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India's Transporatation Performance Index

Policy Brief No. 2 | 2019 | Authors: Sameer Malik, Devendra B Gupta and Sanjib Pohit

Globalisation has opened up economic opportunities for developing countries in the form of outflow of value-added services, low-cost raw materials , human resource skills, improved market access for their exports, efficiency gains in their economies through technology transfer and spill-over, and resource re-allocations. Consequently, various developing countries, including India, have increasingly begun to position themselves for greater participation in regional and global markets. It goes without saying that India needs to build its capacity for establishing linkages with global and regional markets for deriving the optimal benefits of engaging with the globalised world. This, in turn, depends on the creation of an efficient logistics system. For this purpose, most of the developed and emerging countries estimate logistics costs on a regular basis, and use performance indicators to measure the efficiency levels of logistics activities. In fact, it is imperative to measure these logistics costs to analyse where and how we stand vis-à-vis the competing countries in this sphere, and thereby enhance our competitiveness. Equally important is an identification of the factors that would facilitate a reduction in logistics costs.

Box 1: World Bank Domestic LPI Index

On the global scale, the World Bank ranks countries based on their score on the Domestic Logistics Performance Indices (LPI). This is constructed by collating information from respondents on various qualitative and quantitative indicators on the logistics environment in the respective countries in which they operate. The questions typically pertain to: (a) perceptions regarding the state of domestic logistics vis-à-vis international logistics, (b) the quality of trade and transport infrastructure, (c) competence and the quality of service associated with logistics operations, (d) the frequency with which shipments reach consignees within the scheduled or expected delivery time, and (e) changes (improvement/deterioration) in the logistics performance indicators since 2015.

However, these indicators provide the score at the national level. No information is available at the subnational level. This is a major drawback, especially for a large country like India that is characterised by unequal regional development, leading to differences in the state of logistics across regions, which, in turn, obstructs the development of backward regions.

At the national level, studies by Armstrong & Associates* (October 2017) suggest that supply chain management capabilities differ from country to country due to the following two main factors: (1) Information flow and controls, and (2) Physical limitations. Albeit, the largest economies dominate in terms of infrastructure. For instance, India was ranked 2nd and 5th globally for its roadways and railways facilities, respectively, in 2016.

However, very few roadways in India have the modern four-lane highways. In the railways too, the current practice of having different gauges makes railcar interchanges impossible, thereby disrupting

*Armstrong & Associates, Inc. (2017). Report on "Global and Regional Infrastructure, Logistics Costs and Third-Party Logistics Market Trends and Alaysis", October.

freight flows. These inefficiencies and limitations contribute to higher logistics costs in India.

The World Bank has developed an International *Logistics Performance Index (LPI),* which ranks countries qualitatively on various logistics indicators. According to LPI 2018, India is ranked 42nd while Germany is ranked first in the world. A subset of these indicators has also been used to construct the domestic logistics performance index (see Box 1). However, these indicators provide only the status of logistics for the nation as a whole and not at a subnational level. Given the regional disparity in infrastructure and development across India, it is crucial to capture the regional perspective of logistics. Moreover, the survey for the World Bank Domestic LPI was undertaken only at the major growth centres and therefore does not provide an insight into the regional underpinnings.

In this context, an effort has been made to understand the logistics performance pertaining to transport activities at a subnational level with a view to provide policy recommendations. This in in conjunction with NCAER's works on logistics costs, which has been commissioned by Logistics Division, Ministry of Commerce (see Box 2).

Box 2. Scope of NCAER's work on Logistics Costs

- Route Study: Cost analysis of cargo movement on major routes

  This pertains to time and cost analysis of cargo movement on major selected to understand the cost as well as efficiency differences across

  a) Modes of transport (Road, Railway, Air & Waterways)
  b) Type of products (Containerized/ Non-Containerized, Perishable/Non-Perishable)
  c) Nature of logistics operations (First Party Logistics Players/ Second Logistics Players/Third Party Logistics Player)

- Estimation of Logistics cost of India as percent of GDP using primary and secondary data.

- Policy Roundtable among stake-holders

  The purpose is to create a forum at NCAER to undertake brainstorming events in which the key stakeholders of logistics services in private and public sectors would interact with policy-makers for exchange of ideas and identifying challenges faced by this sector.

We have identified 20 major domestic routes along which a majority of cargoes are moved across India. By and large, the origin and destination of each route corresponds to metros or Tier-I/II cities where the transport/ or warehouse hubs and manufacturers or producers are located. These details are based on the information provided by transporters/ Third-Party Logistics (3Pl) players on the following aspects pertaining to transportation activities:

1. Road conditions including signage,
2. Harassment by police/ other agencies,
3. Harassment by officials of the Regional Transport Office (RTO),
4. Pilferage/leakage of consignment,
5. Need to pay bribes/ facilitation money,
6. Unavailability of intermodal exchange points,
7. Limitations in terms of rail infrastructure, and
8. Limited infrastructure in terms of parking terminals with refreshment facilities for drivers.

Since roadways have emerged as the principal mode of cargo movement, our questionnaire mainly focuses on this aspect of transportation. However, since policy-makers are increasingly focusing on railways and multi-modal cargo movement, we have also attempted to encompass this aspect in our measure by including indicators (6) to (8) listed above. For each of these indicators, the respondents were asked to rank their perceptions on a scale of 1 to 10, where 1 implies that the challenge is of low intensity while 10 refers to a high-intensity challenge or problem.

A careful assessment of the eight indicators listed above suggests that they may be grouped under two heads: 'soft infrastructure' and 'hard infrastructure'. Grouping under 'soft infrastructure' implies that the score on these indicators may be improved with little investments. On the other hand, improving the score for indicators falling in the category of 'hard infrastructure' requires significant investments in terms of finance and time.

Table 1 shows the routes under study and the modes of transportation currently being used. As Table 1 shows, roads constitute the principal mode while the share of railways hovers between 10 and 25 per cent.

Table 1: Routes under Study

Routes	Share (%) of*		Routes	Share (%) of*	
	Road	Rail		Road	Rail
NCR-Mumbai	80	15	Ahmedabad-Kolkata	81	18
Ludhiana-Mumbai	73	23	Mumbai-Kolkata	70	28
NCR-Bengaluru	70	28	Mumbai-Bengaluru	77	18
NCR-Chennai	76	20	Mumbai-Chennai	73	21
NCR-Hyderabad	72	25	Mumbai-Hyderabad	82	12
Ludhiana-Bengaluru	72	24	Ahmedabad-Bengaluru	87	12
NCR-Nagpur	83	16	Jaipur-Bengaluru	72	25
NCR-Guwahati	90	9	Bengaluru-Kolkata	84	12
Ludhiana-Kolkata	70	25	Hyderabad-Kolkata	85	13
Jaipur-Kolkata	82	16	Bengaluru-Nagpur	85	14

Note: * The total does not add to 100 as the shares of other modes (airways/waterways/multimodal) are not shown.

Soft Infrastructure: Intensity of Challenge across the Routes under Study

Table 2 summarises the perceptions of the transporters/3PL. In this table, the routes that have been marked in a grey background indicate that the particular route is placed on a scale above the average score, implying that these routes entail the most problems. As this table shows, the problem of harassment faced by the truck drivers from the RTO and police officials is serious on every route, with the NCR-Mumbai route recording the comparatively best performance, and the Ludhiana-Bengaluru and NCR-Guwahati routes registering the worst performance. It may be noted that the NCR-Guwahati route too faces challenges of a high intensity in terms of the leakage of consignments and the 'need to pay bribes' along the route. In contrast, the Bengaluru-Nagpur route faces hardly any issue with respect to pilferage/leakage of consignments. In general, the Mumbai-Hyderabad, Mumbai-Bengaluru, and Ahmedabad-Bengaluru routes entail the minimum problems with regard to the 'need to pay bribes'. However, it should also be noted that bribes are an inherent part of the system along all the routes.

Hard Infrastructure: Intensity of Challenges across the Routes under Study

Table 3 summarises the perceptions of the transporters/3PL. As this table shows, the NCR-Hyderabad route faces the least problem with regard to the '*unavailability of intermodal exchange points*' and '*limitations in terms of rail infrastructure*'. The worst performers or the routes entailing the maximum challenges for these two indicators are NCR-Mumbai and NCR-Guwahati, respectively. In terms of road conditions, the Mumbai-Hyderabad route is comparatively the best while the Mumbai-Kolkata route entails the maximum challenges. As regards the challenges of *limited infrastructure in terms of parking terminals with refreshment facilities for driver*, all the routes face a high degree of problems. However, the NCR-Mumbai route is comparatively the best while the NCR-Hyderabad route is the worst performer with respect to this indicator.

Table 2: Perceptions Related to the Routes in Order of Increasing Hindrances as Perceived by the Respondents

Routes	Harassment by Police/ Other Agencies	Routes	Harassment by RTO officials	Routes	Pilferage/ Leakage of Consignment	Routes	Need To Pay Bribes/ Facilitation Money
NCR-Mumbai	6.0	NCR-Mumbai	7.0	Bengaluru-Nagpur	3.0	Mumbai-Hyderabad	6.8
Ludhiana-Mumbai	7.0	Mumbai-Hyderabad	7.0	NCR-Mumbai	3.5	Mumbai-Bengaluru	6.8
Mumbai-Hyderabad	7.5	Mumbai-Bengaluru	7.0	Mumbai-Bengaluru	3.5	Ahmedabad-Bengaluru	6.8
Mumbai-Bengaluru	7.5	Ahmedabad-Bengaluru	7.0	Ludhiana-Mumbai	3.5	Mumbai-Chennai	7.0
Ahmedabad-Bengaluru	7.5	Mumbai-Chennai	7.3	Mumbai-Hyderabad	4.0	Bengaluru-Nagpur	7.8
NCR-Chennai	7.5	Ludhiana-Mumbai	7.8	Ahmedabad-Bengaluru	4.8	NCR-Mumbai	8.0
Mumbai-Chennai	7.5	Bengaluru-Nagpur	7.8	NCR-Chennai	5.0	Ludhiana-Mumbai	8.0
Ahmedabad-Kolkata	7.5	NCR-Bengaluru	8.0	Jaipur-Bengaluru	5.0	NCR-Bengaluru	8.0
Bengaluru-Nagpur	8.0	Ludhiana-Bengaluru	8.0	NCR-Bengaluru	5.0	Ludhiana-Bengaluru	8.3
NCR-Nagpur	8.0	Jaipur-Bengaluru	8.3	Ludhiana-Bengaluru	5.0	Jaipur-Bengaluru	8.5
Ludhiana-Kolkata	8.0	NCR-Chennai	8.5	NCR-Hyderabad	5.8	Ahmedabad-Kolkata	8.5
Jaipur-Kolkata	8.0	NCR-Hyderabad	8.5	NCR-Nagpur	5.8	Mumbai-Kolkata	8.5
Hyderabad-Kolkata	8.0	NCR-Nagpur	8.5	Hyderabad-Kolkata	6.0	NCR-Hyderabad	8.8
Bengaluru-Kolkata	8.0	Mumbai-Kolkata	8.5	Bengaluru-Kolkata	6.0	NCR-Nagpur	8.8
Mumbai-Kolkata	8.0	Jaipur-Kolkata	8.8	Mumbai-Kolkata	6.0	NCR-Chennai	9.0
NCR-Guwahati	8.0	Hyderabad-Kolkata	8.8	Mumbai-Chennai	6.5	Ludhiana-Kolkata	9.0
Jaipur-Bengaluru	8.5	Bengaluru-Kolkata	8.8	Ludhiana-Kolkata	6.5	Jaipur-Kolkata	9.0
NCR-Hyderabad	8.5	Ludhiana-Kolkata	9.0	Jaipur-Kolkata	6.5	Hyderabad-Kolkata	9.0
NCR-Bengaluru	8.5	Ahmedabad-Kolkata	9.0	Ahmedabad-Kolkata	7.0	Bengaluru-Kolkata	9.0
Ludhiana-Bengaluru	8.5	NCR-Guwahati	9.5	NCR-Guwahati	7.5	NCR-Guwahati	9.5
Average	7.8	Average	8.1	Average	5.3	Average	8.2
S.D	0.6	S.D	0.7	S.D	1.2	S.D	0.8

Overall Score: Intensity of Challenges across the Routes under Study

Table 4 summarises the overall score under soft and hard infrastructure of the routes under study. The overall score has been estimated by summing up the score under the above eight indicators for each of these routes and then taking a simple average of the score. The interpretation is the same as earlier—a lower score implies the least hindrance while a high score implies higher inefficiency in transportation along in the route. The results have been tabulated in Table 4, which shows that the routes whose nodes are located in the western/northern/southern parts of India are more efficient than the others. By and large, all routes for which at least one node is located in the eastern part of India score poorly in terms of our indicators. The policy measure is clear: there is need to pay greater attention to the development of transport infrastructure in eastern India

Table 3: Perceptions Related to the Routes in Order of Increasing Hindrances as Perceived by the Respondents

Routes	Road Conditions including Signage	Routes	Unavailability of Intermodal Exchange Points	Routes	Limitations in Terms of Rail Infra-structure	Routes	Limited Infrastructure in Terms of Parking Terminals with Refreshment Facilities for Drivers
Mumbai-Hyderabad	2.5	NCR-Hyderabad	5.5	NCR-Hyderabad	4.0	NCR-Mumbai	7.0
Mumbai-Bengaluru	2.8	Jaipur-Bengaluru	6.0	NCR-Nagpur	4.0	Mumbai-Hyderabad	7.0
Ahmedabad-Bengaluru	2.8	Ludhiana-Mumbai	6.5	NCR-Mumbai	5.0	Mumbai-Bengaluru	7.0
NCR-Mumbai	3.0	NCR-Chennai	6.5	NCR-Chennai	5.0	Ludhiana-Mumbai	7.0
Mumbai-Chennai	3.3	NCR-Guwahati	6.5	Ludhiana-Kolkata	5.0	Ahmedabad-Bengaluru	7.0
Ludhiana-Mumbai	3.5	Bengaluru-Nagpur	7.0	Ahmedabad-Kolkata	5.0	NCR-Chennai	7.0
Bengaluru-Nagpur	3.5	NCR-Nagpur	7.0	Jaipur-Bengaluru	5.5	Mumbai-Chennai	7.0
Jaipur-Bengaluru	3.5	NCR-Bengaluru	7.0	NCR-Bengaluru	6.0	Ludhiana-Kolkata	7.0
NCR-Bengaluru	3.7	Ludhiana-Kolkata	7.0	Jaipur-Kolkata	6.0	Jaipur-Kolkata	7.0
NCR-Nagpur	3.8	Jaipur-Kolkata	7.0	Mumbai-Hyderabad	6.5	Hyderabad-Kolkata	7.0
NCR-Chennai	4.0	Ahmedabad-Kolkata	7.0	Ludhiana-Mumbai	6.5	Bengaluru-Kolkata	7.0
NCR-Hyderabad	4.0	Hyderabad-Kolkata	7.0	Bengaluru-Nagpur	6.5	Mumbai-Kolkata	7.5
Jaipur-Kolkata	4.0	Bengaluru-Kolkata	7.0	Ludhiana-Bengaluru	6.5	Ludhiana-Bengaluru	7.6
Ludhiana-Bengaluru	4.2	Mumbai-Kolkata	7.0	Mumbai-Bengaluru	6.8	NCR-Nagpur	7.8
Ludhiana-Kolkata	4.5	Mumbai-Hyderabad	7.5	Hyderabad-Kolkata	7.0	Bengaluru-Nagpur	8.0
Hyderabad-Kolkata	5.0	Mumbai-Bengaluru	7.5	Bengaluru-Kolkata	7.0	Jaipur-Bengaluru	8.0
Bengaluru-Kolkata	5.0	Ahmedabad-Bengaluru	7.5	Mumbai-Kolkata	7.0	NCR-Bengaluru	8.0
Ahmedabad-Kolkata	5.5	Mumbai-Chennai	7.5	Ahmedabad-Bengaluru	7.5	Ahmedabad-Kolkata	8.0
NCR-Guwahati	5.5	Ludhiana-Bengaluru	7.5	Mumbai-Chennai	7.5	NCR-Guwahati	8.0
Mumbai-Kolkata	6.0	NCR-Mumbai	8.0	NCR-Guwahati	7.5	NCR-Hyderabad	8.5
Average	4.0	Average	7.0	Average	6.1	Average	7.4
S.D	1.0	S.D	0.6	S.D	1.1	S.D	0.5

Several points related to soft/hard infrastructure have also emerged from open-ended interactions with stakeholders, which have been discussed in Box 3. It seems to be feasible to implement some of these policy prescriptions, at least in the short run.

Table 4: Perceptions Related to the Routes in Order of Increasing Hindrances (Respondents' Perceptions)

Routes	Overall Index	Rank	Routes	Overall Index	Rank
NCR-Mumbai	5.9	1	NCR-Bengaluru	6.8	8
Mumbai-Hyderabad	6.1	2	Ludhiana-Bengaluru	6.9	9
Mumbai-Bengaluru	6.1	2	Ludhiana-Kolkata	7.0	10
Ludhiana-Mumbai	6.2	3	Jaipur-Kolkata	7.0	10
Ahmedabad-Bengaluru	6.4	4	Ahmedabad-Kolkata	7.2	11
Bengaluru-Nagpur	6.5	5	Hyderabad-Kolkata	7.2	11
NCR-Chennai	6.6	6	Bengaluru-Kolkata	7.2	11
Jaipur-Bengaluru	6.7	7	Mumbai-Kolkata	7.3	12
Mumbai-Chennai	6.7	7	NCR-Guwahati	7.8	13
NCR-Hyderabad	6.7	7	Average	6.7	
NCR-Nagpur	6.7	7	SD	0.5	

Box 3: Key Takeaways from Interactions

- There is an urgent need to train officials at the check point. As of now, these officials prefer to work in the traditional way and are reluctant to accept electronic documents.
- The absence of predictability in delivery is one of the major reasons that add heavily to the logistics costs in India. The main reason for this is the prevalence of heavy traffic congestions at various bottlenecks not only in the cities but also on major highways and expressways. Daily changes in diesel prices also add to variations and unpredictability in logistics costs.
- Ensuring that freight trains run on schedule, and operationalising modern freight terminals are critical steps for attracting rail freight.
- There is need for rapid innovation in bi-modal transport equipment (road-railer). This road-railer runs as a semi-trailer on the road and moves as a wagon on the rails, which facilitates seamless door-to-door transportation with minimum handling of the cargo at the rail terminals.

Disclaimer: The findings, interpretations, and conclusions expressed are those of the authors and do not necessarily reflect the views of the Governing Body or Management of NCAER.