

# Envisioning India to be the Global manufacturing hub by revamping Supply Chains

<sup>1</sup>Harshal Sutriya, <sup>2</sup>Gourav Bokaria,

<sup>1</sup>Student, <sup>2</sup>Student

<sup>1</sup>School of Business Studies, Christ University, Bangalore, India

<sup>2</sup>School of Business Studies, Christ University, Bangalore, India.

*Abstract* : India dreams to be a 5 trillion dollar economy by the year 2025. To be so India needs to become the leading manufacturing hub. The prime factors of all include efficient supply chains and increased productivity. Innovation is like the sky, which has no limit. This paper studies several aspects, both quantitative and qualitative, which forecasts India to be the global manufacturing hub. The tools used for proving such hypothesis are regression and correlation. In addition, at present, the logistics cost in India is very high. India needs to reduce it in order to lure the manufacturing companies to establish themselves in India. The paper throws light on how India is shifting up its gears to develop and leverage the supply chain to be the global manufacturing hub, which as of now is of paramount importance.

## I. INTRODUCTION

History is the witness that countries all over the world have competed with each other for centuries. The industrial revolution of Great Britain (1770s) marked the beginning of a new era. Slowly and gradually, countries have revolutionised their manufacturing mechanisms and operations, which is typically linked with the growth in income and living standards of a society. It can be witnessed from the later industrial revolutions in other parts of the world like America and Japan.

Although India is a developing nation, it is the seventh largest economy in the world.<sup>1</sup> The spark of industrialisation began during the mid-nineteenth century. LPG marked the dawn of the makeover of the Indian economy in the truest sense. India witnessed the boost in the manufacturing sector after the LPG policy of 1991. Since then India has come a long way enhancing the efficiency and effectiveness of its industrial output.

One of the most important components in determining the manufacturing competitiveness of a nation is its investment towards supply chain management. Supply chain incorporates all activities dealing with the conversion of raw materials into finished goods and providing it to the final consumers. India has constantly worked on improving its supply chain operations to ensure timely production and delivery of goods and services. This paper aims to study how India is poised to become the forthcoming global manufacturing destination. The objectives of this paper are as follows-

- To understand the relationship between infrastructure and supply chains.
- To analyse the role of government in the development of supply chain management.
- To understand the impact of the political turmoil of the trade war on India.
- To examine various companies shifting their manufacturing facilities to India.

## II. LITERATURE REVIEW

The literature renders the various flaws in the supply chain management in India and the measures undertaken by various entities to make it more efficient with the broader goal of making India the manufacturing hub in the global eco-space.

The paper portrays how the logistics are one of the significant industries for the economic development of any nation as it involves the incorporation of warehousing, material handling, packaging, inventory management, shipping security, customer service, and supply chain management. The logistics are expected to mature more in emerging economies. C and M research stated the valuation of logistics as \$4 trillion in 2013. It is crucial from India's point of view as many MNCs want to set up the manufacturing facilities here. Even the logistics in India is evolving at a drastic rate it is facing challenges related to tax structure,

<sup>1</sup> India is the seventh largest economy in terms of GDP as of 02/08/19. Web Source - [www.businesstoday.in/current/economy-politics/india-behind-uk-france-as-7th-largest-economy-in-the-world-in-2018-world-bank/story/369943.html](http://www.businesstoday.in/current/economy-politics/india-behind-uk-france-as-7th-largest-economy-in-the-world-in-2018-world-bank/story/369943.html)

infrastructure, technology, connectivity and transportation in various segments like railway, roadways, and ports. The cost of logistics in India as the whole product cost percentage is approximately 4-5 times extra than the technologically advanced nations. It continues to increase because of the hike in fuel price, overcrowding of ports, inefficient connectivity. India needs to improve the logistics sector and infrastructure by bringing more coordination among various government agencies, improving tax structure and reducing regulatory mechanisms. (S. Ramachandran, 2015). (Sebastian Saez, 2017) uncovers the fact that how inefficient logistics in India cost the country almost 45 billion \$ from its output or around 2 percent of the GDP.

This paper says that failure to invest in infrastructure for supply chain will restrain the economic competitiveness of a nation. The research has revealed that if an infrastructure investment in freight transportation reduces the direct cost of transportation by 10 percent, then it will make the supply chains more efficient and help the companies to diminish the operational cost by up to 1 percent. Advancement in infrastructure will reduce congestion drastically, which will diminish the transit time variability and increase accuracy. One of the biggest indirect benefits of improving infrastructure is the increase in revenues because of the savings resulting from supply chain advancements; shippers can indulge in competitive pricing. It also talks about the case of Baltimore Rail, which leads to the reduction in operational cost that would effect through less time taken in transit through current congestion. (Hodge, 2008)

### Goods & Services Tax

According to the India Development Report by the World Bank, the time taken for the movement of merchandises across states used to be high by as much as a quarter due to regulatory obstructions like checkpoints at state borders and entry taxation requirements of various states. It was the reason why the costs of logistics in India were 2 to 3 times as compared to international benchmarks. The report describes the role that Goods & Services Tax (GST) can play in re-engineering and rationalizing the supply chain network to set up India as the new manufacturing hub. Firstly, Distribution and warehousing decisions will be relieved from tax concerns. Secondly, a unified tax system will replace a range of different local taxes which will eliminate the need of Central State Tax (CST) and reduce the need for reconciling taxes while crossing borders of different states. The introduction of 'e - road permits' allowed the firms to print permits for their goods in advance. It led to fast clearance of trucks at check posts. The report also enlists the infrastructure gap that acts as a hindrance in the efficient functioning of supply chains in India. It comprises of both hard and soft infrastructure. Hard infrastructure comprises of elements like irrigation, telecommunications, transport, waste management, electricity, etc. Soft infrastructure comprises of governance and social and economic infrastructure. (World Bank, 2014)

According to a study by the Ministry of Road Transport and Highways, road traffic resulted in 60% of the freight traffic. A truck's average speed was reported to be 20 – 40 km per hour and these trucks just traveled 250 – 300 km/day on an average. Nearly 45% of firms showed an inclination towards paying a premium for delivering the goods on time. After the implementation of GST, there has been an increase in the distance covered by trucks by almost 100 – 150 km per day, i.e., nearly 30%. However, there have been some new barriers introduced due to the implementation of "e – way billing system" which requires verification of goods by way of road inspections. (World Bank, 2014)

The Goods & Services Tax is anticipated to be a secondary factor that would shape the prime foundation of quicker adoption of innovation and technology and a good infrastructure. The freight time is expected to reduce by 30% - 40%. And the logistics costs are expected to decrease by almost 20% - 30%. (Kanwar, 2015)

India's workforce is highly skilled and specializes in the IT industry. Companies involved in the development of Radio Frequency Identification (RFID) equipment find India as an attractive place. That's the reason the country is being used as an epicenter in entire Asia – Pacific region for carrying out RFID implementation. Companies in India have started experimenting with RFID technology in their supply chain. (Narayan, 2010)

Government is beginning to inform a specific set of transporters about attaching RFID (Radio Frequency Identification Devices) on their vehicles and map it to their system of e-way bills. The report gives an example of a case where the MP court charged a transporter with a penalty for not filling details of the vehicle in the e- way bill system. A lot of software companies in India are providing e way bill solutions along with features like live monitoring of a waybill life cycle, a dashboard for management

overview and compliance of GST returns, etc. The government is also following an active approach to address the hindrances faced by Indian firms. (PWC, 2018). In April 2018, the number of e-way bills created was almost 2.80 crore<sup>2</sup>. The number improved to 3.70 crores<sup>3</sup> in May 2018. The number of E-way bills being generated in a single day exceeds 12 lakh on an average. (Aritua, 2016) uses a freight flow model developed by the World Bank and researchers from Stellenbosch. While corridors contain 58 percent of India's freight traffic, they get only 40 percent of infrastructure spending on transport. The freight flow model will help to improve the supply chains in India in the following ways-

1. The location of logistics clusters and warehouses shall be optimal. Understanding the supply chain and freight flow can provide a direction towards collocation primary & immediate suppliers and auxiliary services.
2. It will help identify transport patterns which will explore opportunities for shifting freight, naturally to waterways and rail, and optimizing various modes of transport.
3. It helps in designing storage & distribution networks for FMCG industries, high-value manufacturing, and e-commerce.
4. It provides a boost to SMEs by enlisting attractive areas for incubation of startups which allows them to ship their goods at competitive rates.
5. To improve the shipping patterns, India should think of creating remote terminals at its twelve major seaports, also known as 'extended gates'.

(Ayres, 2018) explains how Indian manufacturing can take the place of Chinese manufacturing. She gives an example of Ford Motor's straggling 460 acres facility which has the capacity to produce 270,000 engines and 240,000 vehicles a year. The company has implemented Just in Time (JIT) inventory management in its supply chain with a supplier network consisting of almost 2 dozen suppliers. The manufacturing facility is said to be highly automotive.

The increase in the importance of the economy of China leads both small and large enterprises to adopt effective strategies across the Chinese market as a share of the growing international supply chain system. (Paul Hong, 2006)

Companies all over the globe find India as an attractive destination to shift their manufacturing facilities too. Some reasons include:

1. Huge customer base
2. Political stability
3. Manufacturing hub in the region (Juneja, 2019)

(Rama, 2017) highlights the prime role of a strong supply chain infrastructure to ensure the development of the manufacturing sector. There is a direct proportion between supply chain infrastructure, Ease of doing business, and India as an attractive market for manufacturing industries. Container Corporation of India Ltd (CONCOR), a government of India undertaking, declared the development of an Integrated Logistics and Manufacturing Zone (ILMZ) in Andhra Pradesh. ILMZs allow logistics players & manufacturers to compliment and co-exist one another's business.

The government of India has laid down several projects for the development of road infrastructure. Some major initiatives include National Highways Development Projects (NHDP), Bharatmala Pariyojana, Special Accelerated Road Development Programme For North-East (SARDP-NE), National Highways and Infrastructure Development Corporation Ltd. (NHIDCL), mega-plan, Logistic Efficiency Enhancement Programme (LEEP), etc. Figure 1 shows work completed under different programs. (Government of India, 2017)

<sup>2</sup> According to tweet dated 1 June 2018 by official twitter handle of the Government for IT-related queries on the GST

<sup>3</sup> According to tweet dated 1 June 2018 by official twitter handle of the Government for IT-related queries on the GST

<b>NHDP &amp; OTHER NHAJ PROJECTS [31ST MARCH 2017]</b>						
		<b>Total Length (Km.)</b>	<b>Already 4/6Laned (Km.)</b>	<b>Under Implementation (Km.)</b>	<b>Contracts Under Implementation (No.)</b>	<b>Balance length for award (Km.)</b>
<b>NHDP</b>	<b>GQ</b>	<b>5,846</b>	<b>5,846 (100.00%)</b>	<b>0</b>	<b>0</b>	<b>-</b>
	<b>NS - EW Ph. I &amp; II</b>	<b>7,142</b>	<b>6,563</b>	<b>305</b>	<b>28</b>	<b>274</b>
	<b>Port Connectivity</b>	<b>435</b>	<b>381</b>	<b>54</b>	<b>7</b>	<b>-</b>
	<b>NHDP Phase III</b>	<b>11,809</b>	<b>7,507</b>	<b>2,357</b>	<b>72</b>	<b>1,945</b>
	<b>NHDP Phase IV</b>	<b>13,203</b>	<b>3,773</b>	<b>6,373</b>	<b>105</b>	<b>3,057</b>
	<b>NHDP Phase V</b>	<b>6,500</b>	<b>2,544</b>	<b>1,424</b>	<b>32</b>	<b>2,532</b>
	<b>NHDP Phase VI</b>	<b>1,000</b>	<b>-</b>	<b>184</b>	<b>9</b>	<b>816</b>
	<b>NHDP Phase VII</b>	<b>700</b>	<b>22</b>	<b>94</b>	<b>4</b>	<b>584</b>
	<b>NHDP Total</b>	<b>46,635</b>	<b>26,636</b>	<b>10,791</b>	<b>257</b>	<b>9,208</b>
<b>Others (Ph.-I, Ph.-II &amp; Misc.)</b>		<b>2044</b>	<b>1,736</b>	<b>308</b>	<b>17</b>	<b>-</b>
<b>SARDP -NE</b>		<b>110</b>	<b>107</b>	<b>3</b>	<b>1</b>	<b>-</b>
<b>Total by NHAJ</b>		<b>48,789</b>	<b>28479*</b>	<b>11,102</b>	<b>275</b>	<b>9,208</b>

\*Total 20,000 Km. was approved under NHDP Phase IV. Out of which 14,799 Km. as assigned to NHAJ remaining Km. with MORTH.

Figure 1<sup>4</sup>

### Chabahar Port, Iran

Chabahar port in the Gulf of Oman is a very strategic port in the North-South transit corridor. India assisted Iran in the construction of the Chabahar port. The port is much more proximate to Afghanistan than Karachi in Pakistan. Due to increased proximity to Central Asian countries like Uzbekistan & Turkmenistan, this port is also referred to as the 'golden gate' to these countries. The benefits of this port will be exorbitant for India. Firstly, this port will increase Indian agricultural exports to Afghanistan. Secondly, a urea plant has been set up by India in Chabahar which will assist companies manufacturing agricultural machinery. Thirdly, an MOU has been signed by National Aluminium Company (NALCO) to set up an aluminum plant in Chabahar, Iran. Fourthly, it will ensure energy security in India as the country will maintain a direct linkage with the energy-rich nations in Central Asia. Jafar Sayareh concludes by stating that Chabahar port is better than Gwadar port in terms of Logistics performance, supply chain reliability, terminals access, infrastructure, etc. (MBA Rendevoez, 2018), (Sayareh, 2016)

<sup>4</sup> This figure has been obtained from Make in India's official website on 17<sup>th</sup> August, 2019.



Figure 2<sup>5</sup>

### Singapore-Logistics Hub

Singapore is now one of the wealthiest nations in Asia, one of the major reasons being its top-performing supply chain and logistics hub. The port of Singapore is the top transshipment port in the world. Developing the connectivity to various destinations all across the world is the result of proactive development policy. Apart from developing the port, increasing the frequency of flights it has established a great network of Free Trade Agreements with various nations. These things have led to the efficient operation of logistics and supply chain in Singapore. The country always thinks ahead and has developed innovative infrastructure. It is using advanced data analytics in order to foresee traffic congestion and it is also leveraging the sensors to detect anomalies like piracy. It is planning to double the capacity of a few airports. Singapore was the world's first country in 1989 to launch National Single Window in order to digitize trade approval processes. Today trade permits can be attained within minutes by the usage of an electronic document. (Yin Lam, 2017)

For many companies who want to enter and establish in the Asian market, Singapore is indeed a very attractive supply chain management hub which resulted due to its innovative ecosystem, extensive connectivity, and support of supply chain services and accessibility of consultancies. Companies like Unilever and Nike use these centralized located hubs to reach the world market. The global trading hub of Nike was established in Singapore so that it can leverage Singapore's logistics strengths. Unilever has created its centralized logistics leadership in Singapore for the Asian continent to manage each and every functioning of supply chain letting it reduce cost. (Lee, 2014)

### Multi-Modal Logistics Parks (MMLPs)

This initiative by the government of India under the Logistics Efficiency Enhancement Program will provide many services like logistics costs reduction, freight aggregation, warehousing, distribution, and storage improvement and creation of numerous value-added services like crating, labeling, tagging, and packaging. MMLPs save a lot of money and time by allowing the firms greater production and lesser lead delivery times. 24 MMLPs out of 35 are located on national corridors. (Jeong, 2017), (Dutta, 2019)

<sup>5</sup> This figure has been obtained from twitter on 15<sup>th</sup> August, 2019.

## Smart Cities

In a smart city, a municipality uses (ICT) information and communication technologies to enhance the operational efficiencies, enhance the quality of services provided by the government and also the citizen welfare. Basically, there are 9 characteristics to assess the smartness of the city including environmental initiatives, technological infrastructure, high efficient public transportation. The success of the smart city is determined by the strong relationship between the government and the private sector. Smart cities use a wide variety of IoT (Internet of Things), user interfaces, software solutions, automation, user interfaces, machine learning, cloud computing. The smart city can become successful by following the four steps. They are: collection of the data through sensors in the city; analysis of the data to have a meaningful insight; it is then communicated to the decision-makers with the help of communication networks, and then the cities use these insights to create the solutions, optimize the operations and also to improve the life quality of the citizens. (Rouse, 2019)

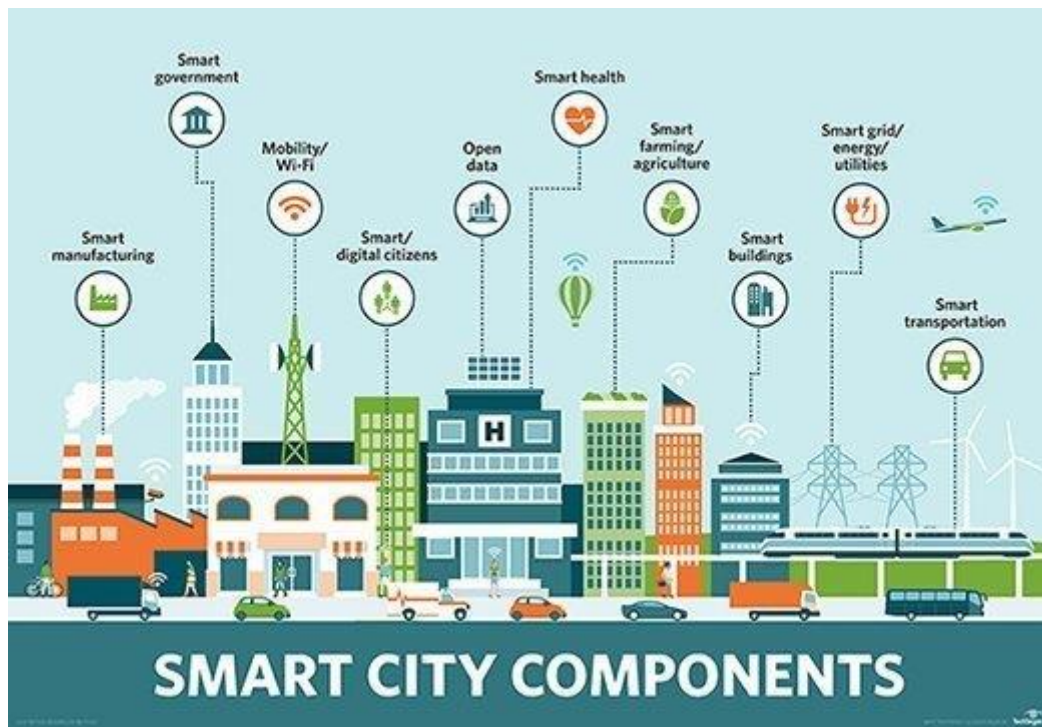


Figure 3<sup>6</sup>

The growth of a city is measured with its ability to solve the various challenges linked to the urbanization and also the social, economic and environmental issues in a rather very holistic manner. Smart city concepts act as frameworks in order to implement the vision of modern and advanced urbanization. It will help the government to develop its practices included with the ingenuity and supported by technology. (PWC, 2018-19)

The Indian government has taken the ambitious initiative to start developing the first 100 self-sustainable and citizen-friendly smart cities. By 2021, the first 20 of them will probably be accomplished. The projects worth Rs. 9981 crore is accomplished out of Rs. 50,221 crore which has been implemented. It will be also linked to the 'Digital India' initiative as well. The proposal of Rs. 2,01,981 crore (approx.) has been received by the 99 cities so far. (Dutta, HT, 2018)

Many countries have shown their interests to tie up with India for its Smart City program. It would bring the investments from these countries, lead the transfer of technology from these countries, and develop the infrastructure, connectivity in India. The countries who have signed or proposed to come into partnership are the US (through the USTDA), Japan, Canada, Germany, France, Spain, Singapore. (Sandilya, 2015) Japan and India have signed the MOU in which Varanasi will be developed by taking help from Kyoto's experience. (The Hindu, 2014) The MOU has been signed between the Union Ministry for Housing and Urban Affairs and GIZ (German Development Agency) to develop the smart cities in India. GIZ would also be contributing amount up to €8 mn for this purpose. (Business Line, 2018) Bloomberg Philanthropies has also partnered with the Indian government to support the Urban development in India. It will provide its technical and strategic assistance to India to design and to administer

<sup>6</sup> This figure has been obtained from <https://internetofthingsagenda.techtarget.com/definition/smart-city> on 16/08/19.

the challenges of cities. It will be leveraging its resources in order to support India in sharing the best of the global practices in its urban planning and smart city solutions. (Bloomberg Philanthropies , 2015)

### SEZ (Special Economic Zones)

It is a region in a nation which has exclusive economic regulations which differ from the other parts of the same nation. India had SEZ only after April 2000. Until then India only had the Export Processing Zones. (Rastogi, 2018) says that by September 2017, only 221 SEZs were in operation. As of January 2018, 423 SEZ have received the formal authorization for operation. SEZ provides huge benefits and incentives to the companies. According to the GOI Ministry of Commerce and Industry the main objectives to establish the SEZ are to generate extra economic activity, promote the investment from foreign and domestic sources, to create the employment opportunities and also to develop the infrastructure facilities.



Figure 4<sup>7</sup>

### Make in India

An initiative by the GOI intends to energize the manufacturing segment of the nation. A lot of countries decided to either expand or shift their manufacturing facilities to India.

One such country is Sweden. A Swedish automobile manufacturer named 'Volvo' decided to manufacture all its medium-duty engines in India. It also made India as its Research & Development (R&D) hub. The Sweden India Startup Sambandh (SISS) provides features like one on one facilitation cell for Swedish startups setting up in India and go to market guide. Swedish textile machines are 40% more effective than Indian machines. Therefore, Indian textile manufacturers would benefit from this

<sup>7</sup> Source: The figure has been obtained on 29/08/2019 from 'India Briefing' <https://www.india-briefing.com/news/logistics-industry-india-modernizing-tax-reform-technology-infrastructure-15107.html/>

partnership with Sweden. Secondly, the Swedish manufacturer 'Ericsson' established a manufacturing facility to produce radio base stations in Pune. (Government of India, 2017), (Make in India, 2017)

Russia also created a billion-dollar fund with India to invest in infrastructural projects in India in March 2017. The Russian Railways will collaborate with the Indian Railways to work on high-speed trains with speed up to 200km/h. (Government of India, 2017)

A lot of geographical locations in India have specifically been developed to provide necessary facilities to the manufacturers. One such location is Chakan near Pune, Maharashtra. Maharashtra Industrial Development Corporation (MIDC) has developed industrial parks there. It contains automobile manufacturers like Volkswagen (Germany based), Daimler, Bajaj Auto, and Mahindra & Mahindra. The place is proximate to the coast and there is enough availability of skilled manpower, outstanding infrastructure, and power supply. Mercedes Benz has also set up its manufacturing plant in Chakan. This automobile belt in the Chakan region has the capacity to produce 11 lakh vehicles. Similarly, Chennai hosts a capacity of manufacturing 14 lakh cars per annum. Automobile manufacturers like BMW, Daimler, Royal Enfield, Mitsubishi, Renault, and Hyundai have set up their plants in Chennai. Japanese carmaker Nissan also instated its 'India Design Centre' in Chennai in 2017. These facilities are proximate to Chennai's 3 ports. Similarly, the Delhi-Mumbai Industrial Corridor includes a strategic export hub in Gujarat known as Sanand. Companies like Tata Motors and Ford Motors have established their plants there. (Government of India, 2017)

Growth in the number of Indian startups has been very significant in the economy. These startups are making innovative products with Robotics & Artificial Intelligence, Analytics & Big Data. The trend has been to go further than businesses that are app-based. India has more than 4750 startups, which makes it the country with the 3<sup>rd</sup> largest startup ecosystem around the globe. (Government of India, 2017)

The idea of Industry 4.0 is booming all around the globe. The government of India is trying to implement this concept in the Indian ecosystem. The Boeing Company seed-funded the building of a smart factory in Bangalore by the Indian Institute of Science (IISc). The German company Bosch implemented the concept of smart manufacturing in manufacturing auto components at 15 centers in India. General Electric has invested in a multi-modal factory in India a sum of 200 million US\$. This factory's intelligent ecosystem comprises of digitally linked supply chains, servicing units, and distribution networks. (Abhishek, 2017)

The ambitious Union Budget of India, 2019 primarily focuses to diminish the red-tape, investing and developing the infrastructure, Make in India, Digital India, technology, creation of employment in MSME and to increase liquidity in the economy. The total estimated Capex is Rs. 876209 for FY 2020. The government has declared the investment of Rs. 100 lakh crores in the infrastructure sector over the next 5 years. The road length of 1,25,000 km shall be upgraded in the next 5 years under PMGSY( Pradhan Mantri Gram Sadak Yojana-III). Under PMGSY 30,000 km of roads have been constructed using the Waste Plastic, Green Technology. In this budget, Rs. 94,071 crore has been allocated to the Ministry of Railways. The Indian government has also recommended investment for the railway infrastructure of Rs. 50 lakh crore during 2018-2030. Digitalization of every sector is also an important vision of the government. (IBEF, 2019)

### III. RESEARCH METHODOLOGY

This paper tries to throw light on how the Indian economy can become the global manufacturing hub. The variables include the GDP of India in terms of PPP, FDI inflows, Ease of Doing Business rank of India, Quality of Infrastructure rank, India's industrial production of infrastructural goods rank, India's Business sophistication rank, rank of Technological readiness of India, India's share of world GDP (in terms of %). The data used is secondary in nature and is obtained from sources like World Bank Doing Business report, World Economic Forum's Global Competitiveness report, Government of India's MOSPI (Ministry of Statistics and Programme Implementation), etc. The data is of last 4 years starting from 2014-2015. The analysis of data was done through SPSS-21.



#### IV. DATA ANALYSIS

##### 1. *Industrial production of infrastructural goods vs GDP of India in terms of Purchasing Power Parity (PPP)*

###### Model Summary<sup>b</sup>

Model	R	R Square	Adjusted R Square	Durbin-Watson
1	.998 <sup>a</sup>	.996	.994	2.697

a. Predictors: (Constant), IIPinfra

b. Dependent Variable: GDP.PPP

The R square for the data is 99.6%, i.e., very proximate to 100%. It means that 99.6% variation in GDP in terms of PPP can be attributed to the industrial production of infrastructural goods. The value of R is 0.998. There is also a strong correlation between the two variables. It is pretty clear that an increase in production of infrastructural goods makes the supply chain and logistics more efficient. It adds up to the value of GDP.

##### 2. *Quality of infrastructure vs Ease of Doing Business index.*

###### Model Summary<sup>b</sup>

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.968 <sup>a</sup>	.937	.906	9.025	2.255

a. Predictors: (Constant), Infrastructure

b. Dependent Variable: EaseofDoingBusiness

The World Bank's doing business index shows the ease with which businesses can function in a country. Lesser the rank, better the position of the country. The Ease of Doing Business index is calculated using a lot of parameters. These include parameters like ease of starting a business, getting electricity, trading across borders, etc. which also form a part of the broader supply chain management. On the other hand, the quality of infrastructure is a major determinant of manufacturing goods in India with ease. The World Economic Forum ranks countries globally in its global competitiveness report every year. The quality of infrastructure encompasses various components like the quality of roads, railways, ports, airports, and electricity. In the table above, the value of R is 0.968. Both variables are strongly correlated. The value of R square is 93.7%. It means that 93.7% of the variation in ease of doing business can be attributed to the quality of infrastructure in the country.

##### 3. *Technological Readiness of India vs Ease of Doing Business index.*

###### Model Summary<sup>b</sup>

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.982 <sup>a</sup>	.965	.947	6.758	3.257

a. Predictors: (Constant), TechnologicalReadiness

b. Dependent Variable: EaseofDoingBusiness

According to the global competitiveness report by the World Economic Forum, the technological readiness of a country depends on various factors like availability of state-of-the-art technologies, technology absorption at the firm – level, FDI & technology

transfer, etc. In the table, R square is 96.5%. It means that a 96.5% variation in Ease of Doing Business can be attributed to the technological readiness of a country. Moreover, the correlation between them is 0.982. Hence, the two variables are highly associated. The more technologically ready a country is, the more easily businesses can work.

#### 4. Business sophistication of India vs Ease of Doing Business index.

##### Model Summary<sup>b</sup>

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.886 <sup>a</sup>	.785	.677	16.713	2.223

a. Predictors: (Constant), BusinessSophistication

b. Dependent Variable: EaseofDoingBusiness

According to the global competitiveness report by the World Economic Forum, the Business sophistication of a country is based on various elements like local supplier quantity, state of cluster development, value chain breadth, nature of competitive advantage, production process sophistication, local supplier quality, etc. It basically shows the quality of a nation's global business networks and the quality of distinct businesses' strategies & operations. In the above table, the R square is 78.5%. It means that a 78.5% variation in Ease of Doing Business index can be ascribed to business sophistication in a country. The value of R is 0.886. The values aren't strongly correlated but their degree is more than average.

#### 5. Foreign Direct Investment (FDI) vs India's share of GDP in the world.

##### Model Summary<sup>b</sup>

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.947 <sup>a</sup>	.896	.845	.13974	1.794

a. Predictors: (Constant), FDI

b. Dependent Variable: GDPWorldShare

India's share in the World's Gross Domestic Product (GDP) in an indicator of a growing economy. Foreign Direct Investment (FDI) records the inflow of funds to assume ownership in a company by a foreign entity. The correlation between them is 0.947, i.e., they are highly correlated. The R square is 89.6%. it means that an 89.6% variation in India's share in World's GDP can be attributed to FDI. An increase in FDI implies more inflow of funds into business which essentially provides them more capital. Thus, there is a rise in the manufacture of goods (especially infrastructural, which further eases business processes).

*According to the current scenario, India is poised to be a global manufacturing hub. India's unconditional commitment and investment in the infrastructure space is promoting manufacturing in the country. The manufacturing output of India has substantially increased especially since the past 5 years.*

Year	Amount in US\$ Billion (manufactured)
2013	283.206
2014	307.206
2015	327.82
2016	348.143
2017	394.444
2018	408.693

Table 1<sup>8</sup>

<sup>8</sup> This data has been derived from World Bank on 25-08-19 from <https://data.worldbank.org/indicator/NV.IND.MANF.CD?locations=IN>

The table shows the manufacturing output of India in US\$ Billion for the last 6 years. As we can see India's manufacturing output has grown by 44.3% in the past 6 years. There has been a shift in manufacturing goods from China to India. (India Brand Equity Foundation, 2019) The present Government of India wants to surge the share of the manufacturing sector of the GDP from 16% to 25% by the year 2022. It plans to create approximately 100 million additional jobs by 2022. It's Make in India is leading India to be the global hi-tech manufacturing hub as corporate giants like Siemens, Toshiba, General Electric, HTC, Boeing have either in the process of establishing or have already established their manufacturing plants in the country. The draft of NPE (National Policy on Electronics) released by the Government of India in October 2018 has envisioned to create a whopping US\$ 400 billion worth of electronics manufacturing sector by 2025 in India. The manufacturing industry of India possesses the ability to reach one trillion US dollars by 2025. The GOI has taken policies like the implementation of the GST, Smart Cities, Digital India, Make in India, huge infrastructure investment to generate the holistic environment for India to become a global manufacturing hub. The various policies by the Government of India are creating a conducive environment by enhancing supply chain to pull the companies to set up the manufacturing bases in the nation.

India is leveraging its infrastructure development to cut the supply chain time and cost. The GOI is progressively investing in infrastructure to develop the roadways, railways, airport, and port which may lead to the reduction of the transportation costs and time by up to 20%. Moreover, the wages for labor in India is way lower than in China. The logistics cost in China is whopping 18% of the GDP.

Due to the trade war between the US and China, the US manufacturers plan to shift production out of China. China has recently unveiled the retaliatory tariffs on the US goods worth \$75 billion. So the American companies have been ordered to exit from China by Donald Trump recently. The escalating trade tensions among the two biggest economies provides an opportunity for India to become a leading manufacturing and exports hub. Also, both the economies are looking for alternate sources to meet the requirements of the country.

India is trying to make the full of this golden opportunity by efficiently improving its supply chain. The supply chain is a prominent factor in improving the ease of doing business and reducing the manufacturing costs for the company. In the past few years, India is witnessing the influx of the capital through both the foreign and domestic mediums. (Singh, 2018) Future Supply Solutions already has raised Rs. 13,000 crores in investments. Spearhead Logistics (Pune Based) has recently been acquired by FM Logistics, the French Firm. The GOI is actively working on the industrial corridors. The DMICDC (Delhi-Mumbai Industrial Corridor and Development Corporation) has already awarded contracts worth US\$2.3 billion to the companies to develop the multimodal logistics centers in Gujarat, Maharashtra and in the National Capital Region. It will offer the end to end solutions, like processing facilities, packaging, inbound and outbound logistics till the final delivery.

The supply chain infrastructure is highly getting aided through government spending, tax incentives, and easier investment rules. India's 95% trade by volume is handled by its ports. Currently, for the building and maintenance of the ports, India permits 100% FDI. The government encourages investing companies by providing 10 years tax holiday. The ambitious Sagarmala Project will develop new ports in Odisha, Kerala, Karnataka, Tamil Nadu and also aims to modernize the existing ports. To construct various sea and river ports, US\$ 3 billion joint investment has been signed between Dubai based DP World and National Investment and Infrastructure Fund of India. The freight corridor is an important investment and strategy to leverage logistics. The freight corridors will help in the efficient and faster movement of goods. It will cover 15 states. In India, a cargo train travels at the speed of 25 kmph. On the railway lines of the freight corridors, the trains will be able to carry the double quantity of goods and that also in the speed range of 70-100kmph. Foreign and indigenous companies are working for the project with the government. 100% FDI is allowed by India for the development and repairs of storage and warehousing facilities. Several zones are reserved for the development of warehousing in India under the FTWZ scheme. Panvel, Khurja and Siri City are some FTWZs in India. These zones are well connected through roads, railways, ports, and airways. In Nanguneri (Tamil Nadu), 100-acre FTWZ opened a couple of years ago. The supply chain in India is getting remodeled through greater government spending and enhanced private sector participation.

## V. SUGGESTIONS AND CONCLUSIONS

The logistics in India is undergoing a transformation with various government initiatives such as Make in India, introduction of GST, emerging logistics parks, infrastructure, and e-commerce, which are changing the dynamics and course of the supply chain industry. For the implementation of National Logistics Policy(NLP), the Union Minister of Commerce and Industries, Piyush Goyal reviewed the planned action plan. The draft of NLP was prepared with the consultation of the Ministries of Road Transport and Highways, Shipping, Railways and Civil Aviation. (Bhosale, 2019)

The logistics sector in India is extremely de-fragmented. 14% of GDP is the logistics cost in India. The aim of the NLP is to reduce it to below 10% by 2022. President of the Federation of the Export Body (FIEO), Ganesh Kumar Gupta stated that the efforts of the GOI especially to reduce the logistics cost and time, refund of taxes in time, improvement in the rank of ease of doing business will lead India to touch \$1trillion in exports in the upcoming three years. According to him, the 10% decrease in the logistics cost will boost India's exports by 5-8%. According to the Union Budget, 2019 India will spend Rs. 100 lakh crore in the infrastructure over the next 5 years and according to our analysis of secondary data, we can say that it will increase the ease of doing business rank which will lure more global companies to set up their manufacturing bases in India. A positive correlation has been found between –

- a. Quality of Infrastructure and Ease of Doing Business
- b. Technological Readiness and Ease of Doing Business
- c. Business Sophistication and Ease of Doing Business

It shows that efficiency and innovation in supply chain management is a prime determinant of Ease of Doing Business in a country. We also found a strong regression between industrial production of infrastructural goods and GDP in terms of PPP. It shows how GDP is strongly dependent upon the production of infrastructural goods. The data of past 4 years shows how the variables have grown over the years. These variables are instrumental in proving the hypothesis true.

Year	2014-15	2015-16	2016-17	2017-18
<b>Quality of Infrastructure</b>	87	81	68	66
<b>Technological Readiness</b>	121	120	110	107
<b>Business Sophistication</b>	57	52	35	39
<b>Ease of Doing Business</b>	142	130	100	77

Table 2<sup>9</sup>

Year	2014-15	2015-16	2016-17	2017-18
<b>GDP PPP (in bn\$)</b>	8036.3	8787.9	9596.8	10505.2
<b>GDP World Share (in%)</b>	6.94 %	7.27 %	7.52 %	7.77 %
<b>FDI (in bn\$)</b>	45.15	55.56	60.22	60.97
<b>IIP Infrastructure goods (in%)</b>	2.8	3.9	5.6	7.3

Table 3<sup>10</sup>

<sup>9</sup> The unit of the data shown in Table 2 are ranks.

<sup>10</sup> GDP PPP – Gross Domestic Product in terms of Purchasing Power Parity

FDI – Foreign Direct Investment

IIP – Index of Industrial Production

The manufacturing sector will play a primary role in developing the economy over the next few years as India is nurturing itself to leverage its supply chain to be the next manufacturing hub which will ultimately lead to the immaculate growth of the whole economy. Hence, our hypothesis, i.e., India can be the global manufacturing hub through its improving supply chain operations, is proved.

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