# A STUDY ON THE EXPORT PERFORMANCE OF ENGINEERING GOODS IN INDIA

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**Abstract:** The engineering has a significant component of manufacturing sector, and the contribution of engineering products in overall manufacturing output is a vital. This sector is a well organized sector and employed 4 million skilled and semi skilled labour. India is one of the largest exporters of engineering in the world. This study is focused to analyse the overall performance of the export of Indian engineering goods with major economic indicators. India has a competitive advantage in terms of manufacturing costs, market knowledge, technology and innovation in various engineering sub-sectors. India's engineering sector has witnessed a remarkable growth over the last few years, driven by an increased investment in infrastructure and industrial production. The data is collected from the database of the Ministry of Commerce and Industry, Reserve Bank of India (RBI) and Indiastat for acquiring national level economic data while UN Comtrade and World Trade Organization (WTO) databases are sourced for obtaining international economic data. The study is made on the data collected for the period of 2009-10 to 2021-22. The relationship between the export of engineering goods from India and the foreign exchange reserve of India is analyzed with the help of simple linear regression. This study reveals the R squared value is 0.720 which means that there is a high level of positive influence of engineering goods export on the foreign exchange reserves of India. The relationship between the export of engineering goods from India and the foreign exchange reserve of India is analyzed with the help of bi-variate correlation run between two variables namely the export of engineering goods from India and the foreign exchange rate of India with respect to the US Dollars. The value of correlation is 0.793 which means that both the variables are highly correlated to each other in the positive direction. Thus the Government of India has taken initiatives both for engineering goods in particular and merchandise in general to boost the

country's growth and development.

**Keywords:** WTO, RBI,FDI, Foreign Exchange Reserve, Revealed Comparative Advantage, Recession

## I. INTRODUCTION

India has a long and rich history of global trade, dating back thousands of years. The country has been a hub of trade and commerce since ancient times, with traders from all over the world coming to India to exchange not only goods, services and resources but also valuable knowledge and ideas. After independence, India continued to be an important player in global trade with a focus on textiles, agricultural products and information technology. Today, India is the world's sixth-largest economy and a major player in global trade, with exports of not only agricultural goods but also textiles, engineering goods, pharmaceuticals and software services.

### A. Engineering Goods

The engineering goods are inevitable to the functioning of modern societies and play a vital role in driving economic growth and development. They are produced by specialized engineering firms and manufacturers, who employ highly skilled engineers, technicians, and both high and semi-skilled workers to produce high-quality products that meet precise technical standards and specifications. In the decades since independence, India's engineering goods industry has grown significantly, with the country emerging as a major producer and exporter of automobiles, machinery, electrical equipment and other engineering products. The industry has benefited fromongoing advances in technology, as well as a skilled workforce and a large domestic market. Overall, the history of engineering goods in India reflects a long tradition of innovation, expertise and technical excellence, and the industry continues to play a critical role in the country's economic development.

### B. Export of Engineering Goods in India

India is one of the largest exporters of engineering goods in the world. The country has a well-developed engineering industry, with a skilled workforce and advanced manufacturing facilities. According to the Ministry of Commerce and Industry, India's engineering exports were worth $76.2 billion in 2020-21, despite the disruptions caused by the COVID-19 pandemic.

The major engineering goods exported by India include metals, machinery, transport equipment and electronic goods. Some of the most popular items exported by India are automobile parts, engines, pumps, generators, transformers and medical equipment. The top export destinations for Indian engineering goods include the United States, the United Arab Emirates, Germany, the United Kingdom and Italy.

India's engineering industry is expected to continue to grow in the coming years, driven by factors such as increasing demand for infrastructure, rising investment in renewable energy and the growth of the automobile sector.

## II.STATEMENT OF THE PROBLEM

The engineering sector is of strategic importance to the Indian economy as it is the leading merchandise exporter to the globe contributing 25 per cent of the total merchandise exports of the country. The field of engineering is omnipresent; from a fan to a scissors, every object is a feat of engineering. It is crucial for the government to boost this sector as it creates jobs and spurs development in every sense. The turnover of capital goods industry is expected to increase to USD 115.17 billion by 2025. India's engineering R&D market will increase from USD 36 billion in FY19 to USD 42 billion by FY22. India needs INR 235 trillion (USD 3.36 trillion) of investment in infrastructure in the next decade (2020-29).The export of engineering goods is expected to reach USD 200 billion by 2030. Thus, the Indian engineering sector has significant importance in the economic growth and development of the country. So, an attempt has been made to analyze the export performance of the engineering goods in this study.

## III. OBJECTIVES

To analyse the overall performance of the export of Indian engineering goods with major economic indicators

## IV.SCOPE OF THE STUDY

India has a competitive advantage in terms of manufacturing costs, market knowledge, technology and innovation in various engineering sub-sectors. India's engineering sector has witnessed a remarkable growth over the last few years, driven by an increased investment in infrastructure and industrial production. The engineering sector, being closely associated with the manufacturing and infrastructure sectors, is of huge strategic importance to India's economy.The development of the engineering sector of the economy is also significantly aided by the policies and initiatives of the Indian government. The engineering industry has been de-

licensed and allows 100 per cent foreign direct investment (FDI). Additionally, it has grown to be the biggest contributor to the nation's overall merchandise exports. With this importance, the export performance of the engineering sector needs to be analyzed.

## V.LIMITATIONS OF THE STUDY

1. The study is confined to a particular time period and limited variables so the results maynot be generalized.
2. The study is based on secondary data; it has its own limitations.

## VI.METHODOLOGY

### A) Nature of the Study

The study is analytical in nature as the study analyzes the collected data with the quantitative tools to find the relationship among the variables used to fulfill the research objectives.

### B) Source of Data

The data is collected from the database of the Ministry of Commerce and Industry, Reserve Bank of India (RBI) and Indiastat for acquiring national level economic data while UN Comtrade and World Trade Organization (WTO) databases are sourced for obtaining international economic data.

### C) Period of Study

The study is made on the data collected for the period of 2009-10 to 2021-22. After the Great Recession in 2008-09, the Government of India too had taken various steps for recovery like the release of the ‘Fiscal Stimulus Packages’ in a phased manner. These initiatives have lead to the significantly positive sign in the performance of engineering goods from 2009-10 to 2021-22.

### D) Statistical Tools Used

In order to analyze the overall performance of the export of Indian engineering goods with major economic indicators, Percentages, Simple Linear Regression, Bi-variate Correlation and Revealed Comparative Advantage (RCA) index were used.

## VII.ANALYSIS AND DISCUSSION

### A) Level of Contribution of the Engineering Goods Export of India to the

**Engineering Goods Export of the World**

The level of contribution of the export of engineering goods from India in the global export of engineering goods is studied as follows to identify the significance of India's contribution to the world export of engineering goods.

**TABLE I**

**PERCENTAGE OF ENGINEERING GOODS EXPORTS OF INDIA (EGX-INDIA) IN THEENGINEERING GOODS EXPORTS OF WORLD (EGX-WORLD)**

| Year | EGX-World (USD bn) | EGX-India (USD bn) | Percentage (%) |
|---|---|---|---|
| 2009-10 | 5789.13 | 38.95 | 0.67 |
| 2010-11 | 6915.58 | 58.38 | 0.84 |
| 2011-12 | 8061.28 | 68.69 | 0.85 |
| 2012-13 | 8057.46 | 66.93 | 0.83 |
| 2013-14 | 8233.84 | 71.33 | 0.87 |
| 2014-15 | 8492.04 | 78.83 | 0.93 |
| 2015-16 | 7882.97 | 66.17 | 0.84 |
| 2016-17 | 7759.64 | 72.90 | 0.94 |
| 2017-18 | 8571.68 | 84.75 | 0.99 |
| 2018-19 | 9270.69 | 92.02 | 0.99 |
| 2019-20 | 9010.71 | 89.99 | 1.00 |
| 2020-21 | 8513.08 | 87.39 | 1.03 |
| 2021-22 | 10418.70 | 127.22 | 1.22 |

*Source: Obtained from the calculations using the compiled data from the UN Comtrade and Indiastat*

Note: To standardize the world export and import of Engineering Goods data in the Indian scenario, the calendar years (2009 to 2020) are considered as financial years (2009-10 to 2020- 21). Also, the data from UN Comtrade is obtained from the aggregate of commodities

under engineering goods using the Harmonized System Chapters (HS 2017).

The above table shows the total value of export of engineering goods by India and that of the world and the column of percentage indicates the level of the export of engineering goods from India in the entire world's export of engineering goods. The contributionof India to the global engineering goods is in the growing trend in the study period from 0.67 per cent in 2009-10 to 1.22 per cent in 2021-22 despite having slight fall in years of 2012-13 with 0.83 per cent contribution and 2015-16 with 0.84 per cent contribution to the world engineering goods export.

**B) Relationship between Engineering Goods Export of India and Indian Foreign ExchangeReserve**

The relationship between the export of engineering goods from India and the foreign exchange reserve of India is analyzed with the help of simple linear regression.

**Table II**

**SIMPLE LINEAR REGRESSION ANALYSIS BETWEEN ENGINEERING GOODS EXPORT OF INDIA(EGX-INDIA) AND FOREIGN EXCHANGE RESERVE OF INDIA**

| | |
|---|---|
| **Dependent variable** | Foreign Exchange Reserve of India |
| **Independent variable** | Engineering Goods Export of India |
| **Constant value (β0)** | 47.857 |
| **R- squared** | 0.720 |
| **Adjusted R- squared** | 0.694 |
| **Std. Error of the Estimate** | 66.114 |

*Source: Obtained from the calculation using SPSS with the compiled data from Indiastat*

The above table depicts the results of simple linear regression with engineering goods export of India as the independent variable and the foreign exchange reserve of India as the

dependent variable. The R squared value, that is, the value of simple linear regression is 0.720 which means that there is a high level of positive influence of engineering goods export on the foreign exchange reserves of India. This means that the export of engineering goods is contributing significantly to the foreign exchange reserve of India which is meant to be maintained for carrying on the international trade by the country.

### C) Relationship between Engineering Goods Export of India and Indian Foreign ExchangeRate

The relationship between the export of engineering goods from India and the foreign exchange reserve of India is analyzed with the help of bi-variate correlation. This means that the exchange rate of the Indian domestic currency, that is, the Indian Rupees (INR) to the global currency used for carrying on international trade, here the Unites States of America's Dollar (USD) owing to its predominant use and demand by most of the countries for global trade, is associated with the value of export of engineering goods from India to find their influence on oneanother.

**TABLE III**

**BI-VARIATE CORRELATION ANALYSIS BETWEEN ENGINEERING GOODS EXPORT OF INDIA(EGX-INDIA) AND FOREIGN EXCHANGE RATE [1 USD TO RUPEE VALUE] (FOREX RATE)**

| Variables | | EGX-India | Forex Rate |
|---|---|---|---|
| **EGX-India** | Pearson Correlation | 1 | .793** |
| | Sig. (2-tailed) | | 01 |
| | N | 13 | 13 |
| **Forex Rate** | Pearson Correlation | .793** | 1 |
| | Sig. (2-tailed) | 01 | |
| | N | 13 | 13 |
| **. Correlation is significant at the 0.01 level (2-tailed). | | | |

*Source: Obtained from the calculation using SPSS with data compilation from Indiastat data and Database on Indian Economy, RBI*

The above table depicts the results of bi-variate correlation run between two variables

namely the export of engineering goods from India and the foreign exchange rate of India with respect to the US Dollars. The value of correlation is 0.793 which means that both the variables are highly correlated to each other in the positive direction. This depicts that Indian export of engineering goods and the foreign exchange rate of India are having greater influence on each other, as increase in either of the variables lead to increase in the another variable so as the decrease in one of the variables influencing the same pattern of trend to be followed with the value of another variable.

**D) Identification of the Competitiveness of the Export of Indian Engineering Goods**

The competitiveness of the export of Indian engineering goods with the global exports is calculated with the help of Revealed Comparative Advantage (RCA) index. Here, the Revealed Comparative Advantage (RCA) on the export of engineering goods by India and the leading five engineering goods exporting countries of the world namely Japan, the Republic of Korea (South Korea), Germany, China and the United States of America (USA) has been calculated from the values of a countries' export value of engineering goods, total value of merchandise export by the countries, total export value of engineering goods of the world and total value of world merchandise export during the given study period according to the formula mentioned in the research methodology on calculating the RCA index.

**TABLE IV**

**REVEALED COMPARATIVE ADVANTAGE (RCA) INDEX FOR THE EXPORT OF ENGINEERINGGOODS OF TOP 5 COUNTRIES AND INDIA**

| Year | Value of the Revealed Comparative Advantage (RCA) for Engineering Goods | | | | | |
|---|---|---|---|---|---|---|
| | Japan | Republic of Korea | Germany | China | USA | India |
| **2009** | 1.7560 | 1.7020 | 1.3676 | 1.4143 | 0.9952 | 0.5612 |
| **2010** | 1.8008 | 1.7141 | 1.4028 | 1.4420 | 1.0138 | 0.5211 |
| **2011** | 1.8679 | 1.7444 | 1.4782 | 1.4728 | 1.0295 | 0.5048 |
| **2012** | 1.9216 | 1.7132 | 1.5006 | 1.4679 | 1.0564 | 0.5032 |
| **2013** | 1.8711 | 1.7530 | 1.4915 | 1.4623 | 1.0350 | 0.5516 |
| **2014** | 1.8514 | 1.7541 | 1.4825 | 1.4266 | 1.0311 | 0.5442 |
| **2015** | 1.7375 | 1.7333 | 1.4123 | 1.3526 | 0.9886 | 0.5267 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **2016** | 1.7180 | 1.6951 | 1.3955 | 1.3357 | 0.9637 | 0.5251 |
| **2017** | 1.6974 | 1.7140 | 1.4091 | 1.3585 | 0.9468 | 0.5670 |
| **2018** | 1.7296 | 1.7077 | 1.4240 | 1.4086 | 0.9194 | 0.5856 |
| **2019** | 1.7123 | 1.7045 | 1.4136 | 1.3796 | 0.9171 | 0.6251 |
| **2020** | 1.6388 | 1.7181 | 1.3291 | 1.3651 | 0.9152 | 0.6181 |
| **2021** | 1.6934 | 1.7487 | 1.3528 | 1.4316 | 0.8884 | 0.6549 |

*Source: Obtained from the calculations with the data compiled from WTO Stats, SITC rev. 3*

Note: The data is computed by adding up the engineering goods categorized according SITC Revision 3 in the World Trade Organization unlike World Customs Organization's Harmonized System used in India due to the non-availability of sufficient data on the world nations' value of engineering goods export.

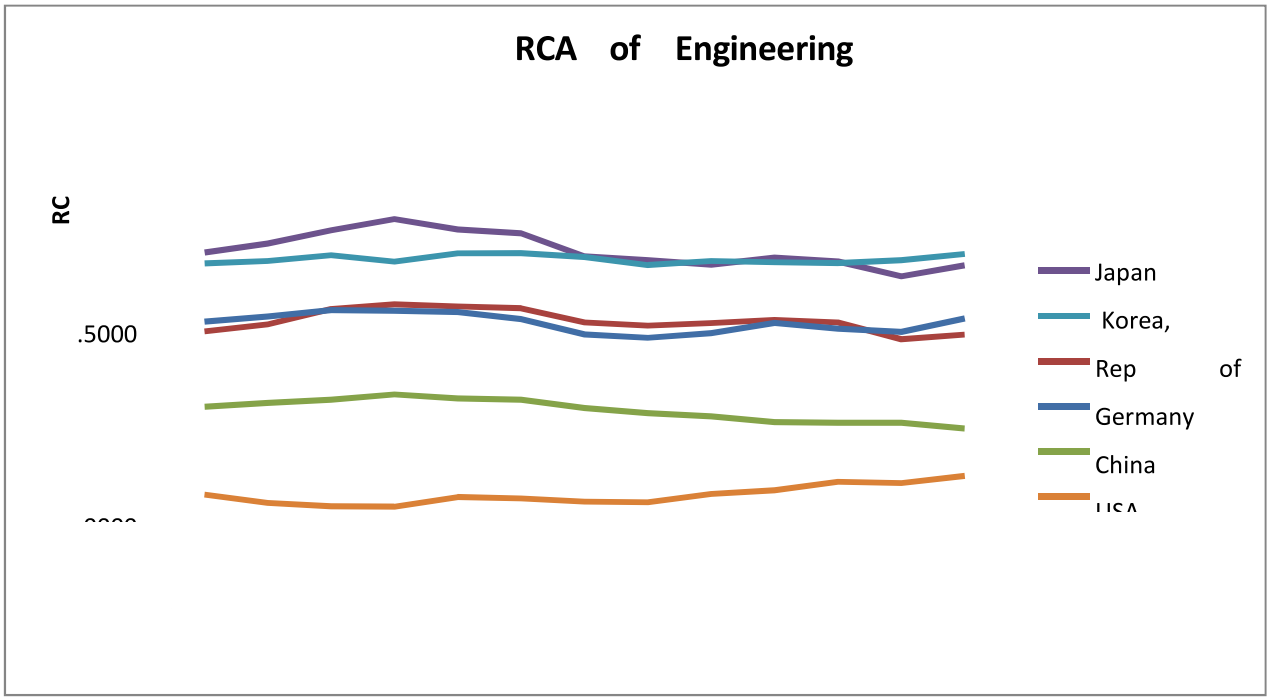


**Figure 1 Revealed Comparative Advantage (RCA) Index Analysis for the Export of Engineering Goods of Top 5 Countries and India**

The above table and chart depicts the comparison of the Revealed Comparative Advantage (RCA) Index of the leading five engineering goods exporting countries of the world and India. It is to be understood that Japan enjoys the highest comparativeadvantage among the leading engineering goods exporting countries which ranges from 1.7560 in 2009 to 1.6934 in 2021

and has the highest RCA index value of 1.9216 in 2012. This is followed by the Republic of Korea which has the RCA index value of 1.7020 in 2009 and 1.7487 in 2021 and its highest RCA index value throughout the study period is 1.7541 in 2014. Third in the export of engineering goods with higher RCA index value is Germany with 1.3676 in 2009 and 1.3528 in 2021 while its all time during the study period is 1.5006 in 2012. The next country is China which despite leading the world in quantity of engineering goods exports has secured only the fourth place in having highest RCA index value which is 1.4143 in 2009 and 1.4361 in 2021 with its highest RCA index value being 1.4728 in 2011. This is followed by the USA with the RCA index value of 0.9952 in 2009 and 0.884 in 2021 with the highest index value be 1.0564 in 2012. In the case of India, though it has the least value while comparing with the leaders of engineering goods exporters, it possess very decent RCA index values with 0.5612 in 2009 and o.6549 in 2021, which is also its highest RCA index value in the study period. This depicts that the country is performing and growing consistently in the export of engineering goods after the Great Recession of 2008 that hit the world economies adversely only to get bounced back higher and stronger economically with its year-on-year increase in the comparative advantage over the export of engineering goods.

## VIII.FINDINGS

The relationship between the export of engineering goods from India and the foreign exchange reserve of India is analyzed with the help of simple linear regression. The R squared value is 0.720 which means that there is a high level of positive influence of engineering goods export on the foreign exchange reserves of India.

The relationship between the export of engineering goods from India and the foreign exchange reserve of India is analyzed with the help of bi-variate correlation run between two variables namely the export of engineering goods from India and the foreign exchange rate of India with respect to the US Dollars. The value of correlation is 0.793 which means that both the variables are highly correlated to each other in the positive direction.

The competitiveness of the export of Indian engineering goods with the global exports is calculated with the help of Revealed Comparative Advantage (RCA) analysis

on the export of engineering goods by India and the leading five engineering goods exporting countries of the world namely Japan, the Republic of Korea (South Korea), Germany, China and the United States of America (USA) which all have secured the index value in the same order as their nameswere mentioned above followed by India in the last of the six countries in the export of engineering goods.

## IX.SUGGESTIONS

The government should take necessary steps to promote the listed engineering goods based on their potential of the corresponding states through better infrastructure, tax subsidies and likewise measures to increase the production and encourage the export of the engineering goods.

Restrictions on the export of listed engineering goods imposed by the destination countries should be made to be relaxed through effective talks and agreements by the Indian government.

## X. CONCLUSION

The growth and performance of engineering goods are of mixed trend due to the economic challenges like the Great Economic Recession of 2008-09, policy changes across the world, the COVID-19 pandemic, etc. Over the study period, the export of iron and steel, electrical machinery and equipment and aluminum and products of aluminum has seen a tremendous growth and are predicted to have an increasing trend in the future too. The states of Maharashtra, Tamil Nadu and Gujarat are the significant contributors in the export of all the eight listed commodities by consistently maintaining their leading positions as the exporters of engineering goods of India. The percentage share of the Indian engineering goods export is accounted as around 1 per cent in the world engineering export which may be due to the imposition of restriction on the export either domestically or globally may cause the decline in the demand for the Indian engineering goods.

Thus, the engineering goods have greater scope for export which in turn would assert favourable influence on the foreign exchange rate and fetch the foreign exchange reserves of the country along with gaining a competitive advantage over the world nations in the domain of export.

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