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Impact of various LPIs on overall LPI (Logistic Performance Index) of India – An Analytical Study

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Abstract
The effectiveness of logistics is essential to a nation's industrial and economic progress. This paper intends to highlight policymakers' options for enhancing nation-level logistics performance considering Industry 4.0. Descriptive and multiple regression analyses are used to analyze the influence of various logistics performance Index (LPIs) on the overall lPI of the Nation. The research was carried out as analytical data research and analyzed various data for the past 15 years,

which data are taken from the World Bank. The empirical study expands the LPI of the World Bank's LPI dimensions & indicators. According to the findings, governmental policies should aim to provide stable foundations for creation of human capital, sustainable usage of internet services, integration of digital technologies, and digital connectivity, to facilitate improvement of logistics performance. Further, the paper works on forecasting India's LPI for the upcoming years.

Subject Classification: *90-00, 91B76.*

Keywords: Digitalization, Logistics Performance Index, Digital Technologies, Forecasting, Industrial 4. O, LPI

Introduction

Countries have continually attempted to lessen the time and money spent on delivery chain logistics. Logistics enterprise affects the financial system, each at macro and micro degrees. It boosts the country-wide financial system by producing employment and inspiring overseas investment influx at the macro degree. The logistics area is rightly taken into consideration to be an essential thing to globalization. As the micro degree, logistics enterprise offers an upward push to multiplied opposition that outcomes in aggressive pricing. The overall performance of any use of the logistics area is measured via India's Logistics Performance Index (LPI)..

The World Bank gives a interactive benchmark tool called Logistics overall performance Index. With the assistance of this tool, countries can, without difficulty, spot the unexploited possibilities that underlying demanding situations concerned with changing logistics' overall performance. LPI become remaining launched in 2018 evaluating one hundred sixty international locations. A survey on floor operator as performed globally, and then their remarks eases of operating and friendliness of the international locations their functioning are recorded.

International LPI includes critiques performed qualitatively through the buying and selling companions running worldwide. The assessments are taken in six regions which include infrastructure, convenience of setting up shipments, quality of logistics services, monitoring traceability, and timeliness. On the alternative, Domestic LPI incorporates each qualitative in addition to quantitative review of a nation performed through logistic specialists running in the country.

The numerous research stated that there had been instances of controversy concerning the methodology of LPI. The subjective responses through numerous logistics operators may also cause skewed rankings. Social and economic elements are primary influencers on scores of LPI

HUMAN DEVELOPMENT INDEX is described because of the encapsulation of fulfillment of a rustic in the most critical dimension of human improvement. Dimension, as said with the aid of using UNDP, are a long & healthful life, be informed, and a first-rate well-known living. The geometric implication of normalized values is taken to outline HDI for the given dimensions. HDI fails to address complex societal inequalities, safety of human. Since 1990, the human improvement Report has been posted using the UNDP. Figure 1 depicts the Human Development Index structure.

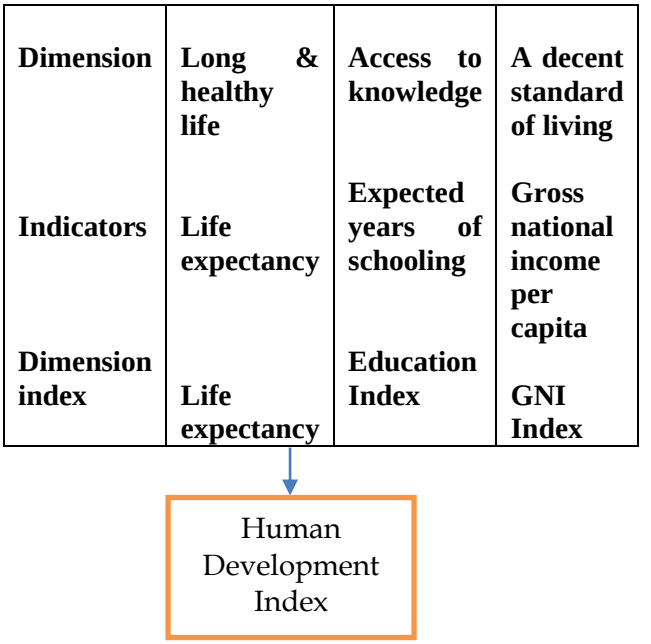


Figure 1
Number of International Tourist arrivals and tourist receipts (Rokou, 2020)

YEARS	2017	2018	2019	Q1 2020	Q2 2020
ITAs (Billion)	1.3	1.4	1.5	1.17	0.52
ITRs (US$ Billion)	1348	1460	1482	1210	1060

II. MATERIALS AND METHODS

2.1 Literature Review

Optimized resource-making plans and warehouse management systems are a few innovative transportation structures in practice; digital technology influences and assists the logistics enterprise with various activities, wherein equal time records and information safety gets growing (2017., Barreto et al; 2018 Kayikci,; Stachowiak, 2018 & Oleków-Szapka) Significance Usually speaking, digital technology is an accelerator or facilitator for the digital conversion or Industry 4.0 within production area, is labeled as enabling technology.

Current research aims to identify novel technologies that can be expected to support the most effective digital transformation in the context of the logistics business. According to Harris et al(2015)., the advancement of multimodal transportation is becoming more and more dependent on cutting-edge software that enables technology like cloud computing, wireless communication technology, and IoT. Analyzing Ardito et al. resulted in parallel discoveries (2019). They sought to identify industry-specific permitting technologies. O revolution, including Industrial IoT, cloud computing, massive data analytics, etc., may be seen as most pertinent for a successful supply chain integration of businesses. IoT, large data analytics, robotics, and other digitally enabling technologies were evaluated by Strange et al. (2017). – can also influence organization for activities within global value chains.

According to the LPI file 2018, the high income economies dominate the pinnacle positions, and a massive disparity in rankings and ranks are visible in the case of BRICS. Six key dimensions are used on this worldwide rating to benchmark a country's overall logistics performance. As defined in figure 2 given below (The World Bank,2021).

2.2 Research Objective

The LPI rank of India has dropped down from thirty-fifth in the year of 2016 to forty-fourth withinside the year of 2018 (World Bank, 2021). This create the need to examine and analyze each issue affects the overall LPI of a nation, and explores a relationship among various LPIs results in the development of overall LPI. This will lead to more economic improvement in India.

The exception of our intelligence, no studies until now have focused on the

effect of HDI with LPI. This specializes in setting up a courting among LPI and HDI of a country. The objective of the study includes.

1. To understand the growing trend of overall LPI over years
2. To understand the most influencing LPI category on overall LPI.
3. Determines the mathematical courting among LPI and HDI exist, if any.

This paper is organized in the following manner.

The 1st phase examines the literature review pointing out the research on LPI and HDI. The technique observed to achieve the result of the examined research is elaborated in phase 3, observed by the data collection strategies in phase 4. Based on research approaches, we arrive at relevant outcomes in phase 5, with suitable numerical and graphical proofs in the following subsections. Finally, phase 6 concludes the study.

2.3 Research Gap

There are only a few articles on LPI concerning the ranking of the World Bank. Furthermore, very few articles on LPI, and with a comparison of LPI with HDI, are infrequent articles that are only available. Especially no study has been done on the impact of overall LPI with LPI in India. With this objective, the present study analyzed the impact of HDI on LPI in India.

2.4 Research Methods

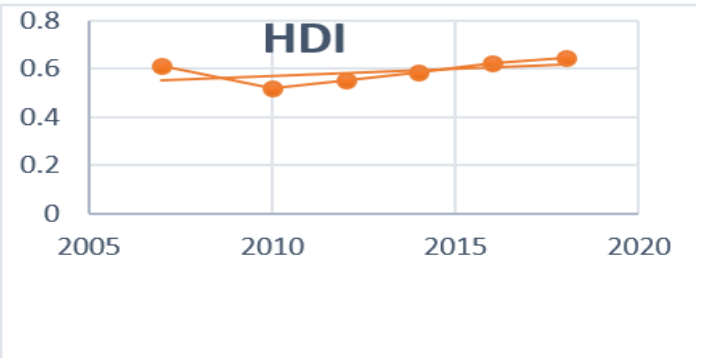
The research was Analytical in nature (Nithya & Kiruthika, 2021) &(Nithya &Selvaraj, 2015). The Secondary data was sourced from the world bank for 11 years (2007 – 2018). The HDI data is taken from the data of Human Development Reports of World Health Organization. For the analysis of data, we used the tools Excel and SPSS.

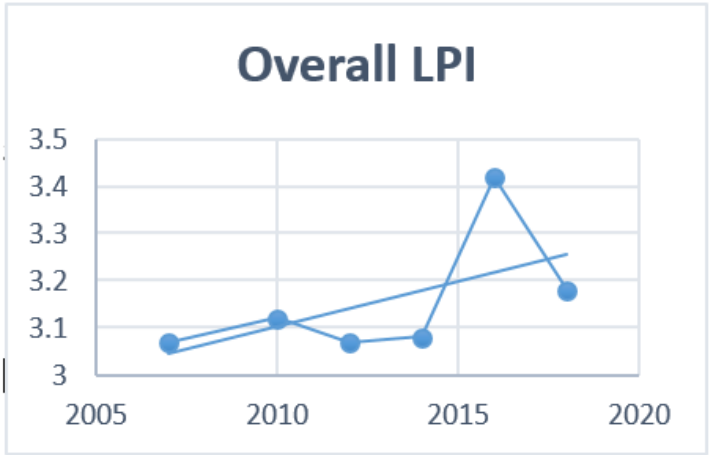
2.5 Framework of Analysis

To achieve the said objectives, the following analysis tools were used, Regression Analysis for identifying the impact of LPI in overall LPI and the effect of HDI in LPI.

III. RESULT AND DISCUSSION

3.1 LPI Score and HDI Value of India





Year	Over all LPI	Infrastr ucture	Inter shipment	Quality of Logistics	Tracking & Tracing	Time lines	HDI
2007	3.07	2.9	3.08	3.27	3.03	3.47	0.612
2010	3.12	2.9	3.13	3.15	3.14	3.6	0.519
2012	3.07	2.86	2.98	2.98	3.09	3.58	0.554
2014	3.08	2.87	3.19	3.19	3.1	3.51	0.586
2016	3.42	3.34	3.36	3.36	3.52	3.74	0.624
2018	3.18	2.91	3.21	3.21	3.31	3.5	0.645

X`

From the above table it was understood that HDI doesn't affect the ranking of overall LPI

3.2 Correlation Analysis

	LPIO	LPIC	LPII	LPIIS	LPIQ	LPITT	LPIT	HDI
LPIO	1	0.94*	0.96*	0.85*	0.72	0.96*	0.81*	0.45
LPIC	-	1	0.86*	0.77	0.62	0.97*	0.68	0.6
LPII	-	-	1	0.79	0.81*	0.87*	0.84*	0.39
LPIIS	-	-	-	1	0.44	0.85*	0.53*	0.53
LPIQ	-	-	-	-	1	0.58	0.6	0.36
LPITT	-	-	-	-	-	1	0.73	0.5
LPIT	-	-	-	-	-	-	1	-0.1
HDI	-	-	-	-	-	-	-	1

From the table it was understood that there exist a significant positive correlation between most of the factors of LPI on overall LPI but the relationship between Overall LPI and HDI is very less and negligible

3.3 Regression Analysis

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.451[a]	0.203	0.004	0.04685	0.203	1.02	1	4	0.37	1.885

a. Predictors: (Constant), overallpi

b. Dependent Variable: hdi

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	0.002	1	0.002	1.02	.370[a]
	Residual	0.009	4	0.002		
	Total	0.011	5			

a. Predictors: (Constant), overallpi

b. Dependent Variable: hdi

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.098	.488	.451	.201	.851
	overalllpi	.156	.154		1.010	.370

From the above table, it was obvious that the HDI is not influenced by LPI as the R square value is only 45% even though there is no first-order autocorrelation (Durban Watson :1.885) existing in the analysis.

IV SUGGESTIONS & CONCLUSION

From the study, it was found that, the various sectoral LPIs are very strongly correlated with overall LPI across years, whereas the effect of LPI on HDI is not appreciating. Further the HDI is found to vary irrespective of LPI and hence the LPI sectoral operations may not directly influence the HDI value.

The present study shows that there is no mathematical courting that exists between LPI and HDI. This adds up to the fact that HDI for the selected period is not influenced by the performance of LPI components.

4.1 CONCLUSION

Thus, the LPI is an independent variable and HDI is an independent variable. LPI and HDI are not dependent to each other and the overall LPI is not influenced by HDI. A country to develop it's HDI, it need not commit LPI's interface

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Availability of data and material: The study used secondary data for its conceptual framework and given in the references.
Code Availability: Not applicable

Author's contribution: The present work is a genuine effort of the three authors mentioned in the journal, with mutual involvement in all the study phases.
Conflict of Interest: There is no conflict of interest with this work.

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