

# **Measuring Export Related Port Logistics in India: An Attempt to Rank Major Ports<sup>1</sup>**

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<sup>1</sup> The views are personal.

## 1. Introduction

At the outset, economies across the world in the last two decades have witnessed greater regional and economic integration due to gradual reduction in tariff and non-tariff barriers across nations. Independent nation states, such as those in Europe, have given way to economic communities; while in other countries regional agreements about trade, investment and the mobility of people have reduced the barriers to a considerable extent to cross border economic engagement. Most of the countries adopted outward-looking economic policies to promote growth and employment through expanding export-oriented activities. All countries nowadays court multinationals to promote growth and increasing the productivity of investment. Typically, multinationals locate production process across nations to reap benefits from lower cost of production and raw materials. This necessitates movement of parts, components, semi-manufactured goods and sub-assemblies across nation at a fast pace with minimal impediments/cost. Furthermore, increased competitive pressure in today's world has made all firms to be cost conscious. The outsourcing to lower cost firms and countries has become a major source of cost reduction. Reduced inventory costs through just-in-time manufacturing, and an efficient supply chain management has been another effective instrument for cost reduction. With worldwide fall in tariff levels, efficiency of supply chains and associated logistics costs have become core determinants of competitiveness for both firms and countries. This trend is now very much evident in the first world economies as well as in fast growing East Asian economies.

Of late, India has been proactive to make India a part of the global supply chains and a manufacturing hub. However, the high logistics cost in India as compared to those in other countries with similar environments and states of development is a matter of concern for the attainment of high manufacturing growth and to be a hub of global supply chain (Armstrong et. al., 2017, Pohit et. al., 2019a). Several reasons are cited for the high logistics costs in India (Avalon, 2017, Cygnus, 2007). These include an unfavourable policy regime, lack of a multimodal transport system, and the consequent heavy reliance on road transport, fragmented storage infrastructure, the presence of multiple stakeholders in the entire transport and storage value chain, inferior quality of road and port infrastructure, and the absence of technology intervention in storage/transportation and distribution activities. While everybody understands the need for keeping logistics cost on the lower side, no considerable effort has been made in India to quantify the same and track its changes over the years. Pohit et al (2019b) report on logistics cost throws light in this context which tried to understand the logistics costs across major domestic/export routes and to quantify the macro logistics costs of India. However, the above study did not try to measure logistics costs across various activities within a port. To our best knowledge, no attempt has been made by other researchers to measure the same in recent years.

No doubt, it is important to quantify the time required for various activities within port and benchmark the same against international norm. The time loss in various activities within the port affects the exporter/importer adversely and as a consequence competitiveness of the country. In this context, this paper tries to map the major activities/processes each exporter need to go through in the selected land port or seaport or airport. This enables us to look into the processes, time taken during various processes, and the perceptions of stakeholders about the extent of challenges they face during these processes. Taking these factors into account, the paper provides

a comparison across exporting ports in terms of their efficiency in clearing cargo, which is measured in terms of time taken in various stages of cargo handling within a port.

## **2. Data and Methodology**

Given the limited published data in this area in India, we had to resort to a pan-India survey to collate information on the above issues<sup>2</sup>. The primary survey included interactions with the logistics firms (Third Party Logistics, Second Party Logistics, Others), Standalone warehouse operators, End users managing own logistics (First Party Logistics), Freight forwarders/clearing agents, Transporters, End-users (manufacturing companies as well as standalone importers) and Port authorities/experts. Interviews were conducted with two sets of stakeholders to collect data. Firstly, interviews with the top officials of the companies were conducted using a semi-structured questionnaire. It is well understood that the top officials of companies at either the corporate offices or regional offices would be well versed of relevant information about the sector and can provide the same with views from top level as well as grass root level. Hence, in-depth discussions were held with this group with open-ended questions to obtain facts as well as their perceptions about various aspects of the logistics sector. However, certain information such as logistics costs and the similar ones that are standard hard numbers in nature, was captured through structured questionnaire from this group as well as others.

We have used 11 variables for the paper from the entire data set used in Pohit et al (2019b). These variables represent parameters like logistics time, logistics costs and perception of the stakeholders about various logistics related activities, primarily within the port area. It does not include transport cost of movement of merchandise outside the port premises. To make it a holistic assessment of the ports, considering origin and destination for products, we have considered indicators that represents activities in the ports. Following are the list of variables we have considered for our analysis:

1. Logistics time in hours;
2. Demurrage cost as percent of logistics cost;
3. Ease of customs and documentation measured on a scale of 1-10, with 1 being least hindrance;
4. Cost of Customs clearings as share of total logistics cost
5. Speed money as per cent of logistics cost;
6. Overall perception of bribes as hindrance to business, measured on a scale of 1-10, with 1 being least hindrance;
7. Harassment by gangs/pilferage or leakage etc. measured on a scale of 1-10, with 1 being least hindrance;
8. Time taken in hours from unloading of cargo to customs check at storage yard
9. Time taken in hours from customs check at storage yard to goods finally move out of port for importers
10. Time taken in hours from the cargo transported to port to inspection by CEBC officials for exporters
11. Time taken in hours from completion of CEBC official's inspection to cargo loaded on vessel

In our study, 22 major routes for export cargoes were selected. We have tried to ensure an all-India coverage. Below, we describe our selected routes and the commodities chosen for our study

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<sup>2</sup> This data for this study was collated as part of the NCAER's study on logistics costs (Pohit et al, 2019b)

**Table 1 Export Routes under study**

<b>Sl. No.</b>	<b>Route/Product</b>	<b>Sl. No.</b>	<b>Route/Product</b>
1.	Chennai → Katupalli Port, Cargo: Exports of organic chemicals	12.	NCR → Mundra Port, Cargo: Exports of automobiles
2.	Route: Durgapur → Kolkata, Cargo: Exports of steel cargos	13.	Pune → Mumbai (Floriculture)
3.	Hyderabad → JNPT Port, Cargo: Exports of pharmaceutical products	14.	Pune → Mumbai Airport (Pharma)
4.	Hyderabad → Visakhapatnam Port, Cargo: Exports of pharmaceutical products	15.	Rajkot → Pipavav, Cargo: Exports of inorganic chemicals
5.	Kanpur → Delhi Airport, Cargo: Exports of leather items	16.	Surat → JNPT Port, cargo: exports of textile items
6.	Kolkata → Petrapole, Cargo: Exports of Fast Moving Consumer Goods (FMCGs)	17.	Tirupur- Kochi, Cargo: Exports of textile items
7.	Kozhikode → Cochin, Cargo: Exports of carpets	18.	Tirupur → Tuticorin, Cargo: Exports of textile items
8.	Mumbai region → JNPT Port, Cargo: Exports of electrical machinery	19.	Trichy → Chennai Cargo: Exports of leather products
9.	Nagpur → JNPT Port, Mumbai, Cargo: Exports of horticulture products	20.	Vadodara → Mundra Port, Cargo: Exports of Basmati rice
10.	Nasik → JNPT Port Mumbai, Cargo: Exports of grapes	21.	Vijaywada → Kakinada, Cargo: Exports of granite/marble
11.	NCR (Noida) → Delhi Airport, Cargo: Export of gems and jewellery items	22	Vijaywada → Kakinada Port Cargo: Exports of Non-Basmati rice

The sample size of the primary survey is given below.

**Table 2 Sample Size of Respondents**

<b>Respondent Category</b>	<b>No. of Interviews</b>
Logistics firms (Third Party Logistics, Second Party Logistics, Others)	490
End-users managing own logistics (First Party Logistics)	140
Freight forwarders	140
Transporters	105
End-users (manufacturing companies as well as standalone importers)	210
Port authorities/experts	35
<b>Total</b>	<b>1120</b>

Source: Pohit et al (2019b).

### 3. Creating the Index of Logistics Performance of the Ports

The logistics performance index of port is a summary measure of performance parameter of the port based on the 11 logistics related parameters as mentioned earlier. Several methodologies are available for indexation purpose. These include simple combination of variables as well as model based composite index. The choice of methodology often depends on whether weights are used to construct the composite index. These weights reflect relative importance of each of the variables in capturing the phenomenon in question. Mostly, model based composite index is used when weights are to be determined in an unbiased manner. Otherwise, either equal weight or subjective weights are assigned to arrive at a composite index (see Kundu 1980). Our data is a mix of continuous and categorical variables and thus, does not allow us to opt for a model based composite index. Since subjective weights are avoidable unless the relative important of the variables are known in a confirmed manner, the paper avoids that option also. The best possible method for constructing a composite index is a simple linear combination of variables with equal weights. This study adopted the indexation methodology as used in Human Development Report 2020 (UNDP 2020b) as well as in many other studies such as The Global Competitiveness Report 2019 (Schwab 2019). The final index has been calculated in two steps as given below:

Step 1: Index for each variable was created using the values for the best and the worst performers in terms of logistics.

This is done in order to transform the variable expressed in different units into indices between 0 and 1. These can be considered as “the natural zeros” and “aspirational targets”, respectively, from which the performance indicators are standardized.<sup>3</sup> The equation used for the purpose is given below:

$$\text{Index value} = \frac{(\text{Actual observation value} - \text{Minimum value of the variable})}{(\text{Maximum value of the variable} - \text{Minimum value of the variable})} \times 100$$

Note that some of the port related data is captured in a manner that was inversely related to logistics performance of the port<sup>4</sup>. To take care of this issue, the individual index was computed as 100 minus the index value obtained using the given formula. This translates the index value to be positively correlated with the performance. In other word, the individual index value is calculated in a manner that it can be interpreted as higher the index value, better is the performance.

Step 2: All the individual index values were combined linearly to obtain the final composite index value. This assigns equal weight for all variables considered.

However, a critical point needs to be noted that like most other indexation methodologies, the index constructed through this methodology also is relative in nature. It can only provide a comparative picture with the selected set of units considered for index computation. Comparing

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<sup>3</sup> Technical Notes to the Human Development Report (UNDP 2020b).

<sup>4</sup> For example, logistics time or cost of customs clearance as share of total logistics cost etc. The rationale being higher the logistics related time or costs within a port, poorer is the performance.

the index values with any entity outside this set is strictly not possible. Therefore, any comparison is valid within the set of the selected ports only for the current study.

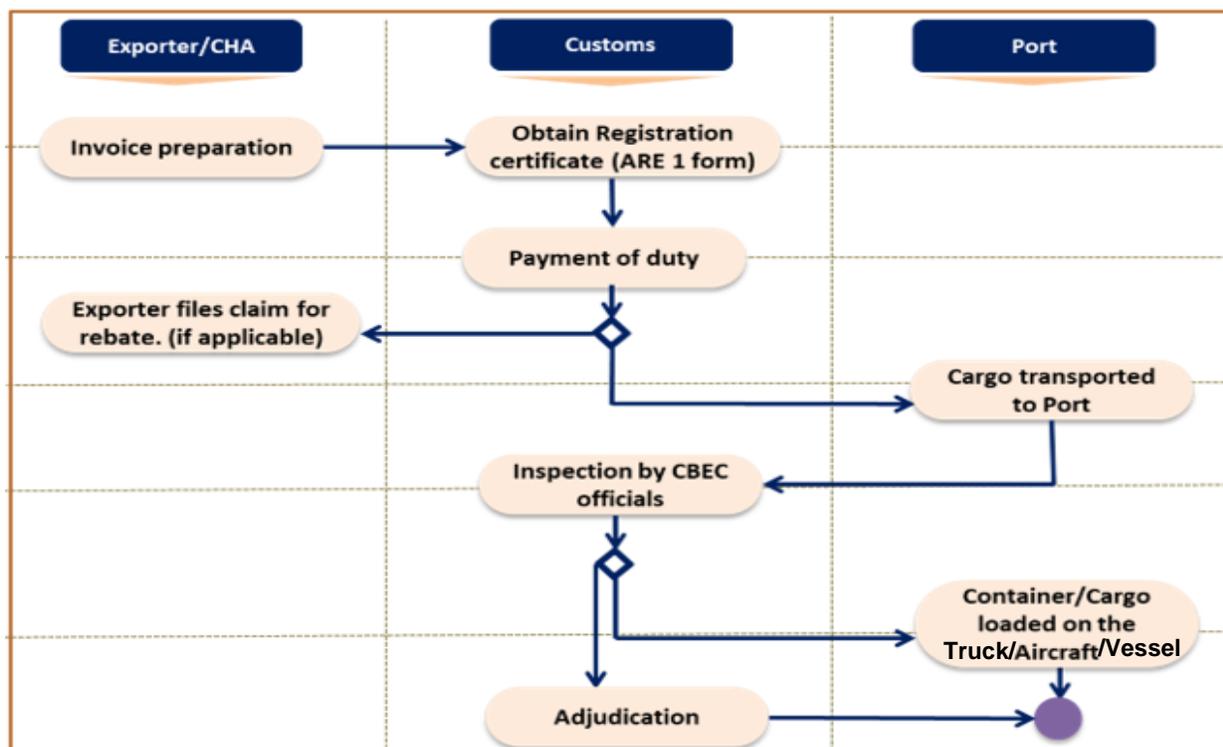
#### 4. Analysis of Results

Before presenting the index, it is worth understanding the process every consignment needs to go through during export.

An export consignment goes through two major phases within a port once it reaches there:

- From the cargo transported to port till inspection of the cargo by CEBC officials
- Completion of CEBC inspection till the cargo loaded on vessel/aircraft/truck etc.

**Figure 1 Process to Follow for Export consignment**



We have analysed data for all individual ports that are exporting commodities to other countries.<sup>5</sup>

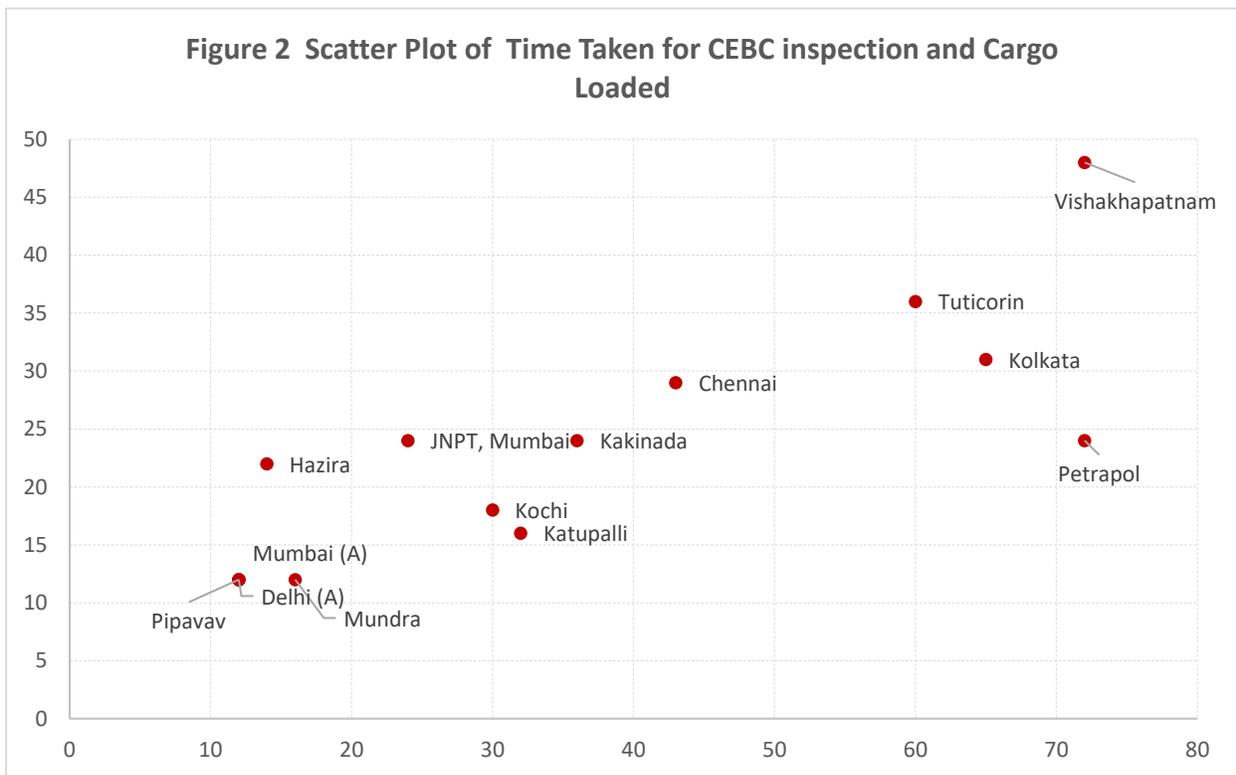
Large variation is observed in terms of average time taken for export consignments during these two processes as reported by exporters. The maximum and minimum time taken for each of these processes for export consignments are given below.

- From the cargo transported to port till inspection of the cargo by CEBC officials -Maximum 72 hours and minimum 12 hours.

<sup>5</sup> Pune – Mumbai has been considered twice in ranking since we have considered two different products, floriculture and pharma.

- From completion of CEBC inspection till the cargo loaded on vessel/aircraft/truck etc. - Maximum 48 hours and minimum 12 hours.

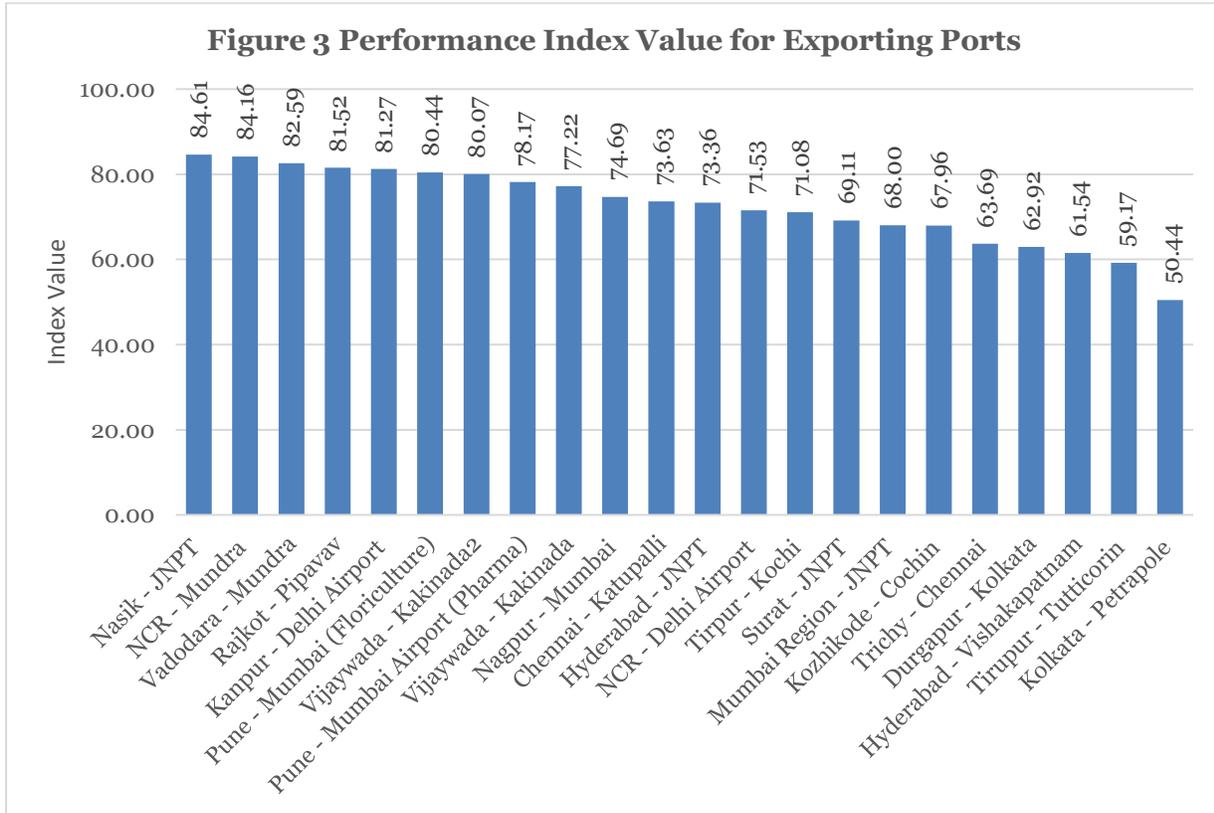
An interesting observation from the data is that the performance of ports in terms of time taken in various activities within port is more or less similar. We have examined the association between time taken during the above two broad activities within a port (Figure 2). The plot shows a correlation coefficient of 0.82 between these two variables. This suggests that if improvement of performance is planned, it needs to be planned in a holistic manner and not specifically for a particular activity. The reason being that the evidence from exporters feedback suggests that if the time needed for one activity in a port is higher compared to other ports, it is also higher for other activities in the respective port. Thus, performance improvement requires an overall enhancement of service quality of the ports instead of any one specific parameter.



Source: As calculated by authors

The performance of the exporting ports is presented in Figure 3. The analysis shows that the ports overall performance also depends upon the product that is being exported. For instance, JNPT is the top-ranking port as reported by exporters of Nasik-JNPT route who generally export Grapes. However, JNPT ranks lower by the exporters who export pharmaceutical products or textile items in Hyderabad – JNPT route or Surat – JNPT route. This suggests that priorities may differ based on perishable nature of the exporting products also. The top 5 ports in the country are JNPT, Mundra, Delhi airport and Mumbai airport. The 5 bottom ranking ports are Petrapole, Tuticorin, Vishakhapatnam, Kolkata and Chennai in order. An important aspect to notice is that the ports or airports located in Western and Northern part of country are amongst the top performers. The

ports located in Eastern and Southern part of the country are amongst the worst performers in general.



**Table 3 Logistics Performance Index Value and Rankings of Exporting Ports**

Ports	Index Value	Rank
Nasik - JNPT	84.61	1
NCR - Mundra	84.16	2
Vadodara – Mundra	82.59	3
Rajkot – Pipavav	81.52	4
Kanpur - Delhi Airport	81.27	5
Pune - Mumbai (Floriculture)	80.44	6
Vijayawada - Kakinada2	80.07	7
Pune - Mumbai Airport (Pharma)	78.17	8
Vijayawada – Kakinada	77.22	9
Nagpur - Mumbai	74.69	10
Chennai – Katupalli	73.63	11
Hyderabad - JNPT	73.36	12

NCR - Delhi Airport	71.53	13
Tirupur - Kochi	71.08	14
Surat - JNPT	69.11	15
Mumbai Region - JNPT	68	16
Kozhikode - Cochin	67.96	17
Trichy - Chennai	63.69	18
Durgapur – Kolkata	62.92	19
Hyderabad – Vishakhapatnam	61.54	20
Tirupur - Tuticorin	59.17	21
Kolkata - Petrapole	50.44	22

Two important implications of the study are critical for all stakeholders. The first one is that the exporters in the country are operating in a level playing field. The logistics cost varies significantly across ports. This affects the competitiveness of the exporters in the global market. However, this also allows them to work towards a cost-benefit before choosing a specific port/s for their consignments considering the entire logistics cost because of numerous factors. These factors also include time taken within ports for specific activities. The study also throws light on performance of specific activities with each of the ports analysed. This is critical for decision makers within port authorities as well as for policy makers to devise a mechanism that can address key causes to reduce time taken within ports for various activities regarding export consignments. This will not only help the exporters but will also help India's export scenario in global market through reducing prices commensurate to savings in logistic costs.

A few areas regarding process reengineering that the port authorities or policy makers need to look into are:

- Identifying existing non-value adding activities or redundancies in the entire process do not improve performance but time consuming
- Duplications of work in terms of documents checking or material checking etc.
- Identifying inefficiency nodes, that are specific activity centres within ports, and remove the root causes of the inefficiencies
- Existing bottlenecks that affect quick clearance process on part of the officials
- Wherever possible, technology and digitisation of documents/process should be introduced so that human intervention can be reduced in areas that are more mechanical in nature.

Of course, further studies are required with exclusive focus on this that aim to identify key reasons for the delays occur in various ports for different activities and suggest a process reengineering for the same. This should take care of each and every activity or in other words micro-processes, understand the responsibilities, work burden and accountability at every node involved in processing export consignments. A system defining responsibility and accountability including decision making for each node involved needs to be incorporated in the ecosystem through introducing proper Standard Operating Procedure (SOP) across all activities. This may help to create a seamless and transparent system with the help of technology and digitisation wherever required to help global export competitiveness of the country.

## **5. Concluding Remarks**

This paper has focused on logistics performance within the ports with special attention to time loss during various activities. The paper asserts that efficiency in ports does not vary drastically for different activities when individual ports are considered. No single activity can be held responsible for overall loss in time within a specific port. Therefore, if ports need to be made efficient, it requires change in efficiency level of all activities within the port. The study showcased that significant difference exists in performance or efficiency across ports as seen through indexation exercise. There is ample scope for several ports to address their efficiency in handling consignments and catch up with the ports that are performing at a higher level. It is worthy to mention here that the ports of East and South India are significantly lagging in terms of efficiency compared to their counter parts from Western India and Northern India. The sooner these lagging ports are able to address their efficiency laps in terms of logistics, it is better for India to become more competitive in global market. While exporters should see a cost-benefit considering their expense in terms of logistics cost, the respective port authorities and policy makers should develop a mechanism to create a seamless system with the help of technology and digitisation wherever required to help global export competitiveness of the country. The scope for process reengineering should be explored to remove non-value adding yet time consuming nodes and identification of inefficient nodes in the process through understanding the micro-processes involved in the ecosystem. A transparent system defining responsibility and accountability including decision making for each node involved needs to be incorporated in the ecosystem through introducing proper Standard Operating Procedure (SOP) across all activities.

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