Executive Summary
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India Electronics & Semiconductor Association
Executive Summary

Global ESDM and economic outlook

In last 20 years, locus of global electronics market has experienced massive migration. Sized at $1.7 -2 Trn USD in 2015, the global electronics market has shifted its production focus from high cost destinations to low cost geographies, contributing heavily to economic development of nations such as China, Korea and Taiwan. In 2015, China is estimated to account for 38% of electronics equipment production up from mere 2.6% in 1995 while low-cost geographies overall accounted for 69% of global share.

Post global slowdown in 2009, global electronics sector took some time to stabilize and has shown stable growth (~4%) since 2012. US has shown signs of recovery and has registered a GDP growth of more than 2% in recent past leading to a growth of ~3% in American electronics market. Emerging economies, backed by strengthening fundamentals around demographic dividend, disposable income and growing enterprises, have been a major impetus to this growth as well.

However in 2015 the industry saw some muted demand sentiments across the board. Globally, inflow of new orders have slowed down since March 2013 and caused manufacturers to cut output. As an effect job creation also fell and Purchasing managers’ index (PMI) for manufacturers dropped below ‘no change’ level (i.e. 50% on PMI). (i)

![Global electronics PMI](image)

Source: IESA-EY Analysis, Markit

The depression in demand for end products is causing a sluggish growth in upstream businesses as well. After a 10% growth in 2014, semiconductor sector which was sized at approximately $350 billion in 2015, (ii) remained flat in 2015 and is expected to stay flat in 2016.
Indian ESDM sector and economic outlook

Amongst all emerging economies, India has been one of the frontrunners from growth and economic development perspective. Post downward trend of GDP growth in 2010 – 2012 period, Indian economy has spurred back to growth and is forecasted to grow at 7+ % YoY till 2020. The robust growth of India’s electronics industry is primarily driven by huge domestic demand for products that can be attributed to a multitude of factors, including growing middle class, rising disposable incomes, favourable duty structures and large scale public procurement needs driven by Govt. projects such as broadband connectivity to villages, rural electrification and e-governance programs. Inflation is forecasted to stabilize beyond 2015 (by OECD, IMF) and will increase confidence in Indian economy. (vi) Investor confidence in Indian economy was evident in 2015 when India emerged as most favoured destination for FDI leaving behind China and US and ensuring over $19 billion of cumulative FDI inflows.

Favourable ESDM policy and initiatives such as M-SIPS, PMA, EDF, duty arrangements, along with rising interest of MNCs and Indian enterprises in the sector have created immense positive impact on Indian ESDM value chain. As multiple foreign manufacturers such as Foxconn setting shops in India and local players (especially mobile phone brands) are shifting from trading-only entities to manufacturing setups in India, demand for electronics component are also poised to see an upward trend.
Indian ESDM sector – The $100 billion opportunity

In 2015, India’s ESDM industry is sized at US$82 billion growing at a CAGR of 8% from 2013. In 2016-17 the sector will become a $100 billion opportunity and is forecasted to grow further at a CAGR of 16-23% to reach US$171-228 billion by 2020.

Apart from sector specific drivers, the forecasts are based upon several parameters such as overall GDP growth of India, currency movement, inflation, existing trade agreements (and changes expected, if any), consumer sentiments, potential government consumption, existing government policies (and changes expected, if any), investments (foreign and domestic), manufacturing entities (existing Indian players, foreign players, Indian conglomerates, start-ups) and type of value addition in India. In the base case, the drivers are assumed to stay at existing levels or move as per foreseeable forecasts. However, in optimistic case all drivers are expected to stay positive leading to a significant growth (resembling a hockey stick growth chart) over the forecast period.

The ESDM sector size is defined as Electronics products TM + Electronics products TE + Electronic component market revenues from local manufacturing + Design services market revenues + EMS services revenues. Please see the report for more details on sector size calculation.

Products drive majority (80%) of the demand, followed by components and services. Though products have significant reliance on imports, the share of domestic supply has improved from 38% in 2013 to 44% in 2015. Components on other side still have heavy reliance on imports with import share being 76%. Services contribute ~16% to sector and the revenues are majorly export driven with very limited domestic demand.
a. Electronic products

In 2015, the electronic products market is sized at $61.8 bn. growing at a CAGR of 10% over past 2 years. The sector is expected to grow at a CAGR of 15-19% to reach $123-150 bn. by 2020. Domestic manufacturing has been growing at a CAGR of 17% in recent past which is expected to increase further over next 5 years. Electronics products TM and TE is considered in the Total ESDM Market size.

Indian Electronics Product Market (in USD billions)

Source: IESO-AY Analysis

Total market demand by verticals

Total market demand by verticals (%)

Source: IESO-AY Analysis

Base case used for 2020 projections

Source: IESO-AY Analysis
Mobile devices segment remains the largest segment in electronics products. Indian mobile devices market has been driven by rising demand for mobile handsets, reducing prices and tariffs. Tablets market had seen a surge in consumer demand in 2013 and then stabilized by 2014-2015. In value terms, the market was valued at US$16.9 billion in FY15 with CAGR of 16% over 2013. TDM was valued at US$6.5 billion in 2015, growing from US$3.5 billion in 2013 at a CAGR of 36%. TE was valued at US$0.05 billion in 2015, reducing from US$2.5 billion in 2013. This market is expected to grow at a CAGR of 17% over the next five years to reach US$36.9 billion by 2020. The growth will be primarily driven by smartphone penetration increase (Estimated to grow to ~66% in 2020 from current penetration of 36%) and tablets seeing increasing use in Government and education sector. The overall tablet market in India is estimated to be US$0.7 billion, with domestic manufacturing of US$0.5 billion in 2015.

Consumer electronics is highly underpenetrated market in India as compared to other countries, and with improved consumer financing this penetration is expected to go up. The Indian market for consumer electronics and durables grew at a CAGR of 14% over the last two years to reach US$11 billion in 2015. Demand growth in Flat Panel Display (FPD) TVs and STBs have been one of the primary drivers for consumer electronics. This market is expected to grow at a CAGR of 14-21% over the next five years to reach US$20.9-28.8 billion by 2020.

The Indian market for industrial electronics grew at a CAGR of 17% over the last two years to reach US$9.4 billion in 2015. Primary demand drivers for this vertical have been large scale government infrastructure development programs such as smart cities, modernization of railways, energy efficiency (LED and smart energy) and demand of power electronics, process control equipment and industrial electronics & automation solutions. This market is expected to grow at a CAGR of 19-22% over the next five years to reach US$22-25.4 billion by 2020.

The Indian market for automotive electronics grew at a CAGR of 19% over the last two years to reach US$4.7 billion in 2015. The demand has been largely driven by increased electronic content in vehicles with increased focus on safety, connectivity and infotainment. This market is expected to grow at a CAGR of 24-31% over the next five years to reach US$13-15.3 billion by 2020.

IT/Office Automation sector is expected to grow slower than it has grown historically owing to the estimated slow growth in desktop and notebook. The Indian market for IT/office automation electronics witnessed decline at a CAGR of -11% over the last two years to reach US$6.3 billion in 2015. The market is expected to grow at a CAGR of 2-5% over the next five years to reach US$7-8 billion by 2020. The growth will be driven by replacement and new customer demand for notebooks.
Electronic Manufacturing Services segment has been one of the major beneficiaries of Government’s focused effort towards developing ESDM sector. The segment has seen a huge growth over the past 2 years and has grown from $0.5bn, in 2013 to $1.0 bn, in 2015. Indian EMS market is estimated to witness exponential growth of 42-68% over the next five years to reach US$6-13.2 billion by 2020, driven majorly by mobile manufacturing in India and further supported by steady growth in other sectors such as strategic electronics (due to offset policy). EMS services revenues is considered in the Total ESDM Market size.

India is emerging as an attractive manufacturing destination with rising cost of production in China driven by increasing labor cost (about 2.5X that of in India). Shortening product life cycles with evolving technologies is driving OEMs to leverage EMS players that offer cost savings derived from scale of operations and enhanced technological and process capabilities.

While India is heavily dependent for components import on countries such as China, Taiwan, Korea and Japan, EMS providers in India are at considerable maturity for final assembly, testing, packaging and distribution services. Sub-system assembly Services are mature in certain verticals such as medical, industrial, automotive and consumer electronics, however scale of operations is limited. EMS companies are evolving to offer end-to-end solutions including product design, procurement, turnkey solutions, logistics and reverse logistics and after-sale services. This enables higher value for OEMs and reduced cost of production.

However, value addition remains limited owing to the dominance of SKD assembly in the initial phase of domestic manufacturing growth in India. As EMS operations gain scale and maturity in India and CKD assembly activities gain traction, local value addition is estimated to increase.
c. Electronic Components

Indian Electronics Component Market (in USD billions)

Source: IESA-EY Analysis

Electronic components market has seen a steady growth in past growing at a CAGR of 12% over past 2 years to reach $13.6 bn. in 2015. The market is estimated to grow at a CAGR of 22-33% to reach US$ 36.6-56.5 bn. Electronic components market revenues from local manufacturing is considered in the Total ESDM Market size.

TDM grew at 2% CAGR over last two years to reach US$3.3 billion by 2015. Overall, a majority of demand (−60%) for electronic components in the country is met through imports. Domestic component manufacturing is dominated by electromechanical and passive categories.

Electromechanical components form largest segment of total domestic supply with a share of about 70%, while active components hold the smallest piece of the pie.

Although India has significant presence of R&D captive units, there exists very limited/no capabilities in manufacturing active components. There are signs of positive sentiments (with players such as HSMC, STMicroelectronics showing interest), the prospects of establishing fab setup in India is yet to be realized.

In passive components, though significant import reliance exists, Indian manufacturers have considerable production capabilities around select passive components such as film and electrolytic capacitors, and wire wound resistors.
d. Design Services

Indian Design Services Market (in USD billions)

2013 2014 2015 2020E

- 10.2 11.5 12.9 23.5-29.2
- 0.6 0.7 0.7 1.3-1.8

Source: IESA-EY Analysis

Contribution of design services to ESDM sector has grown steadily over 2013-15 at a CAGR of 12% to reach $12.9 billion in 2015. Design services revenue is forecasted to reach $23.5-29.2 billion by 2020 at a CAGR of 13-18%. Design services market revenues is considered in the Total Market size.

The segment has shown a strong growth in the last ten years, witnessing entry of a number of domestic and global companies in Indian design services landscape. Leveraging abundance of local talent and presence of mature ITeS firms that have achieved significant scale; India has already emerged as an attractive destination for offshored ER&D services.

As a segment, design services revenue is heavily reliant on export demand. Though the domestic market has grown in last few years, it is at a nascent stage given limited cases of indigenous product companies generating domestic demand for offshored R&D services (except for verticals such as aerospace and defence).

% split of design services revenues

Design Services revenue by segments (%)

2015 2020E

- Embedded Systems: 85% 87%
- VLSI: 5% 8%
- PCB: 10% 5%

Base case used for 2020 projections
Source: Nasscom, IESA-EY Analysis
Sized at US$10.9 billion in 2015, embedded systems is the largest segment (85% revenue share) within design services market. Connectivity, portability and IoT are the key themes that are driving demand for embedded systems services across verticals such as automotive, consumer electronics, mobile handsets, healthcare and industrial.

The VLSI market is expected to grow at a CAGR of 8% over the next five years to reach US$2 billion by 2020 from US$1.3 billion in 2015. Consolidation across industry with increased M&A activities (e.g. NXP Freescale) resulting in realignment of product portfolio and shrinking R&D budgets remain major challenges for the segment.

Hardware and board design is the smallest segment in design services valued at US$ 0.7 billion, and is largely driven by domestic demand.

**Key challenges**

Although domestic manufacturing is showing an uptick, the domestic demand-supply gap still remains large enough to create significant pressures on the country’s current account deficit. With a drop in oil prices, the impact of electronics imports is becoming more significant vis-à-vis oil imports.

![Quarterly Imports in USD billions](chart)

*Source: IESA-EY Analysis, World Bank*

Assumptions: The annual import volumes for both electronics and crude oil are equally distributable over the quarter. Crude oil import volumes to vary steadily in future as seen over past 2 years. Crude oil prices in Case I to change steadily from quarter to quarter during forecast period and to behave as per projections. Crude oil prices in Case II are forecasted to recover to their prices earlier in 2015 over a period of 5 years.

As a result, the electronics import bill may overtake oil import bill between 2017 and 2019. Devaluation of Yuan is affecting domestic manufacturing in India as imports become further cost competitive.

Trade dynamics in electronics has been impacted by turbulence in currencies of major electronics exporters. Emerging markets’ currencies have shown a weakening trend with respect to the US dollar. China’s recent devaluation of Yuan puts a downward pressure on Asian currencies. As a result, export has been lucrative and in turn increasing cost pressures on domestic manufacturers in import markets including India.
Though demand for products is riding growth curve, it is yet to reach its full potential. Market penetration is lagging behind global average up to 60% in certain categories (of consumer electronics) with huge untapped potential in rural markets. This is caused by

i. Limited consumer financing options and penetration in semi-urban & rural markets

ii. Limited penetration of organized retail in semi-urban & rural markets

iii. Price sensitivity

Limited indigenous products have resulted in low local demand for design services. Typically R&D and product development in India are limited to product localization. Global semiconductor industry witnessed a slowed growth of 0.2% in 2015 as compared to strong growth of 9.9% in 2014 (xi). With industry undergoing consolidation, leading players are realigning product portfolio and shrinking R&D budgets which is impacting demand for VLSI design.

Component and EMS demand in India, although showing early signs of growth, is still sub-optimal. The demand is limited due to very low value addition (CKD assembly) and high reliance on trading/import of end products such as high end mobile phones. Majority component sourcing is still done in countries conducting sub-system assembly (China, Korea, Taiwan) given limited CKD assembly in India.

Domestic manufacturing in India faces several structural challenges.

- High cost of capital is one of the largest disabilities for local companies. Cost of borrowing in India is higher (12-14%) as compared to few manufacturing hubs such as Taiwan (~2%) and global average of ~5%-7%.

- Corporate Income Tax in India stands at around 25%, whereas some Asian countries have tax rate at around 17% (Taiwan, Singapore).

- A nascent ecosystem inhibits deployment and quick turning of new projects. India has very limited presence of supplier base, assembly (e.g. sub-system assembly, SMT), SATS ecosystem in India in contrast with other mfg. destinations such as Taiwan, China, Malaysia.
Case in point:

- **Semiconductor Fab:** During 2011 China increased wafer fab capacity faster than the worldwide average. China increased the net number of fabs in production by 13, or 9%—and increased its net capacity by 9%—while the worldwide industry only increased the net number of fabs in production by 25, or 2%, for a 4% increase in net capacity. China has been able to increase its share of total worldwide semiconductor wafer production from the ≤ 2% realized in 2003 to ≥ 10.8% by 2014 by just fully equipping and ramping to full capacity.

- **Semiconductor Assembly & Testing Services (SATS):** Similarly, China and Taiwan together have ~50% of the global SATS capacity. The planned capacities are in concentrated in China, Taiwan, South Korea while Philippines, Malaysia and Singapore attract new set ups with small capacities.

Limited availability of talent around manufacturing, assembly & testing has been another challenge area. Given the nature of the industry, women are preferred for assembly and testing activities across other manufacturing destinations while India is yet to create scalable inventory of skilled women labor force.

Trade policies such as FTAs affect Indian manufacturing competitiveness for some of the white goods such as washing machines, refrigerators and air conditioners:

1. Zero / concessional import duty for some CBU import (e.g. washing machines, refrigerators, AC)
2. Select input components & raw materials still attract import duty (e.g. basic customs duty reduced from 7.5 per cent to 5 per cent on certain components, such as C-block, overload protector and crank shafts for use in the manufacture of refrigerators compressor)
A way forward to $400 billion opportunity

With various government initiatives aiming to boost domestic manufacturing, India has already started witnessing initial movement with increased assembly activities across products such as mobile phones and other consumer electronics. To realize this opportunity India needs to take several steps along incentivizing demand, export and manufacturing among others.

Promoting Domestic Manufacturing

**M-SIPS**

- As components manufacturing (includes active, passive and semiconductors) entails high capital investment and a longer gestation period, the extent of capital subsidy on component manufacturing available under M-SIPS should be increased from the present level of 20% (in SEZ) -25% (in non-SEZ) to 30% (in SEZ)-35%. (in non-SEZ).

- Income tax holiday of 10 years should be provided for the component manufacturers.

- The production subsidy, in its present form, under the M-SIPS is computed @ 10% of the turnover less all the inputs. It is recommended that only the imported inputs be reduced from the turnover, which would promote increased domestic value addition.

- Local value addition through indigenous R&D should also continue get benefits under the M-SIPS.

- Extend M-SIPS capital subsidy to investors /companies relocating their manufacturing facilities from abroad to India. In such cases, the residual value of the capital equipment (which should be certified by the Chartered Engineer or any accredited agency) be considered for capital subsidy. Such proposals should also provide for technology transfer, wherever possible. This measure would enable faster setting up of manufacturing facilities, employment creation and provide readily available market for exports.

- Viability Gap Funding (VGF) should be provided for investments in select high-tech/priority sectors or areas of weak supply chain (with large manufacturing demand for manufacturing e.g. fabs, ATMP Polysilicon manufacturing.

**Duty Structure**

- Non ITA-1 Products; Where domestic manufacturing is already happening or there is significant visibility for the same, the BCD on inputs for such products should be reduced to zero, till the time domestic manufacturing of the inputs starts happening. At the same time, the BCD on the finished product should be suitably increased by utilizing the gap between applied rate and bound rate, thereby, giving an impetus to domestically manufactured electronic products.

- For ITA-1 Products; Differential excise duty structure for domestic manufacturers should be continued post implementation of GST. Additionally, for priority products, a Phased Manufacturing Program (PMP), akin to the PMP for mobile handset manufacturing, should be evolved. Examples are PCs, Energy Meters, etc.

- Revisit the ITA-1 list to identify electronic goods on which BCD can be increased, as many goods have undergone technological advancements and are covered under ITA-2 to which India is not a signatory.

- Review the FTAs under which non-ITA-1 goods are being imported at concessional rate of duty so as to explore the possibility of levying higher rate of BCD.

**Business and Project Implementation**

- Implement Preferential Market Access (PMA) in Defence, PSUs, State Government procurement, especially, in projects / programmes implemented with the funding support of the Government of India. These include programmes such as Digital India, Smart Cities, LED Lighting, Roof top Solar power systems etc.

- To facilitate faster execution of large projects, (entailing large land and infrastructure requirement), create a SPV, which would be initially managed by the Govt/PSU and would obtain Govt. clearances of the required infrastructure as per the investor’s requirements.

Impetus to Exports

- Setting up of Re-export Processing Zones with the facility of duty free import of capital equipment and goods (including products, sub-assemblies, devices, components, raw materials), which will undergo domestic value addition including repair in these zones. Thereafter, it would be exported from the re-export zone with a duty free dispensation.
• It should be a bonded customs warehouse with the dispensation identical to the one in SEZ. Re-export zones will have a huge potential of creating jobs, rapid prototyping facilities, testing, tooling, etc.

• The Re-export processing zones should be subject to 100% exports with no access to domestic market.

Promoting Indigenous R&D and Innovation

Incubation Centres and Chip Design Centre
• Govt. should fund setting up of Chip Design Centres to promote the start-ups in chip design.

• Govt. should facilitate (by providing Cap Ex and limited period Op Ex funding support) for setting up of ESDM Incubation Centres in multiple locations to support the start-ups and entrepreneurs.

• Govt. should fund setting up CoEs for IoT, which offers a large market potential and India can emerge as a global leader in this segment.

ESDM Focused Talent Pool
• Facilitate setting up of talent development centres through integration of industry with academia and regular upgradation of curricula leading to students learning industry relevant programmes and working on industry projects.

• Build Entrepreneurial Ecosystem in Engineering campuses through Industry driven training, R&D Partnership and expert mentoring.

Industry Specific Standards and Test Facilities
• Develop industry specific standards for the ESDM products. Defining such standards for products in sectors with large market potential like automotive electronics and emerging areas like IoT products can be leveraged to position India as a global leader in indigenous development of such products.

• Facilitate setting up of requisite infrastructure for testing: there is already a proposal by MoD to set up a dedicated test facility for Aerospace & Defence sector and the same can be extended for other industry sectors also as needed. This facility may be evolved as a National Test and Certification Centre in compliance with National and International Standards.

ESDM Focused Funds for Start-ups/MSMEs
• Extension of EDF beyond March 2017 by another period of 3 years

• Higher exposure by Govt in such Daughter Funds, which extend funding to start-ups in chip design and engaged in indigenous development of priority products (these products are categorised based on their large market)

Business Support
• Extend benefit of PMA policy for chips designed locally. As an illustration, if a chip in a product is designed locally, and, the cost incurred on designing the chip is ‘x’ while its price is ‘y’ (‘y’ being higher than ‘x’), then, the company designing this chip locally can be incentivised by getting a multiplier impact on ‘x’.

• Waiver of clause related to manufacturing along with R&D under Section 35(2AB) to provide benefits to the start-ups and MSMEs engaged in chip design and software products.
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