To incorporate the feedback and suggestions received from various stakeholders on the implementation of these Guidelines, the Ministry would review the Guidelines as required to suitably incorporate the learnings from the National Benchmarking exercise under these Guidelines.
7. In case of any ambiguity or doubt arising in regard to any provision of these Guidelines, the Ministry of Ports, Shipping and Waterways (MoPSW) would have the powers to interpret and clarify the same within the overall framework and spirit of these Guidelines.

Methodology

The evaluation process can be encapsulated in 7 steps:

1. Creation of a matrix consisting of M alternatives and N criteria. This matrix is usually called an “evaluation matrix”.

$$(a_{ij})_{M \times N}$$

Illustration: M represents the number of seaports, while N represents the number of criteria (TAT, OSBD, PBD, Traffic etc).

2. Normalization of evaluation matrix:

$$\alpha_{ij} = \frac{a_{ij}}{\sqrt{\sum_{i=1}^M (a_{ij})^2}}$$

Each metric j for each seaport 'i' is normalized between 0 and 1. The higher its value, the better the metric.

3. Calculation of the weighted normalized decision matrix. Each criterion should have its own weight so that all of them will sum up to 1.

$$\chi_{ij} = \alpha_{ij} * \omega_j$$

$$\omega_j = \frac{w_j}{\sum_{j=1}^N w_j}$$

$$\sum_{j=1}^N \omega_j = 1$$

After a weight is assigned to each metric, normalization to be done so that the weights sum up to 1. Then each normalized metric from step 2 is multiplied by the corresponding normalized weight.

- Determination of the best and the worst alternative for each criterion:

$$\chi_j^b = \max_{i=1}^M \chi_{ij}$$

$$\chi_j^w = \min_{i=1}^M \chi_{ij}$$

Finding the maximum and minimum value of each KPI metric among all ports.

- Calculation of the Euclidean distance between the target alternative and the best/worst alternative:

$$d_i^b = \sqrt{\sum_{j=1}^N (\chi_{ij} - \chi_j^b)^2}$$

$$d_i^w = \sqrt{\sum_{j=1}^N (\chi_{ij} - \chi_j^w)^2}$$

This is a calculation of the geometric distance between the value of each KPI metric for a given port i and the best/worst value of such a metric among all ports.

- For each alternative calculate the similarity to the worst alternative. The results are the evaluation scores:

$$s_i = \frac{d_i^w}{d_i^w + d_i^b}$$

A score is calculated for each port based on distances obtained as above.

- Rank alternatives are sorted according to scores in the descending order.

Customer Satisfaction Questionnaire / Survey Form

Name of Client: _____

Port Name: _____

Service availed: _____

(Rate on the scale of 1 to 5 where:

1 - Poor, 2 - Fair, 3 - Satisfactory, 4 - Good, 5 - Excellent)

1. Logistics tracking & punctuality: _____
2. Quality/price ratio: _____
3. Quality of communications with staff (Professional attitude and behaviour): _____
4. Cargo handling (Safety / Security): _____
5. Quality of services/ technical support in meeting client's requirements: _____
6. After sales service: _____
7. Reliability & Efficacy in operations/ Management: _____
8. Error- free invoice and related documents: _____
9. Infrastructure of the port (berths, yards, warehouses, distribution centres, and hinterland connection networks): _____
10. Digital Infrastructure of the Port: _____

Signature:

Date:



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