

# ENHANCING COMPETITIVENESS OF INDIA'S ELECTRONIC EXPORTS

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Tel: +91-11-24629994-7, Fax: +91-11-24626149; Email: [info@cii.in](mailto:info@cii.in); Web: [www.cii.in](http://www.cii.in)

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# I. Introduction

Electronics manufacturing is one of the largest and fastest growing industries in the world and demand for electronics manufacturing has rapidly gone up along with the increased pace of digitalization over the last few years. The sector is also heavily prioritised in global value chains, with extensive and deep linkages across key manufacturing nodes in the world.

India's electrical machinery and equipment sector has expanded over the years and between 2012 and 2021, its exports increased from US\$ 10.76 billion to US\$ 18.84 billion. The domestic electronics sector in India received an impetus in 2014, with the announcement of the Make in India campaign which aimed to catalyse and transform India's manufacturing economy into a global hub.

Electronics has been a major area of emphasis and the sector has received focussed attention over the years, with the Government announcing several policy measures to promote and expand the sector. Taking cognizance of the sector's potential, opportunities and challenges, the Government of India notified the National Electronics Policy (NEP) in 2012, which provided a roadmap for the development of the domestic electronics sector. The NEP was approved in 2019, and envisioned positioning India as a global hub for Electronics System Design and Manufacturing (ESDM) by driving capabilities in the country for developing core components and creating an enabling environment for the industry to become globally competitive.

These included large scale electronics manufacturing, Scheme for Promotion of Electronic Components and Semiconductors (SPECS), the Modified Electronics Manufacturing Clusters Scheme notified in 2020 and the Production Linked Incentive (PLI) scheme for IT hardware, notified in March 2021. These schemes gave a strategic heft to India's domestic electronics sector with the objectives of increasing the scale of manufacturing as well as enhancing the global quality and efficiency of electronic products. The schemes also aim to



attract global companies to set up manufacturing in India, which in turn will help India's further integration into Global Value Chains (GVCs).

A key challenge facing the Indian electronics sector has been the high dependence on imports for components and parts. The electronics industry continues to be one of the largest contributors to India's merchandise imports and the gap between the country's electronics demand and its domestic production capabilities has been widening over the years (Francis, 2018). It is estimated that India's imports of electronic goods increased from US\$ 0.9 billion in 1993-94 to US\$ 51.5 billion in 2017-18, recording an annual growth rate of over 15% (Gupta et al., 2021). It is therefore important to put in place enabling policies and interventions that reduce India's dependence on Asian economies, especially China.

At the same time, it is also important for India to learn from other countries' experience, such as Vietnam and China, which have been able to increase their domestic manufacturing as well as achieve global scale over time through macro, trade and industrial policies.

It is crucial for the country to diversify its exports basket and also look for alternative suppliers instead of relying on limited sources for inputs.

Given that the world economic environment and the global geopolitical landscape have undergone massive transformation over the last few years, the current setting also provides a number of challenges as well as opportunities for the Indian electronics industry. Thus, it is crucial for the

country to diversify its exports basket and also look for alternative suppliers instead of relying on limited sources for inputs. It is also an opportune time for India to take advantage of the rising demand for electronics goods and cater to the huge domestic as well as international market.

Given this backdrop, the paper undertakes the following studies:

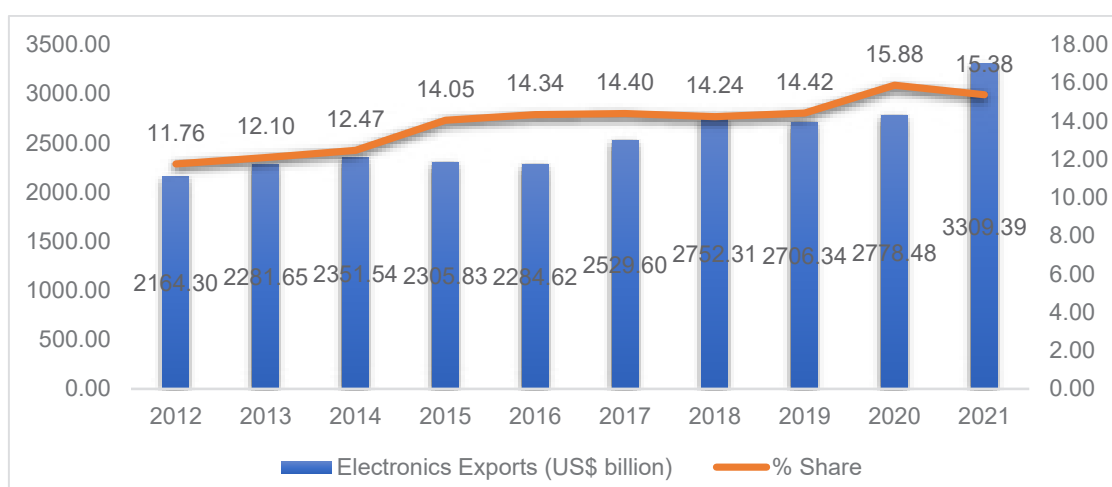
- Current domestic and global trends in the Indian electronics sector, specifically the broad HS 2-digit level category of electrical machinery and equipment (HS 85)
- Competitiveness of the sector's products at the HS 6-digit level
- Identification of high-potential electronics exports that have the ability to achieve global scale through a Revealed Comparative Advantage (RCA) analysis
- Outlining the top export destinations and markets for these products
- Recommendations which have the potential to enhance the competitiveness of the industry as well as the identified products

## II. Recent Trends

### Global Trends

Electronics (HS 85) is by far the largest export product in the world, surpassing petroleum products in 2015. Between 2012 and 2021, the global exports of electronic products grew from US\$ 2,164.30 billion to US\$ 3,399.13 billion, registering a compound annual growth rate (CAGR) of 4.8%. The share of electronic products in the world's exports has steadily increased from 11.76% in 2012 to 15.88% in 2020, before slightly moderating at 15.38% during 2021.

**Figure 1: World Exported Value of Electronic Products**



**Source:** Calculations based on International Trade Centre data, accessed in July, 2022

The overall HS 85 category is widely diversified and includes consumer goods as well as inputs and components.

Electronic integrated circuits as processors and controllers (854231) was the top electronic export in the world at the HS 6 digit level in 2021, recording an export value of US\$ 364.73 billion and accounting for around 11% of total world exports. Other top exports belonged to the categories of electronic integrated circuits excluding processors, controllers etc. (854239), telephones for cellular networks (851712), and electronic integrated circuits as memories (854232).

**Table 1: World's Top 10 Electronics Export Products (HS 6-digit)**

Product code	Product label	Exported Value in 2021, US\$ billion	% Share
854231	Electronic integrated circuits as processors and controllers, whether or not combined with ...	364.73	10.90
854239	Electronic integrated circuits (excluding such as processors, controllers, memories and amplifiers)	352.00	10.57
851712	“Telephones for cellular networks “”mobile telephones”” or for other wireless networks”	288.41	7.99
854232	Electronic integrated circuits as memories	269.64	7.91
851762	Machines for the reception, conversion and transmission or regeneration of voice, images or ...	180.40	5.26
851770	Parts of telephone sets, telephones for cellular networks or for other wireless networks and ...	152.27	4.36
850440	Static converters	81.65	2.37
852990	Parts suitable for use solely or principally with flat panel display modules, transmission ...	74.89	2.18
854140	Photosensitive semiconductor devices, incl. photovoltaic cells whether or not assembled in ...	72.35	2.07
850760	Lithium-ion accumulators (excluding spent)	68.90	2.03
<b>Total World Exports</b>		<b>3414.67</b>	

**Source:** Calculations based on International Trade Centre data, accessed in August 2022

Electronic integrated circuits as processors and controllers (853231) was also the top imported item, with an imported value of around US\$ 480 billion in 2021 and accounting for around 14% of world total imported value. Other top imported electronic items in the year 2021 were in the categories of electronic integrated circuits excluding processors, controllers etc. (854239), telephones for cellular networks (851712), electronic integrated circuits as memories (854232) and machines for the reception, conversion and transmission or regeneration of voice, images etc. (851762).



**Table 2: World's Top 10 Electronics Imports (HS 6-digit)**

Product code	Product label	Imported Value in 2021, US\$ billion	% share
854231	Electronic integrated circuits as processors and controllers, whether or not combined with ...	500.92	13.94
854239	Electronic integrated circuits (excluding such as processors, controllers, memories and amplifiers)	348.17	9.69
851712	"Telephones for cellular networks ""mobile telephones"" or for other wireless networks"	310.41	8.64
854232	Electronic integrated circuits as memories	280.27	7.80
851762	Machines for the reception, conversion and transmission or regeneration of voice, images or ...	188.22	5.24
851770	Parts of telephone sets, telephones for cellular networks or for other wireless networks and ...	146.92	4.09
852990	Parts suitable for use solely or principally with flat panel display modules, transmission ...	80.16	2.23
850440	Static converters	79.76	2.22
854140	Photosensitive semiconductor devices, incl. photovoltaic cells whether or not assembled in ...	72.47	2.02
853710	Boards, cabinets and similar combinations of apparatus for electric control or the distribution ...	68.19	1.90
<b>Total World Imports</b>		<b>3594.46</b>	

**Source:** Calculations based on International Trade Centre data, accessed in August 2022

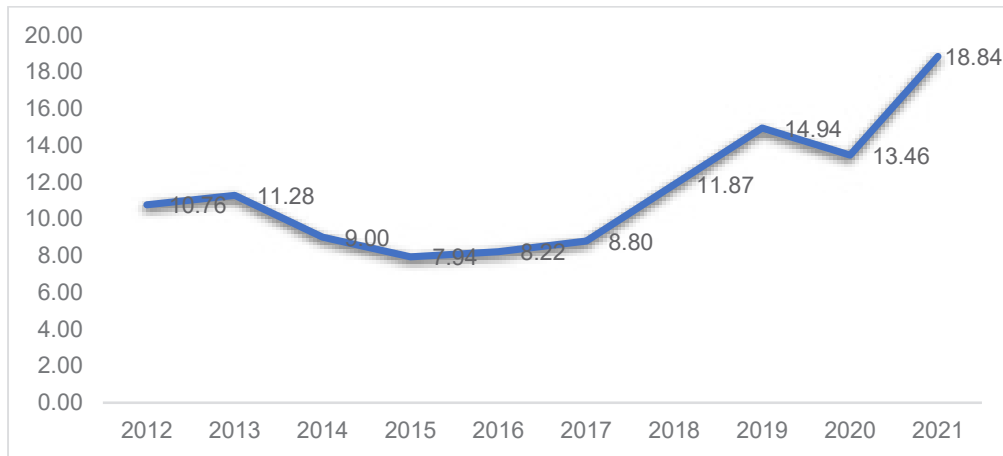
In terms of exporting countries, China is by far the dominant player in the global electronics value chain, accounting for close to US\$ 900 billion of world exports of US\$ 3.4 trillion. Taken together with Hong Kong, its share in global exports stands at close to 40%.

Taiwan, Republic of Korea and USA are the other top 5 exporters, with Vietnam having jumped up to 8th rank among electronic exporting nations.

## Domestic Trends

India's exports of electronic products grew from US\$ 10.76 billion in 2012 to US\$ 18.84 billion in 2021. During the 10-year period between 2011 and 2021, India's electronic exports registered a CAGR of 6.42%, which was higher than the global export trend. India ranked 25<sup>th</sup> in 2021 as a global exporter in the category.

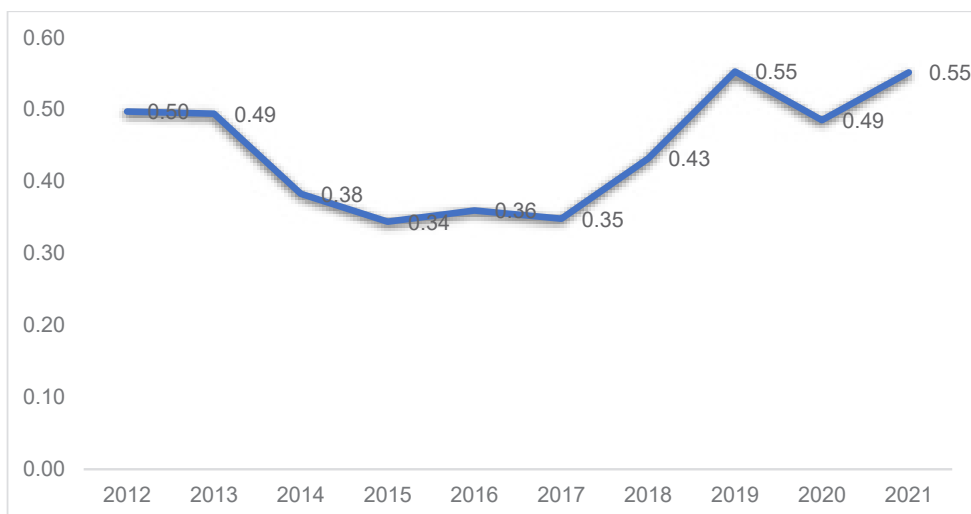
**Figure 2: India Exported Value of Electronic Products, US\$ billion**



**Source:** International Trade Centre accessed in August 2022

During the same period, the global share of Indian electronic exports increased from 0.50% in 2012 to 0.55% in 2021. The relatively low share of Indian electronic exports in the global market indicates the need to step up domestic manufacturing and scale up efforts in expanding the global share of India's electronic exports.

**Figure 3: Global Share of India's Electronics Exports, %**



**Source:** International Trade Centre accessed in August 2022

Telephones for cellular networks (HS 851712) was India's top electronics export at the HS 6-digit level during 2021 with an exported value of US\$ 4.87 billion, followed by static converters (HS 850440) valued at US\$1.3 billion. Other top export items included parts of telephone sets (HS 851770), parts suitable for use with electric motors and generators (HS 850300), and machines for reception, conversion and transmission or regeneration of voice (HS 851762), among others.

**Table 3: India's Top 10 Electronic Exports at the HS 6-digit level**

HS Code	Product label	Exported value in 2021 (US\$ million)
851712	"Telephones for cellular networks ""mobile telephones"" or for other wireless networks"	4871.53
850440	Static converters	1300.03
851770	Parts of telephone sets, telephones for cellular networks or for other wireless networks and ...	854.10
850300	Parts suitable for use solely or principally with electric motors and generators, electric ...	802.05
851762	Machines for the reception, conversion and transmission or regeneration of voice, images or ...	677.54
853890	Parts suitable for use solely or principally with the apparatus of heading 8535, 8536 or 8537, ...	517.73
853710	Boards, cabinets and similar combinations of apparatus for electric control or the distribution ...	429.43
853690	Electrical apparatus for switching electrical circuits, or for making connections to or in ...	376.95
854449	Electric conductors, for a voltage <= 1.000 V, insulated, not fitted with connectors, n.e.s.	354.16
850490	Parts of electrical transformers and inductors, n.e.s.	354.03

**Source:** International Trade Centre accessed on August 2022

**Table 4: India's Top 10 Electronic Imports at the HS 6 digit level**

Product Code	Product label	Imported value in 2021, US\$ million
854231	Electronic integrated circuits as processors and controllers, whether or not combined with ...	7523.58
851770	Parts of telephone sets, telephones for cellular networks or for other wireless networks and ...	7348.51
854140	Photosensitive semiconductor devices, incl. photovoltaic cells whether or not assembled in ...	4167.37
851762	Machines for the reception, conversion and transmission or regeneration of voice, images or ...	3872.73
852990	Parts suitable for use solely or principally with flat panel display modules, transmission ...	2808.60
854239	Electronic integrated circuits (excluding such as processors, controllers, memories and amplifiers)	2431.78
854232	Electronic integrated circuits as memories	2180.02
852580	Television cameras, digital cameras and video camera recorders	1764.57
850760	Lithium-ion accumulators (excluding spent)	1664.29
850440	Static converters	1543.17

**Source:** International Trade Centre accessed in August 2022

Electronic integrated circuits as processors and controllers (HS 854231) was India's top imported item in 2021, with a total imported value of US\$ 7.52 billion, followed by parts of telephone sets (HS 851770) valued at US\$ 7.35 billion. Other top imported items were photosensitive semiconductor devices (HS 854140), machines for the reception, conversion and transmission or regeneration of voice (HS 851762), and parts suitable for use with flat panel display modules (HS 852990), among others.

The USA and the UAE are the two largest markets for India in terms of exports as of 2021, with total exported values recorded at US\$ 3.37 billion and US\$ 2.61 billion respectively. China, Germany and UK were the other top export markets for India during 2021.

On the other hand, China continued to be India's largest source of imports for electronic products during 2021, with India's total imported value recorded at US\$ 26.4 billion. Hong Kong was India's second largest import partner with total imports from Hong Kong valued at US\$ 8.6 billion. India's other

top import sources included Vietnam, Singapore and the Republic of Korea for the year 2021.

**Table 5: India's Top 5 Import and Export Partners for Electronic Products**

Top Export Partners	Exported Value in 2021, US\$ million	Top Import Partners	Imported Value in 2021, US\$ million
USA	3373.48	China	26391.48
UAE	2610.13	Hong Kong	8561.23
China	986.89	Vietnam	3072.43
Germany	913.61	Singapore	2962.74
United Kingdom	885.59	Republic of Korea	2833.49
World	18836.21	World	56725.01

**Source:** International Trade Centre accessed in August 2022

## III. Identifying India's Top Potential Electronic Exports

In this section, India's high potential electronics exports, i.e., those with high comparative advantage in international markets, are identified with the help of a Revealed Comparative Advantage (RCA) analysis. The analysis is conducted at the HS 6-digit level. Boosting the domestic production of the identified products will help expand India's electronic exports globally, thereby also expanding the global shares of these products.

The Revealed Comparative Advantage (RCA) index as well as a modified version of the index is used to determine India's high potential exports in the Indian electronics sector, at the HS 6-digit level.

Two indices are employed in this study to assess the competitiveness of India's electronics exports in the global market. The Revealed Comparative Advantage (RCA) index as well as a modified version of the index is used to determine India's high potential exports in the Indian electronics sector, at the HS 6-digit level.

Apart from the above methodology, certain benchmarks must be followed while identifying potential products that have the ability to boost overall manufacturing capabilities of the electronics sector. Below listed are some of the criteria which are also important for identifying the right products.

- Ability to produce at large scale
- Possibility of large-scale employment generation
- Scope for substantial design led manufacturing
- Possibility of Value Addition

While the RCA index is one of the most accepted and frequently used economic approaches for assessing the competitiveness or relative advantage of products and this study identifies certain electronics products as high-potential exports based on the RCA analysis, it is important to emphasize that developing the entire exports ecosystem of the electronics sector is critical for India to become



a global hub of manufacturing. While special focus on the high-potential products identified in the study will help enhance the competitiveness of India's electronics sector, it is also critical to identify products which currently have low global shares and undertake appropriate policy interventions to build capacities in these segments as well. Based on the needs of these low-share products, tailor-made strategies must be developed for the specific product categories.

Developing the entire exports ecosystem of the electronics sector is critical for India to become a global hub of manufacturing.

## Revealed Comparative Advantage Index

The RCA index is a frequently used trade indicator in international economics, that is employed to assess the relative advantage or disadvantage of a country in a specific class or category of products in international markets. This measure also provides valuable information about potential trade prospects with new partners.

World Bank's World Integrated Trade Solution (WITS) database defines the RCA index of country  $i$  for product  $j$  as the product's share in the country's exports in relation to its share in world trade:

$$RCA_{ij} = (x_{ij}/X_{it}) / (x_{wj}/X_{wt}) \dots(i)$$

Where  $x_{ij}$  and  $x_{wj}$  are the values of country  $i$ 's exports of product  $j$  and world exports of product  $j$ , and  $X_{it}$  and  $X_{wt}$  refer to the country's total exports and world total exports.

In other words, the numerator is the country's total exports of a specific product divided by country's total exports. On the other hand, the denominator is the world exports of the commodity divided by total world exports.

A value greater than 1 indicates that the country under consideration has a revealed comparative advantage in the product. Similarly, a value less than 1 signifies that the country has a revealed comparative disadvantage in the product.

After collecting data on the relevant variables from the International Trade Centre (ITC) for the year 2021, the RCA index is calculated for Indian exports at the HS 6-digit level. All products for which the RCA is less than 1 is excluded. Further, Indian exports and world exports above US\$ 200 million are considered to ensure adequate production capability.

## Key Findings: RCA<sup>W</sup>

After applying the filter of US\$ 200 million and excluding products with RCA less than 1, a total of 9 products remain which are identified as Indian electronic products with high potential in global markets. Global shares for these products are also calculated.

See Table 1, Annex for the complete list of products. Final products are sorted as per India's exported value in 2021. Some of the top potential exports include parts suitable for use solely or principally with electric motors (HS 850300); parts of electrical transformers (850490); lead acid accumulators (HS850720); boards, panels, consoles etc. (853810); electrodes of graphite or other carbon for electric furnaces (854511); among others.

## RCA Index for Electronics

Apart from using the conventional RCA index to identify the relative competitiveness of India's electronics products, in this paper, a slightly modified version of the index is also used, that takes into account the global electronics industry, rather than total world export shares. So based on formula (i) above,

instead of India's total exports and world total exports, India's total exports of electronics and world total exports of electronic products are considered.

We call the first measure RCA<sup>W</sup>, which indicates the competitiveness of the specific electronics products in the global market. The other measure, specific to the global electronics industry is termed RCA<sup>E</sup>, which indicates the relative competitiveness of the electronics products in the global electronics industry.

This exercise helps us determine the competitiveness of Indian electronics products in the global electronics space, instead of considering all exports. Accordingly, it identifies India's high potential electronics exports exclusively in the

global electronics space.

The modified formula for the RCA index for the global electronics industry is given below:

$$RCA^E = RCA_{ij} = (x_{ij}/X_{it}) / (x_{pj}/X_{pt})$$

Apart from using the conventional RCA index to identify the relative competitiveness of India's electronics products, in this paper, a slightly modified version of the index is also used, that takes into account the global electronics industry, rather than total world export shares.

Where  $x_{ij}$  and  $x_{pj}$  are the values of country  $i$ 's exports of product  $j$  and world exports of electronics products  $j$ , where  $X_{it}$  and  $X_{pt}$  refer to the country's total exports and world total exports of electronics products.

Along with the RCA indices, we also calculate global shares of the electronics products in our analysis.

## **Key Findings: RCA<sup>E</sup>**

After applying the filter of US\$ 200 million and excluding products with RCA less than 1, a total of 18 products remain, which are identified as Indian electronic products with high potential in the global electronics markets. Global shares for these products are also calculated.

See Table 2, Annex for the complete list of products. Final products are sorted as per India's exported value in 2021.

Some of the top potential exports include telephones for cellular networks (HS 851712); static converters (850440); parts of electrical transformers (850490); boards, panels, consoles etc. (853810); electrodes of graphite or other carbon for electric furnaces (854511); among others.

The products coincide with the world set, which ensures the reliability of the products in terms of the analysis as well as high competitive advantage.

The fact that more products are found to be competitive in the global electronics export sector indicates that these products can also become competitive in global markets, provided that domestic production is expanded, and the right domestic policies are devised.

## IV. India's Potential Export Destinations for Electronics Products

This study also identifies India's potential top export destinations by mapping the top importing countries with the identified potential export at the HS 6-digit level. For identifying the potential export destinations, all the 18 identified export products as per the RCA analysis applied at the global electronics industry level are considered. The top three import partners for each of the top export product is then identified from the ITC database. For the full list of potential export destinations, see Table 3, Annex.

USA, UK, UAE, France, and Germany, among others, are some of the leading destinations for the identified Indian electronic products. Netherlands, China, Belgium, and Japan also feature in the list of potential destinations for India's electronic exports.

USA, UK, UAE, France, and Germany, among others, are some of the leading destinations for the identified Indian electronic products.

## V. Recommendations for Boosting Indian Electronics Exports

The Government's major policy initiatives for the sector have succeeded in transforming the ecosystem for manufacturing of electronic goods. Exports under HS 85 crossed US\$ 20 billion in 2021-22 and reached around US\$ 29 billion in 2022-23, as per official estimates.

India jumped spectacularly in exports of mobile phones and crossed a milestone of US\$ 11 billion during 2022-23.<sup>1</sup> This reflects the impact that policy can have on a sector, and therefore, it is important to not only look at potential exports from the RCA point of view, but also explore how exports even of goods where India currently does not display competitiveness can be pushed faster.

Given that India's current share of global exports stands at just 0.55%, there is high potential for India to propel exports in this leading product category for the world. A well-considered mix of policy options would enhance the competitiveness of goods as also encourage investments in manufacturing and exports for India to deepen its presence in the global electronics value chain.

It is important to note that for helping Indian electronics industry better integrate into global value chains and become globally competitive, rationalizing the tariff structure and reducing import tariffs to an Asia competitive level is required. A graded roadmap is to be considered for shifting duty slabs to a competitive level for boosting domestic manufacturing with duty on imports of final products at the standard slab (5-7.5%), duty on intermediates in the lower slab (2.5%-5%) and duty on inputs or raw materials at the lowest or nil slab (0-2.5%).

### i. Building an inclusive exports ecosystem

For building a competitive and inclusive exports ecosystem, it is important to ensure that all Indian exporters can enjoy the benefits of reduced custom duties. Manufacturers of inputs often import goods and after value addition, these are sold to the next level of manufacturers, who in turn may sell

<sup>1</sup> <https://www.pib.gov.in/PressReleasePage.aspx?PRID=1924766>



to the final exporter. While the actual exporter has the facility of duty free imports, this is not applicable to lower-tier suppliers who may be supplying both to domestic users as well as exporters. This thus ends up as export of import duties.

Further, it has been observed that despite zero duties in certain products, exports have not picked up as margins in this sector are low and every cost addition can make the goods uncompetitive. Also, higher tariffs are often applicable on goods that are not produced domestically. This tends to negate the support provided through PLI schemes.

Therefore, policies and export schemes must be designed to ensure that exporters in the tier 2, tier 3 and tier 4 levels of manufacturing can also avail duty free access to products that ultimately feed into exported goods. For example, this can be facilitated using End Users' Certificate so that tier 3/tier 4 suppliers have access to zero duty. Schemes such as Advance Release Order (ARO) and Advanced Authorization Scheme allow duty free imports of inputs by businesses and such schemes must be made more facilitative.

## ii. Design Led Manufacturing

Focus on a research-driven, design-thinking approach that will encourage manufacturing companies to innovate is critical for enhancing the sector's competitiveness. Such an integrated manufacturing approach from concept to the final manufacturing process will result in more efficient and cost-effective designs, components and production processes. Facilitating the adoption of digital technologies across small, medium and large enterprises would be crucial in this regard to drive manufacturing excellence. Design led manufacturing thus must be encouraged across all sectors which will help Indian manufacturers to create world class designs and offer new and differentiated solutions to the world.

During Union Budget 2022-23, the Government proposed to launch a scheme for design led manufacturing to build a strong ecosystem for 5G as part of the Production Linked Incentive (PLI) scheme for the telecom sector<sup>2</sup>. In April, the Department of Telecommunications amended the PLI scheme and added design led manufacturing and announced additional incentives to the tune of INR 4,000 crore (INR 40 billion) for five years<sup>3</sup>. Similar PLI Schemes must be implemented across the sectors to incentivize manufacturers.

2 <https://pib.gov.in/Pressreleaseshare.aspx?PRID=1794158#:~:text=DESIGN%2DLED%20MANUFACTURING%20SCHEME%20PROPOSED,A%20STRONG%20ECOSYSTEM%20FOR%205G&text=The%20Union%20Budget%202022%2D23,75%20to%20India%20at%20100>

3 <https://www.livemint.com/industry/telecom/dot-offers-4k-cr-incentives-to-design-led-manufacturers-11655753933977.html>



### iii. Adoption of Technology

Technology is a critical pillar of the electronics sector and can drive the growth of the industry. Thus, in order to be globally competitive, the Indian electronics sector must transform and adapt to newer business models. The ability to quickly innovate is also critical for the sector to achieve global scale. The adoption of modern technology can improve the competitiveness of the sector through economies of scale.

Greater investments in R&D and innovation systems are a crucial requirement to help build capacities and scale to cater to global markets. India's R&D expenditure, at 0.65% of GDP is much lower than the global average of 2.3% for developed countries and 1.25% for developing countries. Thus, R&D investments must be stepped up to encourage greater innovation.

Greater investments in R&D and innovation systems are a crucial requirement to help build capacities and scale to cater to global markets.

Subsidizing the cost of new innovations and significant increase in allocation of R&D expenditure should be the key focus area. Strong R&D collaboration between academic and R&D institutes and industry must be supported through greater incentives and schemes such as Multiplier Grants Scheme. Schemes such as Technology and Development of Entrepreneurs (TIDE 2.0) must also be supported for strengthening Technology Incubation Centres in higher learning institutes and enabling entrepreneurs to initiate technology start-ups in the areas of electronics and ICT. More scholarships must be awarded through Visvesvaraya PHD Scheme for Electronics and IT, in streams such as quantum computing, 3D printing, vehicular electronics, Blockchain, etc. to strengthen the overall eco-system (Gupta et al., 2021).

India's FTAs could include special clauses on R&D collaboration and investment promotion while the FDI policy should be designed to attract FDI in sectors with technology gaps as well as for incentivizing adoption of modern technologies.

At the same time greater partnerships with other countries and overseas entities are important, as this will result in greater technology transfer and greater access to overseas markets.

Both the Government and the private sector must work together in a collaborative manner for intensifying technology adoption which in turn will result in operating efficiencies and cost reduction.

#### iv. Building a strong domestic ecosystem of electronic ancillaries and intermediate products

Developing and strengthening the domestic ecosystem in the electronics sector is an imperative for India to become a global manufacturing hub of electronic products. Encouraging the development of the local ancillary industries and strengthening the local supply chain is critical in this regard. Promoting the ancillary units can be achieved in the following ways:

i. **Connecting suppliers through trade fairs** – Sourcing fairs, buyer seller meets can be arranged for local firms to connect suppliers with local as well as foreign companies. Awareness programmes can be arranged to provide guidance on quality, standards, and requirements for electronic products.

ii. **Boosting MSMEs:** For the electronics domestic market to flourish, it is crucial to provide strong support to the MSME sector. The MSMEs can play a critical role in building quality and innovative electronic products that have the ability to become globally competitive, if provided the right support through enabling policies and incentives.

It is crucial to address the many challenges that MSMEs face including adoption of technology, access to credit, setting up business, and others to level their cost disadvantage and enhance their competitiveness. Schemes such as the Modified Special Incentive Package Scheme (MSIPS), which aims to attract greater investments and boost production of electronic products in the industry must be extended.

iii. **Enabling Programmes and Interventions:** Technology updation programmes must be in place to help build technical capabilities and improve worker skills, to boost local manufacturing and strengthening local supply chains. Industry development programmes to support local firms and SMEs and linking them to local and global firms in the supply chain in an investor friendly way is also important. Something on the lines of Vietnam's ten-year Supporting Industry Development Programme (SIDP) 2016-25 (which aims to assist local Vietnamese firms so that they can meet 65 percent of both local and foreign firms manufacturing by 2025) could be envisaged in the Indian context (ICRIER, 2022).

iv. **Developing Electronic Parks:** For producing at speed and scale and becoming a global manufacturing hub, setting up of electronic components manufacturing near the finished product manufacturing

units must be facilitated. This would require developing electronics parks, rather than clusters, with full infrastructure development and 100% power to offer a plug and play network (NCAER, 2022).

#### v. Skill Development Initiatives

There is a dearth of readily available vocational training programmes tailored to the needs of the electronics industry as well as lack of a skilled workforce to produce parts and components. Therefore, new courses relevant for the fast-growing electronics market must be developed (ICRIER, 2022). Concerted efforts from state and central governments as well as the industry is required to step up job creation and building a skilled workforce for the sector.

As higher skilled manpower is required at every stage of the value chain, there is a need for more training centres and higher investments for imparting industry relevant and updated skills to workers. The relevant infrastructure for skill development also needs to be built including driver training institutes, vocational institutes, institutes imparting warehouse related courses, etc. through private sector participation. With the rapid pace of technological advancements, digital skilling of the workforce is also an imperative.

As the electronics sector employs a large percentage of women workers, it is critical to step up female labour force participation in the sector by providing incentives such as flexibility in work hours, availability of housing, and job security that promote a women friendly work-environment.

Greater focus on job training is also an important requirement as it can produce significant benefits by imparting sector specific, firm-specific and task specific skills. However, on the job training has not acquired much attention in India, though evidence shows around 20% to 60% of skills are acquired on the job. The private sector must step in to promote on the job training programmes.

Strengthening the education sector, specifically the Indian engineering sector, which has lagged behind in terms of technology changes, is an imperative, for enhancing skills as well as building capabilities of the workforce (Francis, 2018).

As the electronics sector employs a large percentage of women workers, it is critical to step up female labour force participation in the sector

**vi. Need for a Strategic Industrial Plan:**

As the global electronics value chains are marked by the presence of numerous suppliers and parts scattered across the world, a holistic approach towards developing a strategic industrial development plan is the need of the hour. While there is a great need for supportive policies for promoting the development of the domestic components sector, trade, investment and FDI policies must not be considered in silos. An open and liberal trade regime must be facilitated to provide further heft to the country's Make in India initiative.

A multisectoral approach must be adopted to facilitate greater coordination and coherence among trade, FDI, technology, taxation, infrastructure development, education, and skill development policies. The alignment of national and subnational policies is required to reduce the regulatory burden and enhance exports and investments. It is also important to have sector wise strategies to bolster sector wise exports. Therefore, focus must be on working on a coherent, holistic and strategic industrial plan that addresses the challenges faced by the electronics hardware manufacturing segment and creates a stable and conducive environment for entrepreneurs, investors as well as consumers.

**vii. Identify Champion Sectors and Products and Undertake Market Promotion**

To boost domestic manufacturing in the electronics sector, the products identified in the present paper can be promoted through appropriate policies and incentives. This in turn will also provide an impetus to India's Make in India campaign.

With economies and trade recovering post the Covid-19 pandemic, green shoots are appearing in areas such as mobile phones. However, apart from the identified export products in this paper, it is important to also consider products in new age areas such as smart manufacturing, where disruptive technologies such as robotics, AI and Internet of Things (IoT) are some of the key emerging trends.

Tailor-made strategies can be designed for the identified products to address the bottlenecks faced by the sectors. While many of these products face high comparative advantage, it is important to identify as well as address tariff and non-tariff barriers for enhancing the competitiveness of these products.

Aggressive market promotion of the identified products in the select markets identified in this paper, must also be undertaken. Dedicated market promotion strategies such as organizing trade fairs, buyer seller meets, seminars and exhibitions to create and promote Brand India could help build the image of the country as a supplier of quality and unique products.

Dedicated export marketing centres on the lines of UK trade and Investment (UKTI), Buy USA etc. can be set up in select markets to promote exports, organize business meets and link Indian exporters with local buyers.

### **viii. Promote Ease of Doing Business Reforms**

India has made considerable progress in Ease of Doing Business by simplifying procedures, digitalization of clearances and approvals, setting up of National Single Window System and enhancing trade facilitation measures. Some key issues that must be resolved include multiple compliances, weak infrastructure and poor logistics that create an uncertain and unpredictable environment, resulting in lower FDI inflows.

Thus, it is important to identify specific issues faced by the high potential segments in the electronics sector and focus on improving ease of doing business as it has a positive impact on attracting greater foreign investments. Implementing investor friendly policies along with handholding of investors and bringing greater transparency to the sectors are some key focus areas. Improving logistical efficiencies, reducing procedural complexities and avoiding multiple documentation and multiple approvals are also key imperatives.

Ensuring single window clearance, getting land and power, easing of land acquisition for large corporates and offering plug and play models to MSMEs, and setting up of inland container depots near manufacturing centres, are some of the key measures that must be adopted to facilitate a more conducive business environment and attract greater investments into the country (NCAER, 2022).

Greater impetus must be provided to EODB 2.0 or the next phase of ease of doing business reforms, which specifically focuses on strengthening production and easing supply chain bottlenecks.

Greater impetus must be provided to EODB 2.0 or the next phase of ease of doing business reforms, which specifically focuses on strengthening production and easing supply chain bottlenecks.

## VI. Conclusion

The global electronics industry has rapidly expanded over the past few years, on account of rising demand for electronic items as well as with the increased pace of digitalization. This trend is bound to gain pace as new technologies such as artificial intelligence, smart products, and 3D printing become accessible to mass consumers.

While India's electronics industry has grown significantly in the last few years, the global share of India's electronic products still remains low. The high dependence on imports of electronic components and parts in particular is a key challenge that needs to be addressed urgently. With several developments

in the world's economic and geopolitical landscape over the years, the current scenario is an opportune time for India to step up efforts for enhancing the competitiveness of its electronics industry.

Two points are particularly relevant in this context. First, the future of focus products will depend largely on the policies that the Government adopts. In other words, government policies to support certain products as well as the overall electronics landscape will play a critical role in driving the growth of the sector as well as transforming India into a global manufacturing hub. For example, the PLI schemes

and their effective and timely implementation would enhance the large-scale manufacturing of the identified products.

Secondly, the current global manufacturing landscape would also influence the future of the identified products and impact the strategy that is adopted for supporting the champion products and the domestic players involved. Emerging trends need to be considered, for example, new technologies which are reshaping the global manufacturing landscape such as AI, IoT and advanced robotics, etc. As technology, skills and innovation are likely to dominate the

Government policies to support certain products as well as the overall electronics landscape will play a critical role in driving the growth of the sector as well as transforming India into a global manufacturing hub.



global manufacturing landscape in the coming years, these would be the key areas to focus upon for building competitive products with speed and scale.

Given this backdrop, this paper examined the current trends in the domestic as well as global electronics industry. Using a Revealed Comparative Advantage (RCA) analysis, the paper also identified several Indian electronics products with high potential which can perform well globally. The select markets where these products have the potential to perform are also identified.

The targeted and aggressive promotion of the identified products, addressing tariff and non-tariff barriers, focus on design led manufacturing, formulating a strategic and coherent industrial development plan, building a strong, domestic system of ancillary industries are some of the policy suggestions prescribed in this paper, which have the potential to enhance the competitiveness of the electronics sector. The timely and effective implementation of such policies would be critical for India to realize its ambitious plan of US\$ 300 billion of electronics manufacturing by 2026.

**Table 1: India's High Potential Electronic Exports in the World, US\$ million**

Product code	Product label	World exported value in 2021	India exported value in 2021	RCA Index	Global Share (%)
850300	Parts suitable for use solely or principally with electric motors and generators, electric ...	24,264.69	802.05	1.84	3.31
850490	Parts of electrical transformers and inductors, n.e.s.	13,645.36	354.03	1.44	2.59
850720	Lead acid accumulators (excluding spent and starter batteries)	8,810.61	307.46	1.94	3.49
853810	Boards, panels, consoles, desks, cabinets and other bases for the goods of heading 8537, not ...	4,450.89	301.28	3.76	6.77
850231	Generating sets, wind-powered	7,281.60	292.55	2.23	4.02
854460	Electric conductors, for a voltage > 1.000 V, insulated, n.e.s.	8,935.46	281.87	1.75	3.15
854511	Electrodes of graphite or other carbon, for electric furnaces	3,202.56	237.24	4.12	7.41
853620	Automatic circuit breakers for a voltage <= 1.000 V	9,958.27	217.32	1.21	2.18
852352	"Cards incorporating one or more electronic integrated circuits "smart cards""	4,789.75	210.52	2.44	4.40

Source: CII Calculations based on ITC data accessed in August 2022

**Table 2: India's High Potential Electronic Exports in Global Electronics Industry, US\$ million**

Product code	Product label	World exported value in 2021	India exported value in 2021	RCA Index	Global Share (%)
851712	"Telephones for cellular networks ""mobile telephones"" or for other wireless networks"	288,411.62	4,871.53	3.06	1.69
851770	Parts of telephone sets, telephones for cellular networks or for other wireless networks and ...	152,268.84	854.10	1.02	0.56
850440	Static converters	81,651.57	1,300.03	2.89	1.59
853710	Boards, cabinets and similar combinations of apparatus for electric control or the distribution ...	68,289.54	429.43	1.14	0.63
853690	Electrical apparatus for switching electrical circuits, or for making connections to or in ...	45,592.77	376.95	1.50	0.83
854430	Ignition wiring sets and other wiring sets for vehicles, aircraft or ships	41,303.44	254.93	1.12	0.62
853890	Parts suitable for use solely or principally with the apparatus of heading 8535, 8536 or 8537, ...	37,504.75	517.73	2.50	1.38
854449	Electric conductors, for a voltage $\leq 1.000$ V, insulated, not fitted with connectors, n.e.s.	36,554.06	354.16	1.76	0.97
850300	Parts suitable for use solely or principally with electric motors and generators, electric ...	24,264.69	802.05	5.99	3.31
850490	Parts of electrical transformers and inductors, n.e.s.	13,645.36	354.03	4.70	2.59



Product code	Product label	World exported value in 2021	India exported value in 2021	RCA Index	Global Share (%)
850710	"Lead-acid accumulators of a kind used for starting piston engine ""starter batteries"" (excluding ...	12,551.15	218.59	3.16	1.74
853620	Automatic circuit breakers for a voltage <= 1.000 V	9,958.27	217.32	3.96	2.18
854460	Electric conductors, for a voltage > 1.000 V, insulated, n.e.s.	8,935.46	281.87	5.72	3.15
850720	Lead acid accumulators (excluding spent and starter batteries)	8,810.61	307.46	6.33	3.49
850231	Generating sets, wind-powered	7,281.60	292.55	7.28	4.02
852352	"Cards incorporating one or more electronic integrated circuits ""smart cards""	4,789.75	210.52	7.97	4.40
853810	Boards, panels, consoles, desks, cabinets and other bases for the goods of heading 8537, not ...	4,450.89	301.28	12.27	6.77
854511	Electrodes of graphite or other carbon, for electric furnaces	3,202.56	237.24	13.43	7.41

**Source:** CII Calculations based on ITC data accessed in August 2022

**Table 3: India's Potential Export Destinations based on RCA Analysis**

Product Code	Product label	Top Export Destinations
851712	"Telephones for cellular networks ""mobile telephones"" or for other wireless networks"	UAE, UK, Russian Federation
851770	Parts of telephone sets, telephones for cellular networks or for other wireless networks and ...	China, USA, Hong Kong
850440	Static converters	USA, China, Netherlands
853710	Boards, cabinets and similar combinations of apparatus for electric control or the distribution ...	USA, UAE, Japan
853690	Electrical apparatus for switching electrical circuits, or for making connections to or in ...	USA, Germany, Netherlands
854430	Ignition wiring sets and other wiring sets for vehicles, aircraft or ships	UK, USA, France
853890	Parts suitable for use solely or principally with the apparatus of heading 8535, 8536 or 8537, ...	USA, Germany, France
854449	Electric conductors, for a voltage $\leq 1.000$ V, insulated, not fitted with connectors, n.e.s.	UAE, USA, UK
850300	Parts suitable for use solely or principally with electric motors and generators, electric ...	USA, Germany, Denmark
850490	Parts of electrical transformers and inductors, n.e.s.	USA, Oman, Saudi Arabia
850710	"Lead-acid accumulators of a kind used for starting piston engine ""starter batteries"" (excluding ...	UAE, Malaysia, Nepal
853620	Automatic circuit breakers for a voltage $\leq 1.000$ V	Singapore, USA, France
854460	Electric conductors, for a voltage $> 1.000$ V, insulated, n.e.s.	USA, Australia, Nigeria
850720	Lead acid accumulators (excluding spent and starter batteries)	UAE, Nigeria, Lebanon
850231	Generating sets, wind-powered	Poland, France, Italy
852352	Cards incorporating one or more electronic integrated circuits "smart cards"	UAE, UK, Belgium
853810	Boards, panels, consoles, desks, cabinets and other bases for the goods of heading 8537, not ...	USA, Germany, UK
854511	Electrodes of graphite or other carbon, for electric furnaces	Turkey, USA, Egypt

**Source:** CII Calculations based on ITC data accessed in August 2022



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The Confederation of Indian Industry (CII) works to create and sustain an environment conducive to the development of India, partnering Industry, Government and civil society, through advisory and consultative processes.

CII is a non-government, not-for-profit, industry-led and industry-managed organization, with around 9,000 members from the private as well as public sectors, including SMEs and MNCs, and an indirect membership of over 300,000 enterprises from 286 national and regional sectoral industry bodies.

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As India strategizes for the next 25 years to India@100, Indian industry must scale the competitiveness ladder to drive growth. It must also internalize the tenets of sustainability and climate action and accelerate its globalisation journey for leadership in a changing world. The role played by Indian industry will be central to the country's progress and success as a nation. CII, with the Theme for 2023-24 as '**Towards a Competitive and Sustainable India@100: Growth, Inclusiveness, Globalisation, Building Trust**' has prioritized 6 action themes that will catalyze the journey of the country towards the vision of India@100.

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The Mantosh Sondhi Centre  
23, Institutional Area, Lodi Road, New Delhi – 110 003 (India)  
T: 91 11 45771000  
E: [info@cii.in](mailto:info@cii.in) • W: [www.cii.in](http://www.cii.in)

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