

## Evaluation of Logistic Performance Index of India in the Indian Postal Services

K.Selvavinayagam<sup>1</sup>, V.Jothi Francina<sup>2</sup> and V.P.Rameshkumaar<sup>3</sup>

<sup>1</sup>Principal & Head, Periyar University Constituent College of Arts and Science, Pennagaram, INDIA

<sup>2</sup>Assistant Professor, Department of MBA, Sona College of Technology, Salem, INDIA

<sup>3</sup>Assistant Professor, Department of MBA, Sona College of Technology, Salem, INDIA

<sup>2</sup>Corresponding Author: jothi\_francina@yahoo.co.in

### ABSTRACT

The importance of efficient logistics for postal growth is widely acknowledged. Literature has shown that better logistics performance is strongly associated with postal expansion, export diversification, ability to attract foreign direct investments, and economic growth. On the other hand, Indian postal services represents a challenge to logistic operations in transporting and storing products. High logistic costs and low quality of services may be considered obstacles to Indian postal services. This research aims to assess India's Logistics Performance Index (LPI) in relation to its major competitors in Indian postal services. The inter-national postal data was collected from various post offices in few districts like Salem, Namakkal, Erode. Statistical techniques such as cluster analysis and multiple comparison tests of means have been applied to analyze the data. The competitiveness of Indian domestic firms depends crucially on a dynamic and competitive internal logistic environment in order to stand up to other countries. The results also indicate the bureaucracy as a major obstacle to the logistic performance of the country. The dimension Timeliness of India is very close to the High Logistics Performance Group (HLPG) while Customs is very close to the Low Logistics Performance Group (LLPG). Although India has failed in its customs operations, there seems to be more credibility in Indian dealings. The main contribution of this paper is to reveal logistical aspects in which India has shown large inefficiencies. The difference among the logistic performance index also appears to be relevant to governments to address their new public policies and also to highlight the logistic obstacles of the Indian Indian postal services.

**Keywords--** Indian postal services, Logistic performance indexes, Cluster analysis, Logistic, Customs clearance

Indian postal services of goods has been moved by a network of increasingly global logistic operators that deal with a number of functions in the international supply chains: ocean shipping, air freight, land transport, warehousing, and third party logistics (Korinek & Sourdin, 2011; World Postal Organization, 2012).

The importance of efficient logistics for postal and growth is now widely acknowledged. Analysis has shown that better logistics performance is strongly associated with postal expansion, export diversification, ability to attract foreign direct investments, and economic growth. On the other hand, Indian postal services represents a challenge to logistic operations to transport and store products. The high logistic costs and low quality of services may be considered obstacles to Indian postal services. According to Hummels and Schaur (2012) the lead time to delivery has been a barrier in the Indian postal services. These findings are especially relevant for developing countries such as India that needs to invest in logistics in order to emerge in a more competitive position in Indian postal services (Faria, Souza, & Vieira, 2011).

Despite the importance of India as one of the better global economies, there has been a small participation of it in Indian postal services. According to the International Monetary Fund (2012) the share of India in the world export is 1.2%. India stands out as the ninth global economy but it is on the twenty-second position on the exporters ranking.

India presents inefficiency in quality infrastructure of warehouse, transport, use of information technology, management ability in planning, search and execution of the shipment handling and warehousing. In addition to this, there is a lack of logistic collaboration to

### I. INTRODUCTION

provide more integration among the transaction process (Vieira, Yoshizaki, & Lee, 2009).

According to Harrington (2003) inefficient logistic areas such as poor infra structure of road, rail, airport and port, high cost of shipping among others may introduce restrictions on the companies to conduct business with international partners.

In order to get the benefits of the globalization process, countries might have to identify the key aspects of logistic performance, particularly in terms of its impact on competitiveness. The empirical literature has showed that a good transport infrastructure, institutional quality, low transportation costs and other logistic indexes in international business provide positive impacts on the export performance and postal facilitation (Limão & Venables, 2001; Levchenko, 2004; Djankov, Freund, & Pham, 2006; Portugal-Perez & Wilson, 2010).

The major purpose of this research is to use the logistics performance index (LPI) which has been produced by the World Bank to analyse the Indian logistics performance regarding to its main competitors in the Indian postal services. The research questions of this paper are threefold:

- What are the main logistic areas in which India has inefficiency comparing with its competitors?

- What are the top logistics performers in the international market?
- And what are the most important logistic indexes to distinguish between high and low performers?

Therefore, the main contribution of this paper is to reveal logistical aspects in which India has shown large inefficiencies. The difference among the logistic performance indexes also appears to be relevant to governments in order to address their public policies, and also to highlight the logistic obstacles of India. The remaining of the paper is structured as follows. Section 2 presents the literature review. In section 3 we present the variables and statistical analyses which have been applied. Section 4 shows the main results and section 5 concludes the paper.

## II. LITERATURE REVIEW

### *Logistics Aspect on Indian Postal Services*

There have been some studies in the empirical literature that have been analysing the relationship between logistic features and flow of postal. The logistic aspects range from traditional issues such as customs procedures and infrastructure quality to new concerns such as predictability and reliability of the logistic system as summarized in Chart 1.

**Chart 1**  
**LOGISTIC ASPECTS FOUND IN THE LITERATURE**

Logistic aspect	Description	Authors
Infrastructure	It involves the entire transportation network for the physical movement of goods, telecommunications networks necessary to speed up the exchange of information, suitable structure of customs posts and other services to facilitate customs clearance, cargo terminals, disposal and storage to maintain quality product and agility of the process of moving the goods.	Wilson, Mann and Otsuki (2004), Portugal-Perez and Wilson (2010), Francois and Manchin (2007), Limão and Venables (2001) and Soloaga, Wilson and Mejía (2006)
Logistics competence	It involves the quality of services delivered by the private sector that include cargo storage services, transportation agencies, information technology services, packaging services, consultancy management.	Levchenko (2004) and Francois and Manchin (2007)
Domestic logistic costs	It can be divided into direct and induced costs. The first is a result of freight loads and other costs associated with shipments. The second is due to system failures which may result in fees, longer time of storage, need of transporting higher volumes after the deadline or payment of a more expensive transport.	Bougheas, Demetriades and Morgenroth (1999), Hummels (2001) and Hoekman and Nicita (2008)

Predictability and reliability of supply chain	Predictability is a central issue in logistic performance and its lack may be the consequence of several other deficiencies such as poor information technology and obsolete transportation infrastructure. On the other hand, the lack of predictability might increase induced costs and may become postal barriers.	Nordas, Pinali and Grosso (2006), Persson (2007), Helble, Shepherd and Wilson (2007) and Djankov <i>et al.</i> (2006)
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Source: Elaborated by the authors.

The authors have found that investments in infrastructure may be associated with export growth and business development (Wilson *et al.*, 2004; Soloaga *et al.*, 2006; Mirza, 2008, Limão & Venables, 2001; Portugal-Perez & Wilson, 2010). Another important result is that the variation in the condition of infrastructure (communication and transportation) affects export performance more than the traditional postal barriers in developing countries (Francois & Manchin, 2007).

In general, the results of these studies have shown that it is crucial to increase the countries logistics performance to expand Indian postal services mainly for developing ones.

#### **Logistics Performance Index of World Bank**

The World Bank has been published the LPI every two years since 2007. The proposal is to identify the opportunities and logistic obstacles faced by the countries in the Indian postal services. Hence, LPI helps to understand the challenges of the countries that they and their trading partners face in making their national logistics perform stronger (World Bank, 2014). The World Bank LPI summarizes the performance of countries on six dimensions or indexes which are customs, infrastructure, international shipments, logistics quality and competence, tracking and tracing and timeliness (World Bank, 2007, 2010).

#### **Customs index**

The customs clearance procedures involve import and export agencies and different services at borders. These procedures represent on average one third of the time of import or export, and their efficiency depends on the managers of the agencies and the service providers involved in the process. According to the World Bank (2010) the customs index encompasses information such as: 1. if the cus-toms declarations are processed electronically and this process is clear and transparent, 2. if the information is complete and available on time due to changes in regulations, 3. if imports and exports occur according to schedule, 4. if the time between submission of the documentation in customs clearance is expensive, among others. In terms of transparency this index is crucial, especially regarding the customs clearance time and bribery (Souza & Burnquist, 2011). According to Cipolla (2013) the customs variables have the highest impact on the postal flow of India and its main partners.

#### **Infrastructure index**

The quality of transport infrastructure and information and communication technology includes issues about the conditions of the physical transport (Keedi, 2007). Maintaining good conditions in these sectors is important to business processes due to the physical handling of goods and it implies an efficient exchange of information due to the link between the material and information flow. High quality infrastructure may contribute to improve the communication among the actors of a supply chain. A considerable challenge lies in responding to the increasing demand for physical structure especially in low income countries.

#### **Logistics quality and competence index**

The logistic service providers, typically the third party logistics (3PL) and carriers, are carried out by road, rail and air transport. These companies, cus-toms brokers and companies responsible for border procedures provide logistics services of high quality and they are urged to work together to fulfil the cus-tomer requirements with the highest logistics performance. According to the World Bank (2007) the countries with higher logistic performance present pri-vate sector well developed. On the order hand, countries with low performance have problems in both public and private sectors. Regardless of which group of countries has the best logistics performance, the lack of competition among companies may contribute to the corruption at border posts. The corruption may inhibit the emergence of new competitors which can work more effectively with international operations.

#### **Timeliness index**

The lack of timeliness and reliability in the trading system is central to the logistic performance, and they can restrict the postal through increasing costs and lowering competitiveness. Timeliness is also an important measurable component of quality (Hummels & Schaur, 2012). Delivery delays, lack of shipment, need for physical inspections, use of obsolete communication technology and transportation infrastructure in poor condition are crucial factors to determine timeliness index. According to the World Bank (2007) the difference in satisfaction among countries of high and low performance is higher for timeliness index compared to any other indexes. Data about thefts, bribes and fraud, percentage of physical inspection among others are used to compare countries.

**Tracking and tracing index**

The management of logistics flows from origin to destination has been becoming a crucial activity due to necessity to shorten the transit time. The ability to adapt to changes in the route, or departure and arrival date of shipments is the key to competitiveness. This index stresses the quality of information technology in logistics processes, transparency of customs procedures and continuous innovation in communication technologies as the main factors to reach high level in cargo transportation system.

**International shipments index**

This index analyses the management of flow of goods regarding the ability to organize shipments efficiently in terms of deliveries and competitive costs (World Bank, 2010). Timeliness and flexibility are key aspects in this background because companies may benefit itself from changes in the postal environment when they are able to satisfy the customers and provide services at a reduced cost.

**III. METHODOLOGY**

We have applied cluster analysis to verify the ranking of India in relation to its main Indian postal services competitors. The aim is to set up groups of homogeneous countries related to its logistic performance. Therefore, it has been assessed whether the means of indexes are statistically different among the clusters using one-way analysis of variance and Turkey's HSD tests.

**IV. COMPARATIVE RANK OF INDIA TO ITS COMPETITORS**

Based on the criteria described in the methodology we have selected 39 major competitors of India which are also important players in Indian postal services. These countries together held 81.45% of total world exports in 2008. Table 1 presents the scores (5 – point scale) of the six indicators and of LPI for the 39 countries which have been ranked according to its CG.

**Table 1****MAIN COMPETITORS OF INDIA WITH INDEXES AND LPI SCORES**

Rank	Countries	CG (%)	LPI	Customs	Infra structure	Internat. shipments	Logistic competence	Tracking tracing	Timeliness
1	U.S.A.	12.79	3.86	3.68	4.15	3.21	3.92	4.17	4.19
2	China	7.85	3.49	3.16	3.54	3.31	3.49	3.55	3.91
3	Germany	3.87	4.11	4.00	4.34	3.66	4.14	4.18	4.48
4	Japan	2.97	3.97	3.79	4.19	3.55	4.00	4.13	4.26
5	Canada	2.73	3.87	3.71	4.03	3.24	3.99	4.01	4.41
6	France	2.67	3.84	3.63	4.00	3.30	3.87	4.01	4.37
7	Australia	2.19	3.84	3.68	3.78	3.78	3.77	3.87	4.16
8	Argentina	1.95	3.1	2.63	2.75	3.15	3.03	3.15	3.82
9	Korea	1.85	3.64	3.33	3.62	3.47	3.64	3.83	3.97
10	Colombia	1.48	2.77	2.50	2.59	2.54	2.75	2.75	3.52
11	Netherlands	1.41	4.07	3.98	4.25	3.61	4.15	4.12	4.41
12	Mexico	1.36	3.05	2.55	2.95	2.83	3.04	3.28	3.66
13	Belgium	1.03	3.94	3.83	4.01	3.31	4.13	4.22	4.29
14	South Africa	0.95	3.46	3.22	3.42	3.26	3.59	3.73	3.57
15	India	0.95	3.42	3.17	3.34	3.36	3.39	3.52	3.74
16	Italy	0.94	3.64	3.38	3.72	3.21	3.74	3.83	4.08
17	Russia	0.88	2.61	2.15	2.38	2.72	2.51	2.60	3.23
18	Indonesia	0.79	2.76	2.43	2.54	2.82	2.47	2.77	3.46
19	Chile	0.79	3.09	2.93	2.86	2.74	2.94	3.33	3.80
20	United Kingdom	0.66	3.95	3.74	3.95	3.66	3.92	4.13	4.37
21	Venezuela	0.65	2.68	2.06	2.44	3.05	2.53	2.84	3.05
22	Vietnam	0.61	2.96	2.68	2.56	3.04	2.89	3.1	3.44

23	Malaysia	0.61	3.44	3.11	3.50	3.50	3.34	3.32	3.86
24	Kuwait	0.61	3.28	3.03	3.33	3.12	3.11	3.44	3.70

Source: Elaborated by the authors using data from Secex, Compostal and World Bank (2010).

The United States has presented as the most important competitor of India followed by China, Germany and Japan. It might be observed that among 15 top competitors of India in Indian postal services there have been countries that stand out as the best logistic performers such as Germany, Japan, Netherlands and Belgium. In general, these major competitors have been presented LPI higher than India that has overcome only Argentina, Colombia, Mexico and India. High logistic performance might increase the export competitiveness from these countries and India might lose business in international market.

Considering the six performance indexes, we might state that India has presented a relatively good timeliness index overcoming countries like China, Italy and Argentina. On the other hand, the results for customs show lower performance compared to its main

competitors. From this logistic aspect India has only overcome Russia, Venezuela, Ukraine, Guatemala and Angola. This low performance may be explained by excessive bureaucracy such as the high number of documents required by many different agencies of import and export. Moreover the other indexes with lower performance are international shipments and infrastructure.

## V. LOGISTIC PERFORMANCE FOR GROUPS OF COUNTRIES

We have used three hierarchical clustering algorithms (Complete Linkage, Centroid and Ward) and we have observed similar results (based on dendro-grams) whatever the algorithm is. Chart 2 presents the three clusters with their respectively countries.



Source: Elaborated by the authors using LPI indexes.

Cluster 1 was named high logistics performance group (HLPG) because it consists of top logistic performers in the world. These countries are mostly located in Western Europe, North America, Oceania and East Asia. It may be remarked that there are important competitors inside it such as U.S.A., Germany, Canada and Japan.

Cluster 2 which was named medium logistics performance group (MLPG) consists of developing countries (middle income) which are located in Latin America, Asia, Oceania and Africa. The large emerging

economies such as China, India, South Africa and India are inserted in this group.

Cluster 3 which was named low logistics performance group (LLPG) consists of relatively poor countries with less economic importance such as Honduras and Guatemala. The exception is Russia, which despite being an emerging country was not grouped in the same cluster of countries that form Brics.

Table 2 presents the results of multiple comparison of means among the clusters to examine whether the means are statistically different.

**Table 2**  
**MULTIPLE COMPARISON OF MEANS – TURKEY’S HSD**

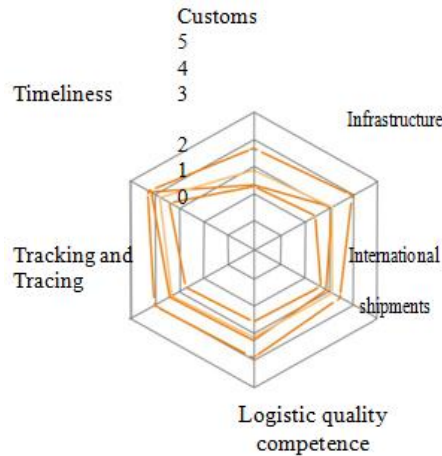
IndEXES	Cluster up level	Cluster down level	Differences of means*
Customs	1	2	0.786
	1	3	1.393
	2	3	0.606
Infrastructure	1	2	0.854
	1	3	1.493
	2	3	0.639
Shipments	1	2	0.345
	1	3	0.755
	2	3	0.409
Logistic quality competence	1	2	0.713
	1	3	1.328
	2	3	0.615
Tracking and tracing	1	2	0.694
	1	3	1.300
	2	3	0.605
Timeliness	1	2	0.439
	1	3	0.880
	2	3	0.440
*Significance at 1%.			

Source: Elaborated by the authors using LPI indexes.

It might be inferred from Table 2 that the most important indexes that distinguish among higher and lower performers are infrastructure, customs and logistic quality competence which are the indexes that have presented the

highest difference of means among the clusters. Figure 1 presents the values of the six indexes for each cluster in radar chart

**RADAR CHART OF LOGISTIC INDEXES BY CLUSTERS**



Source: Elaborated by the authors using LPI indexes.

Comparing India with the three clusters it may be noticed that the Timeliness is very close to the HLPG while customs is very close to LLPG. The remaining indexes presented a compatible performance with the MLPG. This results highlights customs index as a key logistic aspect in which India should consistently invest in reforms and improvements.

## VI. CONCLUSIONS

Using LPI index for the 39 competitors it has been observed that India is in 26th rank of performers behind South Africa, Kuwait and Saudi Arabia. The top performers are in general the leading exporters and importers worldwide (Germany, U.S.A., Japan and the Netherlands). Furthermore, they are the strongest competitors of India in Indian postal services. India presented a relative good timeliness performance. This might reveal that despite its inefficient customs procedures and infrastructure there seems to be a high level of reliability in Indian transactions which might be explained by the possibility of Indian trading partners have already incorporated extra time for possible delays in their expectations.

Moreover, multiple comparisons of means among clusters have revealed that customs and infrastructure are key indexes which distinguish from high to LLPG and these are areas where India has shown large inefficiencies.

The reform of the customs aspects implies less initial investment and short-term benefits. Therefore, a strategy that might improve logistic performance of Indian postal services would be to focus upon reforms since initial infrastructure investments are large and the benefits are usually long-term. Only the investment in infrastructure might not ensure the logistic performance improvements which enable us to conclude that even though these investments are necessary, they might not be sufficient.

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