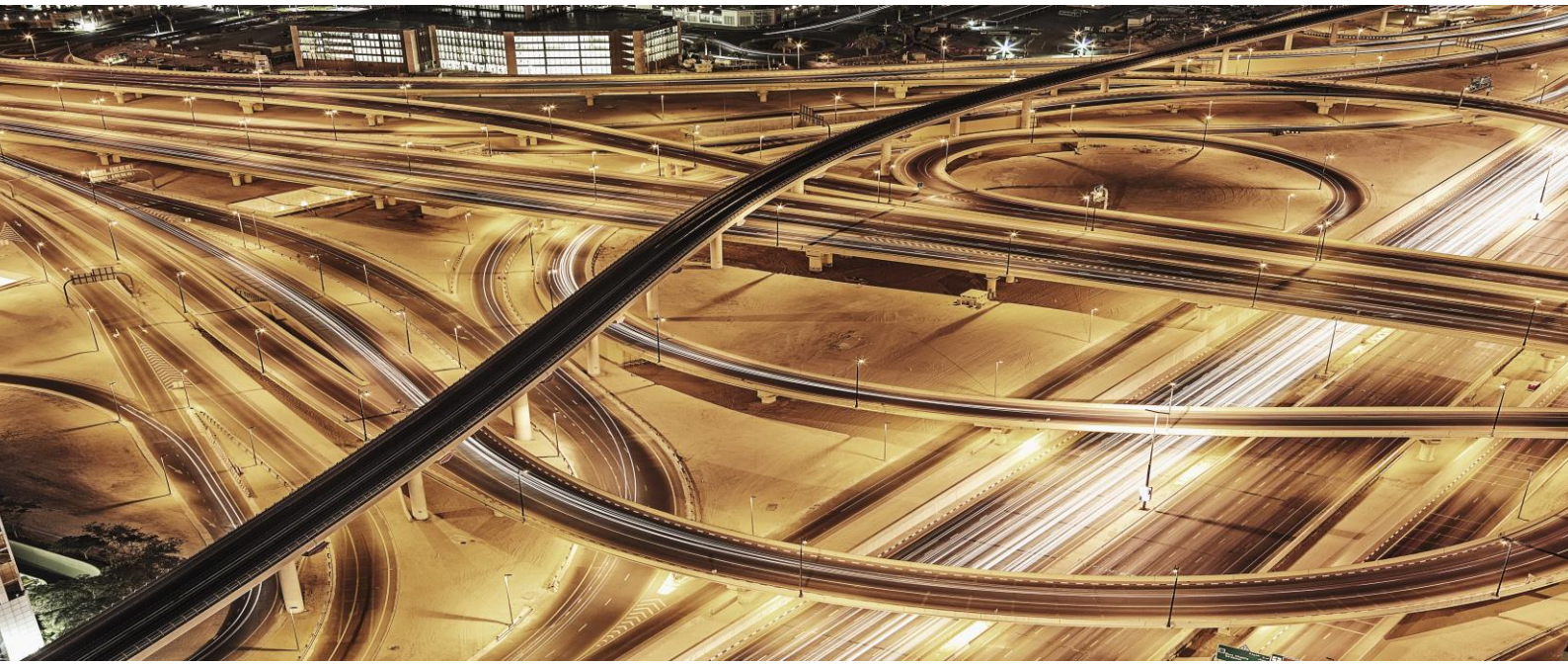
Strategic Roadmap for Development of ESDM Sector in Odisha



Department of Information Technology

Government of Odisha

Strategic Roadmap for Development of ESDM Sector in Odisha

Report prepared by:

IESA
INDIA ELECTRONICS & SEMICONDUCTOR ASSOCIATION
Taking India to ESDM Leadership

EY
Building a better working world

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1. Preface

Since its inception in 2004, the India Electronics & Semiconductor Association (IESA) has played an important role in facilitating the growth of electronics and semiconductor ecosystem in the country. Industry research has been one of the cornerstones of IESA's activities.

IESA has prepared the Strategic Roadmap for Development of ESDM industry in the state of Odisha in collaboration with Ernst & Young (India) and with the active participation and support of Department of Information Technology, Government of Odisha and other agencies in the state.

The present report is divided into four sections — the industry overview & analysis, benchmarking of policy initiatives and clusters, SWOT Analysis for the state, and, recommended strategic roadmap. Industry analysis focuses on the global and the Indian industry, its key segments and the growth drivers. The policy initiatives of the Government of India are covered followed by the benchmarking of the policies announced by various states. The creation of ESDM clusters in leading countries and in the country has been presented. A comprehensive analysis of the state of Odisha as the ESDM destination on important parameters like infrastructure, talent, supporting ecosystem, its competitive advantage and challenges is carried out.

Finally, based on the findings of the above sections, Strategic Roadmap for the development of the ESDM sector in the state is presented. It recommends the industry segment/verticals, products and horizontals of focus, projects the revenue and employment generation over the next 10 years, and, the corresponding investment, supporting infrastructure and manpower requirements to realize the projected revenues. The Roadmap also maps out the prospective locations in the state for ESDM activity. It also articulates the policy initiatives including incentives required for the growth of the ESDM industry in the state.

The various stakeholders including the Government and industry, together, can ensure that the ESDM sector grows in Odisha and the state continues to benefit, grow and prosper from a sector that is marked by innovation and a desire for world-class performance.

The concerted efforts of the officials from the Department of IT (DIT), Government of Odisha and STPI, Bhubaneswar are greatly appreciated, and, would like to acknowledge their support at every stage to prepare the report.

2. Approach and methodology

IESA engaged Ernst and Young to carry out a study on the development of ESDM industry in the state of Odisha. The aim of the study was to focus on ESDM industry in Odisha, its current state and a future roadmap.

As part of the study, IESA and EY contacted various departments from the Government of Odisha (GoO) for state specific data collection. In addition, EY also interviewed management representatives from various industry players and industry associations to capture their views on the industry and ways to build ESDM ecosystem in Odisha.

IESA along with EY conducted workshops with government departments and industry to capture their views and any specific issues that they wanted to highlight. EY also carried out extensive secondary research to capture ESDM specific inputs for the purpose of creating this report.

Limitations of the study

- We have relied on the information provided to us which we believe to be reliable and accurate and in good faith but which, without further investigation, cannot be warranted as to its accuracy, completeness or correctness
- All EY analysis has been done using reputed publicly available sources identified in the report. We have not conducted any exercise to verify correctness of data published by these sources
- Qualitative inputs were received from industry representatives. Some of the views presented in the report are those received from the interviewees.
- The average measure has been used to present benchmarks (if any) in the report

3. Executive summary

The global electronics industry is set to reach US$1.8 trillion by 2013. The Indian Electronic System design and manufacturing industry is estimated to have clocked revenues of US$68.3 billion in 2012.
A host of factors like growth of middle class population, rising disposable incomes, increase in adoption of high end technology, rollout of new telecom networks like 3G & LTE combined with the low level of penetration in rural India are expected to propel the ESDM industry in India to a high growth trajectory. Accordingly, the ESDM industry is expected to grow at a CAGR of approximately 10% to reach US$94 bn by 2015. The task force report on ESDM industry estimates the industry to clock a turnover of US$400 bn by 2020.

While there is high growth in demand for electronics, a large portion of this is catered through imports. It is estimated that by 2020, the demand-supply gap in the country will reach close to US$300 billion and will lead to a situation where the electronics import bill for the country will exceed the oil import bill.

With this in view, the Government of India, in the National Electronics Policy 2011, has set a vision to transform India into a global hub for Electronics System Design and Manufacturing (ESDM) so as to meet the growing domestic and global demand. However, multiple disabilities to electronic manufacturing that currently exist in India are hindering the growth of domestic manufacturing. The last three years have witnessed the announcement of a slew of policy measures and initiatives by Government of India to partly set off these disabilities.

The Government of Odisha has expressed its resolve to play a significant role in contributing to this objective and transform Odisha into a hub for ESDM in the long run. This report outlines the roadmap to help achieve this.

Currently, Odisha houses very few companies in the ESDM space confined to only two subsectors / parts of the value chain (namely Semiconductor design & component manufacturing). There are little or no ESDM exports from the state in the recent years.

While factors like ‘low cost of doing business’, ‘proximity to electronic trading hubs in south east Asia’, ‘presence of good ports’, ‘sufficient supply of water resources’, ‘better power supply scenario’, ‘favourable regulatory scenario’, ‘presence of institutional framework’ etc. are encouraging to the ESDM sector, certain other factors like ‘Absence of ecosystem’, ‘Poor availability of talent’, ‘Being late to catch the technology bus’, ‘poor social indicators’, ‘issue with infrastructure’ etc. present hindrances to the growth of the industry.

Vision*:*
To become a significant player in Electronic System Design and Manufacturing, especially in the sectors of consumer, Industrial, IT/OA, Telecom/Mobile and Strategic electronics, across the value chain of ESDM.
The following projections have been set for Odisha in the ESDM sector over the next decade- :

- Revenue target of INR18,800 Cr by 2024
- Direct employment generation of 50,000 – 60,000

Segment and Product selection:

After analyzing the top 25 electronic products and horizontals on various parameters like market size, demand projection, complexity, categorization as ITA1, non-ITA1 etc., the following products/ horizontals have been shortlisted to be of focus for Odisha:

Segment	Product
Mobile Devices	Mobile phones
Telecom products and equipment	Modem/routers
	Mobile accessories
IT/OA	Notebooks
	Tablets
	Printers/MFD
	Computer accessories
Consumer Electronics	Flat panel display TVs
	Set top boxes
Industrial Electronics	LED lighting (luminaire and chip fabrication)
	Inverters
	Solar PV (Modules, cells and wafer fabrication)
	Power supply
	Energy meters
Strategic Electronics	Products and components from strategic electronics segment
Medical Electronics	Measuring instruments – for common ailments like BP, Diabetes
	Other medical electronic equipment

Horizontal	Details
EMS	EMS
Components	PCB manufacturing
	Connectors
	Passive components
	Active components
ATMP	ATMP
Design	VLSI Design
	Hardware / Board Design
	Embedded software development

Phases:

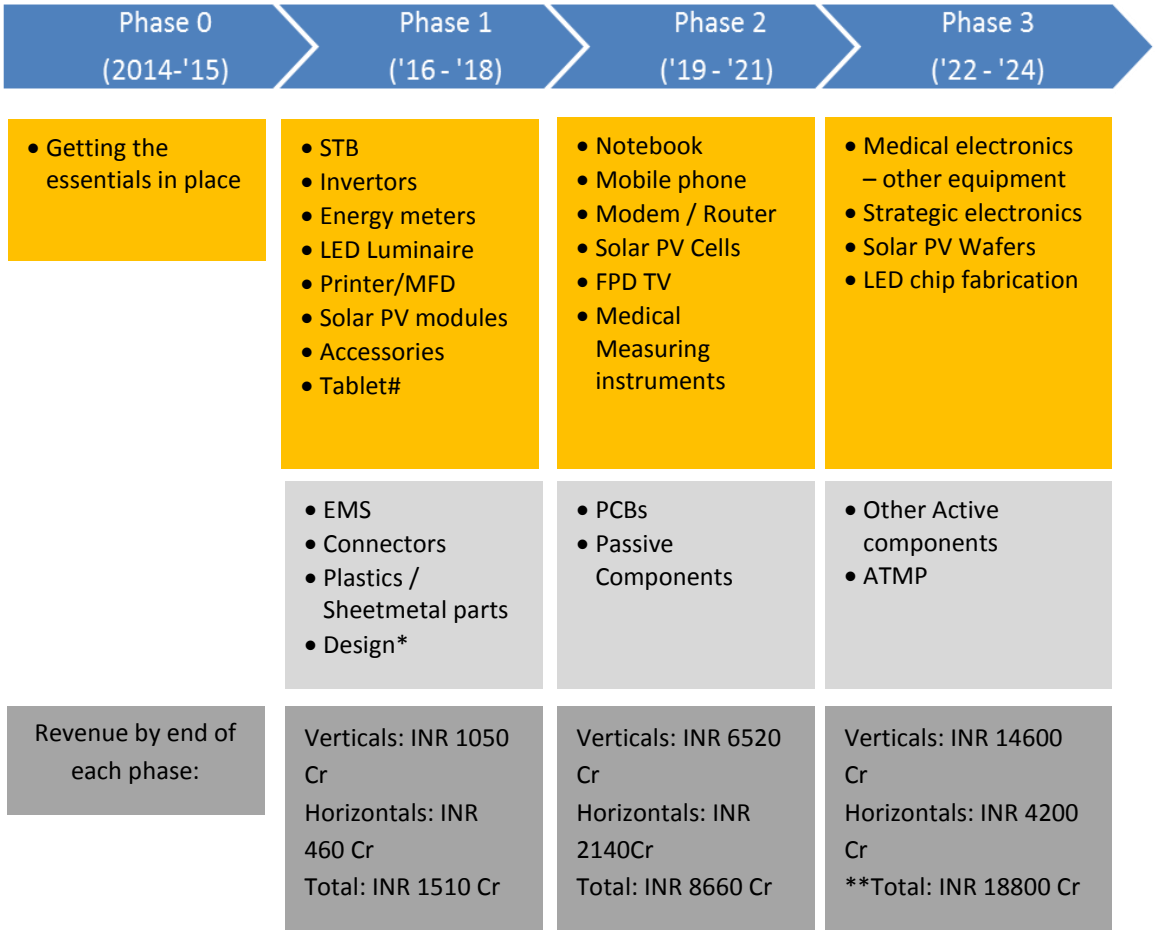
The above targets are set to be achieved in three phases, apart from a 'phase 0' where the essential factors for ESDM sector would be put in place.

Phase 1 can start with system integration and assembly of low complexity products and components.

In phase 2 the manufacturing activities would get deeper into CKD assembly, component manufacturing and manufacture of products with medium to high complexity.

The focus in phase 3 can be on products that are complex or require a mature ecosystem, and require good talent availability and large investment.

The diagram below summarizes the phase-wise approach with an indicative list of products in each of the phases.



* Design includes Embedded software development, VLSI design and Hardware / Board design
**some of the investment from phase 3 will realize full potential post 2024; expected revenue in year 2026 is approximately INR 23500 Cr
Provided Govt. schemes to promote tablet consumption are put in place. Else tablet manufacturing can be started in phase 2.

Investment requirement:

In order to achieve the above targets, investment flow as indicated in the table below would be needed.

	Phase 1	Phase 2	Phase 3	All Phases
Investment for product verticals (INR Cr)	330	1510	2870	4710
Investment for Horizontals (INR Cr)	240	1110	1280	2630
Total Investment required (INR Cr)	**570**	**2620**	**4150**	**7340**

Resource requirement:

In addition to the investment, the state would also need to focus on making resources like power, water, manpower, and logistics available adequately to meet the requirements of the ESDM sector. The table below summarizes the indicative requirements of such resources:

Phase	Manpower requirement				Power (MW)	Water (Mn Lit/day-MLD)	Land (Acres)
	Total manpower	Skilled Manpower	Semi-skilled manpower	Managerial / Other functions			
Phase 1	7500	1500	5850	150	20	1.5	105
Phase 2	24200	4050	19700	450	48	10	400
Phase 3	27120	3550	23050	520	72	18.5	405
Total (by 2024)	**58820**	**9100**	**48600**	**1120**	**140**	**30**	**910**

In addition, the below logistics and infrastructure facilities would be needed:

- Quick turn-around time at sea/airports
- Excellent road/rail connectivity between the ports/airports and the manufacturing clusters
- Warehousing facilities
- Waste disposal / recycling facilities
- High speed and reliable data connectivity
- Proximity to international airport

Location selection:

In view of the resource requirement, various geographies in Odisha have been evaluated on parameters like, 'Proximity to major talent hubs', 'Availability of water resources', 'Presence of SEZs/STPIs/manufacturing clusters', 'Distance to ports/airport', 'Present industrial activity in the district', 'Availability of minerals' etc. The following locations have been found suitable for ESDM clusters.

- **Khurda**
- Berhampur (Ganjam district)
- Rourkela (Sundergarh district)
- Balasore
- Rayagada

As the proposal for creating a cluster at Infovalley, Bhubaneswar has been taken up, the current roadmap focusses on funneling the initial efforts on Khurda (Infovalley) to begin with. Ensuring success in Khurda / Infovalley can set an example and this can act as a model for development of other cluster-locations. From phase 2, expansion of Phase 1 operations and activities like component manufacturing may be carried out in another location depending on the investor interest. We suggest that Berhampur can be considered as the second location. The remaining clusters may be considered for expansion once the ESDM industry matures in the initial phases.

The table below summarizes the cluster & phase-wise plan.

	Phase 1	Phase 2	Phase 3
Khurda			
Indicative Products	• STB • Invertors • Energy meters • LED Luminaire • Printer/MFD • Solar PV modules • Accessories • Tablet	• Notebook • Mobile Phone • Modem / Router (CPE) • FPD TV • Medical measuring instruments	• Medical Electronics – Other Equipment • Strategic Electronic products
Indicative Horizontals	• EMS • Connectors • Plastic /Sheetmetal parts • Design (Embedded software, VLSI, Hardware/board)		
Revenue expected (INR)	1510 Cr (by end of phase)	7580 Cr (by end of phase)	14920 Cr (by end of phase)
Investment required (INR)	570 Cr	1360 Cr (additional in this phase)	1350 Cr (additional in this phase)
Manpower requirement	7500	22360 (additional in this phase)	21200 (additional in this phase)
Power requirement	20 MW	26 MW (additional in this phase)	34 MW (additional in this phase)
Water requirement	1.5 MLD	3.0 MLD (additional in this phase)	4 MLD (additional in this phase)
Land requirement	105 Acres	* 285 Acres (additional in this phase)	250 Acres (additional in this phase)

Activities that can be considered for another location starting from Phase 2			
Product verticals		• Solar PV Cells	• Solar wafer fabrication • LED chip fabrication
Horizontals		• PCB • Passive Components	• Active components • ATMP
Revenue expected (INR)	-	1080 Cr (by end of phase)	3880 Cr (by end of phase)
Investment required (INR)	-	1260 Cr	2800 Cr (additional in this phase)
Manpower requirement	-	1840	5920 (additional in this phase)
Power requirement	-	22 MW	38 MW (additional in this phase)
Water requirement	-	7 MLD	14.5 MLD (additional in this phase)
Land requirement	-	115 Acres	155Acres (additional in this phase)

Review:

As the resource requirements listed above for the long term are indicative, a review of the targets, recommended to be taken up after Phase 1, depending on the progress of investments in the first phase.

Government initiatives to kick start ESDM industry:

Government initiatives required to achieve the targets set for the ESDM sector and to bridge the gaps identified are elaborated below. The initiatives are broadly classified under the below heads:

1. Infrastructure development
2. Institutional mechanism, to promote the sector including Investment Promotion & Branding
3. Skill development
4. Incentives
5. Others

1. Infrastructure development:

A committee comprising members from IDCO and industry including industry associations is recommended to oversee the progress of the following infrastructure initiatives.

- Development of clusters:
  - An additional land area of 480 acres in Khurda and 270 acres in another location (can be extended in Khurda as well depending on investor interest) to be identified in addition to the existing 160 acres available in Infovalley, Bhubaneswar in line with the phased activity plan in the clusters
  - The identified land to be made ready with supporting infrastructure and facilities like, roads, power, telecommunication network, water supply system, water treatment plant, water recycling plant, effluent treatment plant, common mechanism for solid waste collection and disposal, sewage facilities, common storage & warehousing facility. In addition, creation of Incubation Centre, Testing Laboratory, would be also desirable.
- Connectivity:
  - High speed road connectivity from clusters to air/sea ports and between clusters for cargo movement, better passenger commute facilities in the district of Khurda (and subsequently in the second location), International operations and cargo complex at Biju Patnaik Airport, high speed data connectivity, improving turnaround time at ports are to be ensured.
- Power:
  - As investments start picking up, a group captive power plant can be established at Khurda and second location to meet the power demand as envisaged in the resource requirement section and eligible to supply open access power to the electronic clusters.
- Water:
  - Dedicated pipelines and necessary equipment to supply water from the rivers nearby to the clusters are to be put in place.

2. Institutional Mechanism to promote ESDM sector including investment promotion & branding:
   - Rename Department of IT as Department of Electronics & IT on the lines of the Government of India's Department of Information Technology being renamed as Department of Electronics & IT (DeitY)Constitute an ESDM specific nodal agency headed by Secretary, the Department of Electronics and IT. The agency will have officials from industry and government with the following key responsibilities:
     - Investment promotion & monitoring including liasioning with key potential investors and setting up of international desks in key leading ESDM countries
     - Promoting Brand Odisha through participation in major global expos and conducting roadshows in countries that have potential investors (the US, Europe, Japan, Taiwan, Korea and other countries of South East Asia) and supported by print and digital media advertising

- Single window for clearance of proposals and release of incentives for projects and liaison with other concerned agencies to ensure a smooth process for investors

3. Skill development:
    - Establishment of new ITI/Diploma institutes in Khurda with an annual intake capacity in line with the phase-wise talent requirement
    - Addition of a target of 10000 trained students for ESDM sector to the 12th five year plan targets of Odisha state employment mission
    - Masters courses in ESDM related disciplines in all major institutes
    - Encouraging joint R&D labs by companies and universities
    - Mandatory 6 month to 1 year internship for students of Bachelor's and Masters' courses (starting with top 10 institutions) related to ESDM; 50% reimbursement of cost of internship to companies.
4. Govt. Incentives:
    - Capital subsidy of 20% on capex investment over and above the Government of India's MSIPS scheme limited to INR 50 mn per unit.
    - First 2 anchor investors eligible for additional investment from Govt. in return of equity
    - Interest subvention of upto 5% on working capital loan for 5 years linked to value addition
    - Value added market access in government procurements for companies manufacturing in Odisha
    - Training subsidy of up to 50% of the cost incurred (One time reimbursement) to the companies for providing skill gap training to the employees
    - 100% stamp duty and registration fee exemption for the purchase/lease of land and building or office space
    - Reimbursement of VAT payment from 75% - 100% for a period of 10 years, capped to 200% of capital investment
    - 100% refund of CST until the abolition of CST or 5 years, whichever is earlier.
    - Co-investment by Government in ESDM start-ups through ESDM development fund
    - Patents: 50% reimbursement for cost of filing patents
    - Land & lease: 25% rebate on land cost limited to INR 10 mn and 25% subsidy on lease limited to INR 0.5 mn per year for 5 years
    - Marketing expenses: 50% reimbursement of actual cost on international marketing and promotional activities(subject to a maximum of INR 1 million per year per company)
    - 20% subsidy on power cost
    - 100% waiver of electricity duty
    - Exemption from 'Standing orders for Industrial Employment' to be provided for 5 years

In addition to the above mentioned incentives, customized incentives are to be negotiated with large investors depending on the revenue potential and long term employment generation potential.

5. Other Initiatives:
    - Creating Start-up ecosystem through ESDM Centres of Excellence, Incubation Centres and Characterisation Lab at universities and leading institutes with industry, academia, state government and STPI partnership
    - A component free trade and warehousing zone to be established adjacent to Khurda / second cluster location. Development of such zone to receive same incentives as a brown field cluster.
    - BIS testing lab in Khurda cluster to be set-up

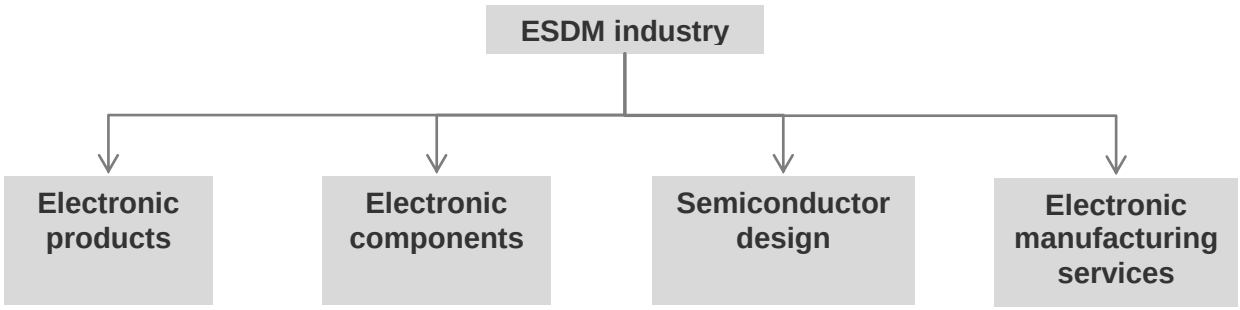
These activities can start simultaneously when investment flow in the ESDM sector gains traction.

4. Module I – ESDM industry study and benchmarking

4.1. Introduction to ESDM industry

4.1.1. Definitions

Electronics systems design and manufacturing (ESDM) industry in India constitutes the following sub-segments:



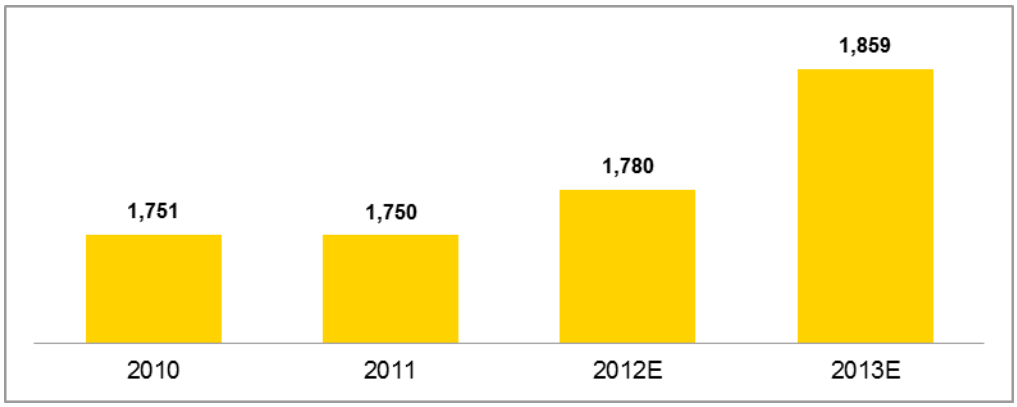
- **Electronic products** – This includes the total market for domestic consumption of electronic products in India (either produced locally or imported) as well as the exports of electronic products manufactured in the country.
- **Electronic components** – This includes the revenues generated from local manufacturing of electronic components.
- **Semiconductor design** – This includes the revenues generated from semiconductor design activities conducted in the country by local players and captives of semiconductor MNCs operating from India. It includes revenues from embedded software, VLSI and hardware/board design.
- **EMS services** – This includes the revenues generated from EMS services delivered from the country.

4.1.2. Global electronics industry overview[i]

The global electronics production was estimated at US$1.78 trillion for 2012, which grew by 1.7% y-o-y. The low growth rate was mainly a result of continuing European debt crisis which resulted in slowdown in demand from Europe. In 2013, the world economy is expected to pick up, due to the recovery in the US economy and monetary relaxation and fiscal policies in emerging economies which will offset the deceleration caused by European economy. As a result, the electronics industry is also expected to grow at a modest 4.4% y-o-y to reach US$1.86 trillion in 2013.

A major driver for this industry is the sharply increasing demand for electronic components and devices for smartphones and tablets. The expansion in smartphones and tablets market has also accelerated data traffic volume leading to development of high speed communication network in developed economies. A rapid growth of consumer electronics in emerging economies as a result of a large youth population and burgeoning middle class is also driving the growth of overall electronics market. Figure 1 below depicts the worldwide production of electronics:

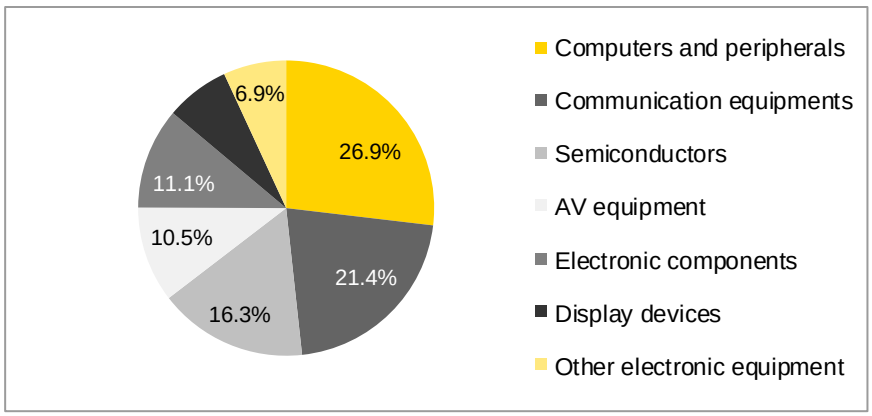
Figure 1: Worldwide electronics production (US$ billion)



Source: Japan Electronics and IT industries association, Semiconductor Industry Association, World Semiconductor Trade Statistics

Computers and peripherals is the largest segment comprising 27.2% of the total global electronics sale followed by communication equipment segment with 21.7% share. Figure 2 below depicts the segment-wise breakdown of global electronics sales:

Figure 2: Segment-wise breakdown, worldwide electronics production, 2012



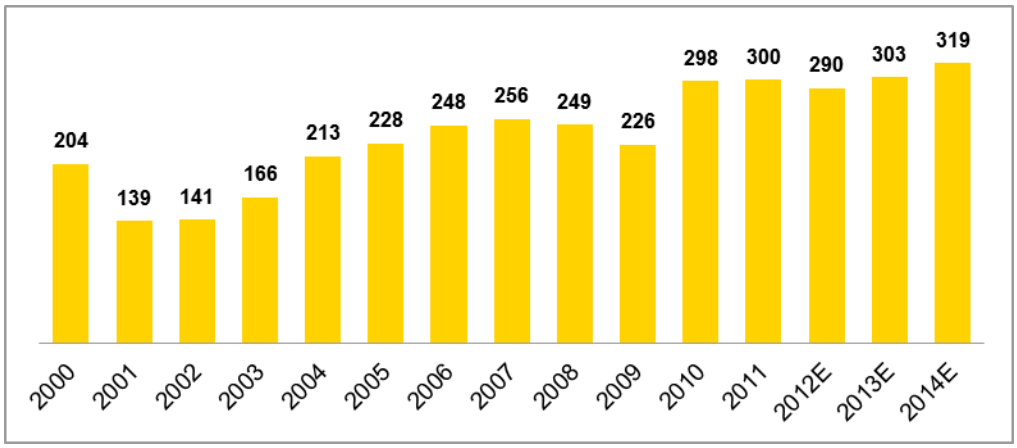
Source: Japan Electronics and IT Industries Association, Semiconductor Industry Association, World Semiconductor Trade Statistics

Global semiconductor market

According to the World Semiconductor Trade Statistics, global semiconductor industry's sales are estimated at US$290 billion in 2012, a 3.2% decline compared to 2011. The industry demonstrated impressive resilience despite a challenging global macroeconomic environment. Even though sales for 2012 lag behind 2011, growth in the Americas was observed in the last quarter of 2012. Beyond 2012, the industry is expected to grow steadily and moderately across all regions. Sales for 2013 and 2014 are expected to be US$303 billion and US$319 billion respectively.

Customers had increased their chip inventories in 2011 to hedge against potential shortages due to natural disasters. However, subsequent demand was weaker than anticipated, leading to excess inventory. Inventory levels remained high in 2012 due to decline in PC demand, leading to oversupply. Figure 3 below depicts worldwide semiconductor market:

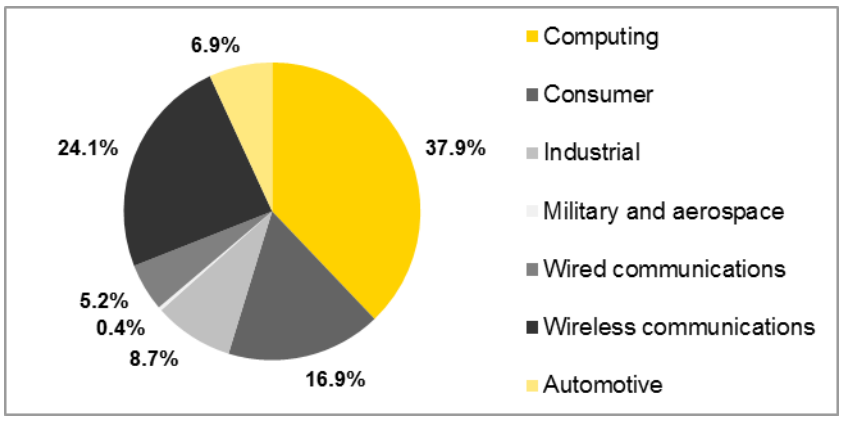
Figure 3: Worldwide semiconductor market, US$ billion



Source: Semiconductor Industry Association, World Semiconductor Trade Statistics

Computers represent the largest end market for chipmakers. Semiconductor chips form the backbone of a computer system, performing all the essential tasks. Together, the computing and communications end-use segments represent more than 70% of industry revenue. In 2012, the military and aerospace segment grew strongest among all, with a 10.2% y-o-y growth rate. Figure 4 below depicts worldwide semiconductor sales by end-use market:

Figure 4: Worldwide semiconductor sales by end-use market, 2011

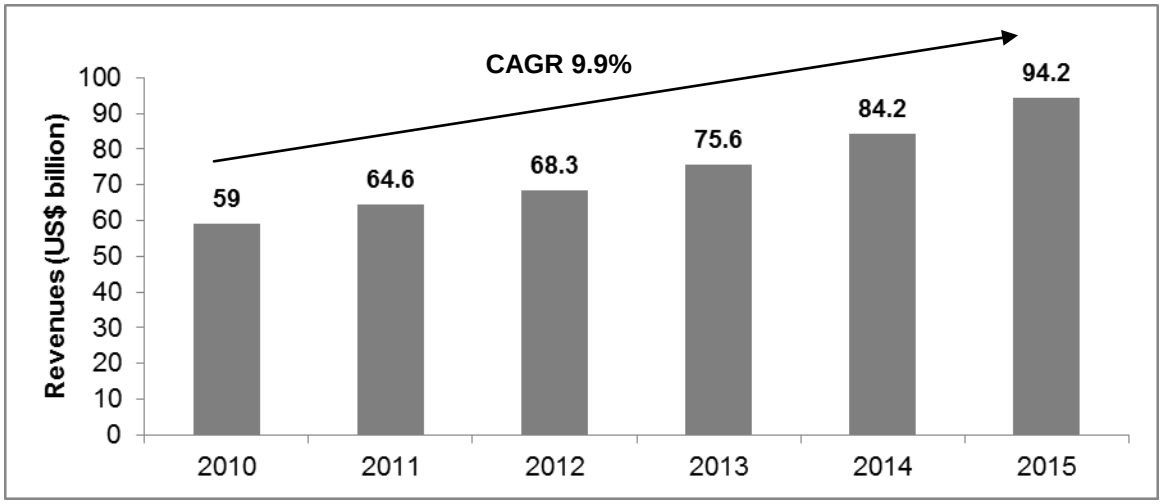


Source: Semiconductor Industry Association, World Semiconductor Trade Statistics

4.1.3. Indian ESDM industry overview[ii]

ESDM industry in India is estimated to have clocked revenues of US$68.3 billion in 2012, growing by 5.7% as compared to 2011. Even though the growth rate was moderate in the last year, the ESDM industry in the country is expected to grow at a CAGR of 9.9% from 2010 till 2015 to reach US$94.2 billion. This is more than twice the growth rate of the global ESDM market. While the current growth rate is lower than what was earlier forecasted before the economic slowdown hit the global economy, the Indian market has still managed to clock decent growth despite the overall slowdown in global and Indian economy. Figure 5 below depicts the total industry revenues for ESDM industry in India:

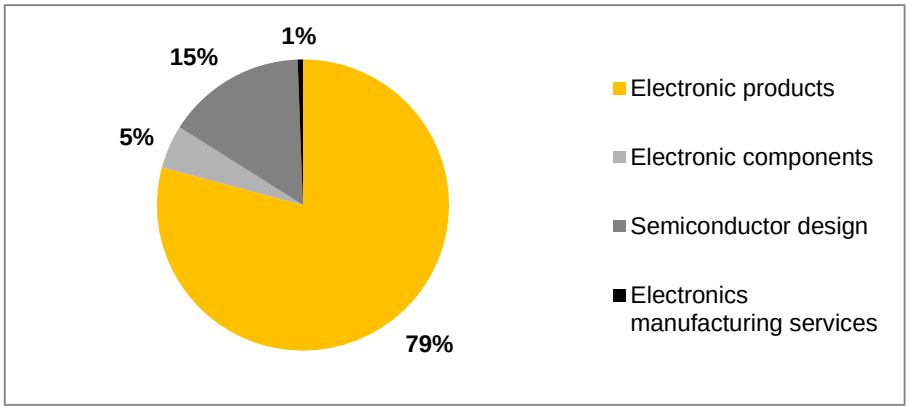
Figure 5: Indian ESDM industry revenues (US$ billion)



Source: IESA-F&S study

Electronic products segment forms the biggest chunk of the ESDM market with an estimated 79% market share in 2012. While semiconductor design forms 15% of the market, electronic components and EMS services form a very small portion with 5% and 1% revenue contribution respectively. Figure 6 below depicts the break-up of industry revenues for ESDM by categories:

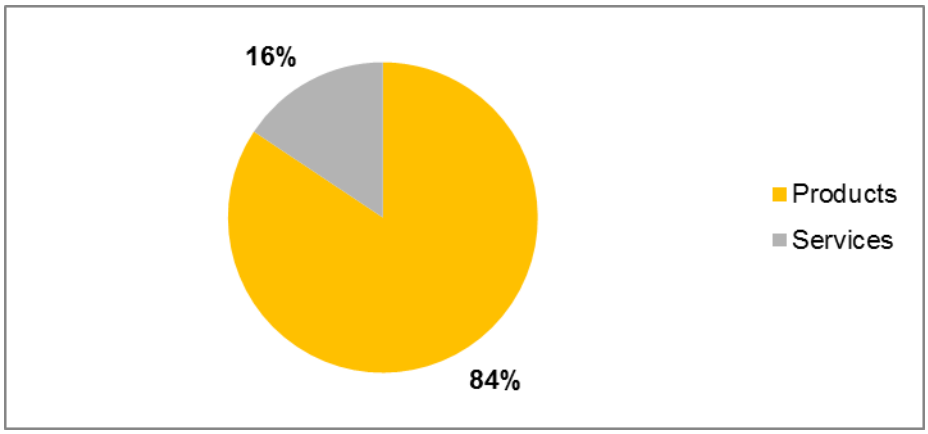
Figure 6: Indian ESDM industry revenues 2012 (by categories)



Source: IESA-F&S study

Product revenues constitute the majority of ESDM industry revenues with 84% market share in 2012 while services revenues account for the remaining 16%. Product-Services revenue contribution mix is expected to remain similar till 2015. Figure 7 below depicts the break-up of industry revenues by products/services:

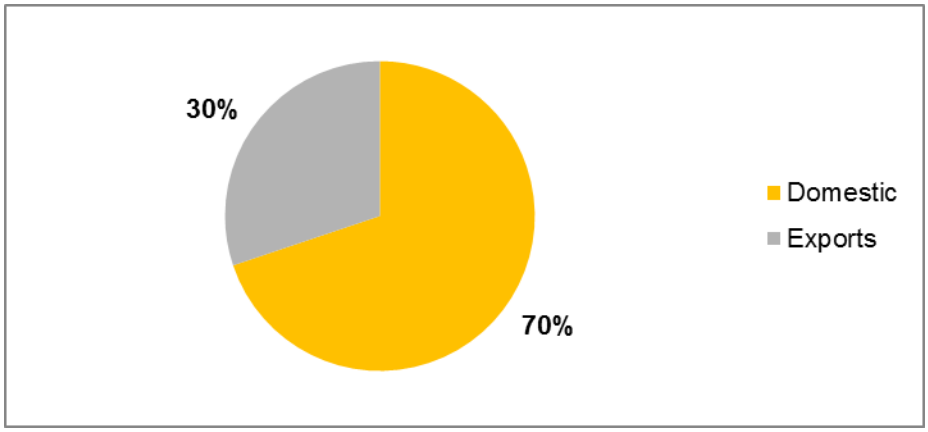
Figure 7: Indian ESDM industry revenues 2012 (by products/services)



Source: IESA-F&S study

Domestic revenues accounted for 70% of the industry revenues in 2012 while exports accounted for remaining 30%. Most of the export revenues are generated from the export of semiconductor design and electronic products while electronic components and electronic manufacturing services constituting a small portion of exports. Domestic revenues are expected to increase to approximately 72% by 2015. Figure 8 below depicts the break-up of industry revenues by domestic/exports:

Figure 8: Indian ESDM industry revenues 2012 (by domestic/exports)



Source: IESA-F&S study

4.1.4. Growth drivers

The robust growth of Indian electronic industry is attributed to a multitude of factors, including:

Growing middle class population

In India, the middle class population is growing strongly which has resulted in increased affordability of electronics products. As per a survey of household income and expenditure of Indian people conducted by National Council for Applied Economic Research (NCAER), there will be an improvement in share of all households with income bracket above INR 112,000 by 2015.

Distribution of households by income (in millions)			
Category	Income range* (in INR)	2010–11	2015–16
Deprived	Below 112,000	134.7	113.7
Aspirers	112,000–250,000	70.7	89.4
Middle	250,000–1,250,000	31.4	53.3
Rich	Above 1,250,000	3.2	6.6

**Income levels as per 2004–05 prices; Source: NCAER research*

Increasing disposable income and declining electronic product prices

Higher disposable incomes and the shift of consumer preference for products and devices that come with smart technology (such as smart LED TVs) and innovative designs has increased the demand for electronic goods. In India, the personal disposable income has grown at a CAGR of 15.6% from FY07–FY11 which has a direct positive correlation with consumer's propensity to spend on electronics products. The declining price of electronics items is yet another factor driving its demand. High degree of competition among electronics players in the country is one of the important factors leading to declining prices.

Government initiatives[iii]

In India, government is one of the largest demand creators for electronics sector. In FY13, the overall IT spend by the government was INR 262 billion, growing by 11% y-o-y. Of this total, approximately 48% was on IT hardware segment. There are several initiatives that have been undertaken by the governments both at central and state level that have given a significant boost to electronics consumption within the country. Some of these include:

- **Increased government spending on laptops and tablets**[iv]

Aakash is a project sponsored by the GoI, to design, manufacture, and distribute low cost Android-based tablet computers to schools and universities in India as a part of its one-child, one-computing device policy announced in 2011. In the 2012–13 Union Budget, the government had allocated about INR 7.5 billion for the Aakash project. The government has initially procured 100,000 tablets as part of this project by March 2013. The project will drive a large demand for low-cost tablets in the country.

- **E-governance initiatives and Unique Identification (UID) project**[v]

The GoI has launched several e-governance initiatives to improve the delivery of public services and simplify the process of accessing them. These initiatives are also resulting in an increased demand for IT hardware including laptops and tablets. With the Government expected to spend more than US $10 billion on National e-Governance Plan (NeGP), including 31 mission-mode projects, electronics consumption is expected to receive a significant boost.

The GoI is also focusing on an ambitious cloud initiative – "GI Cloud" or Meghraj to drive the proliferation and adoption of cloud technology in government departments – both at center and state levels, for effective delivery of e-governance services. This is also driving the demand for IT infrastructure such as large-scale data centers which will further drive demand for storage, servers, network components and associated electronics.

The UID project of the government aims to issue Aadhaar or Unique ID (UID) number to all residents of the country, which offers fingerprint-based verification system. The project is aimed at providing a single source of identity verification to the residents to obtain bank account, passport, driving license etc. and help in financial inclusion. The project is driving large demand for IT infrastructure as well as biometric readers in the country.

- **Roll out of National Knowledge Network (NKN)**[vi]

The government has rolled out NKN which aims to connect 1,500 top universities, scientific research institutes and central institutions like the Indian Institutes of Technologies (IITs), and research labs through fiber optics, to promote R&D in the country. It will be a multi-gigabit pan-India network providing a unified high speed network backbone for all knowledge-related institutes in the country. The overall government spending on the project is expected to cross INR 1 trillion by 2015. The program is driving huge demand for electronics products including IT hardware as well as networking and communication equipment.

- **Broadband connectivity to villages**[vii]

In October 2011, the GoI approved a plan to create National Optical Fiber Network (NOFN), an optic fiber based broadband to connect 250,000 Panchayats in the country by 2014. This is done with a vision to transform governance, service delivery and develop local innovation capacity through rural broadband. The overall government spending on the project is expected to cross INR 200 billion. The project is driving strong demand for networking and communication equipment, in turn boosting the overall electronics industry.

Adoption of high-end technology devices

Introduction of newer technologies especially in consumer electronics segment such as high definition (HD), 3D technology and smart TV (Voice recognition, gesture control), internet browsing, bluetooth connection and wireless AV in LEDs/LCDs is driving the replacement of CRT to LCD/LED TVs. Also, direct-to-home TV broadcasting technology for televisions, RFID technology in smart refrigerators etc. and energy efficient technology across all product segments are resulting into a robust growth of electronics segment. In addition, increasing preferences towards the high-end technology devices such as tablets, smartphones and ultrabooks is leading to a fast growing electronics industry in the country.

Roll out of 3G/LTE networks

With the roll out of 3G and LTE services in India, the telecom infrastructure is witnessing a high demand. With the fast growing 3G subscriber base, the telecom operators are investing in infrastructure to cater to new needs of customers. The recent launch of LTE services in India will be followed by scaling-up of the services across the country. This will continue to drive the telecom infrastructure market in coming years.

Low penetration in rural areas

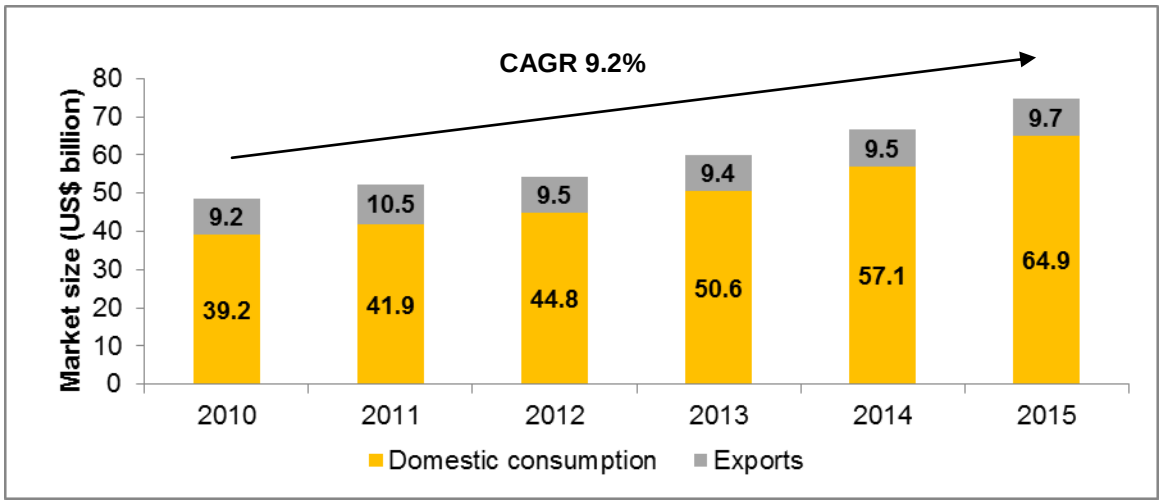
The rural areas in India comprise approximately 70% of the country's total population. Since the penetration level for most of the electronic products in rural areas is still very low as compared to urban areas, it is providing an untapped opportunity for the various electronic industries to explore a potentially large market.

4.1.5. Key segments within ESDM industry

Electronic products

The electronic product market is a combination of total domestic consumption and total exports of these products from India. The total market was estimated to be US$54.3 billion in 2012 growing by 3.6% as compared to 2011. It is expected to grow at a CAGR of 9.2% from 2010–2015 to reach US$74.6 billion. In 2012, while the domestic consumption increased by 6.2% y-o-y, the exports declined by 9.5% y-o-y, resulting in a low overall growth rate of the market. The domestic consumption is likely to grow at a CAGR of 10.6% to reach US$64.9 billion in 2015 while exports will remain mostly flat growing at a CAGR of 1.1% to reach US$9.7 billion in 2015. Figure 9 below depicts the electronic products segment market:

Figure 9: Electronic products segment market (US$ billion)



Source: IESA-F&S study

The Indian electronic products industry can be divided into following broad end-user segments:

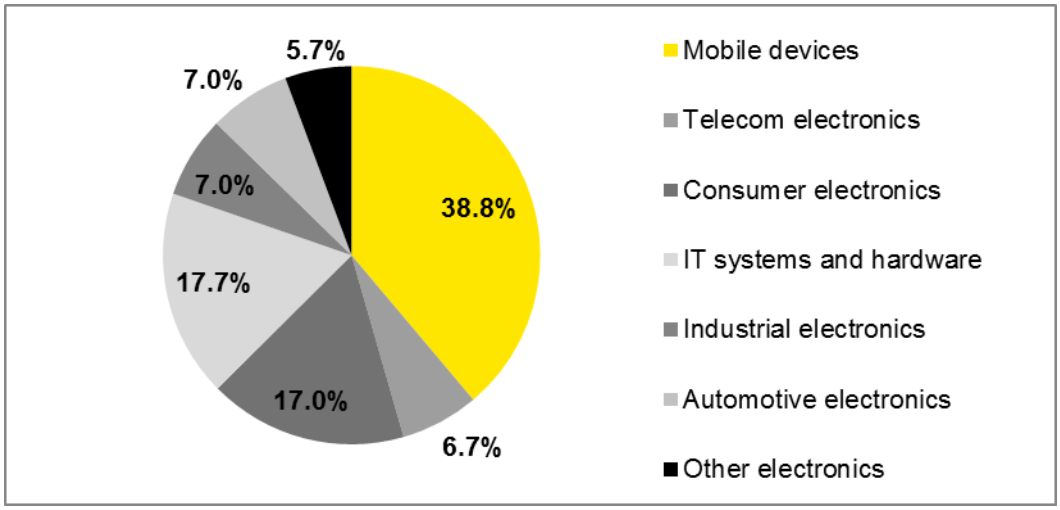
Segment	Products covered[1]
Consumer electronics	TVs (CRT and FPD), DVD players, set-top boxes, home theatre systems, MP3 players, audio equipment, digital cameras and other household appliances
Automotive electronics	Electric vehicles, power windows, anti-brake locking systems, remote keyless entry, two-wheeler (2W) ignition units, flashers, regulators, instrument clusters (2W,4W), engine management system 4W, car radio
Industrial electronics	Power electronics, LED lighting, CFL, energy meters,

[1] Indicative list only;

	UPS, inverters, weighing scales, power supplies
IT systems and hardware	Desktops, notebooks, tablets, monitors, servers, storage flash memory cards, USB drives and printers/MFDs
Telecom products and equipment	Fixed-line and mobile telecommunications equipment, modems, routers, switches, IP PBX, BTS (GSM, CDMA), WiMax (BTS,CPE), PON/GPON ONT/OLT, DWDM
Mobile devices	Mobile handsets
Other electronics	Aerospace, Strategic electronics including defense, medical electronics, smart cards

The mobile devices segment dominates the industry with a 38.8% share of market during 2012. Driven by a strong growth in number of mobile phones across the country, this segment is expected to retain the highest share even in 2015. IT systems and hardware is among the other significant segments of the industry, which accounts for 17.7% share followed closely by consumer electronics with 17% share. Figure 10 below depicts the electronic products market by end-user segment:

Figure 10: Indian electronic products market by end-user segment: 2012



Source: IESA-F&S study

Key trends and growth drivers

- **Consumer electronics**[viii]

With the rising incomes and growing affordability, spending on consumer electronics is growing at a robust rate. TV sets remain the core product in the Indian AV segment. There has been a shift in consumer preference from CRT TVs to LCDs, LEDs and smart LED TVs which has been driving the growth of TV market. The growth is also driven by first-time buyers, as household TV penetration is estimated at less than 60%. TV set demand is projected to reach 38 million units by 2017. In addition, the cable TV digitization policy of the GoI is also driving the demand for set-top boxes.

- **Telecom products and equipment and mobile devices**

The growth of these segments has been driven by a strong increase in the number of wireless and wireline telephone subscriptions in the country. India's telecom industry has become the second-largest market in the world in terms of subscribers. The growth is increasingly driven by tier-2 and tier-3 cities with prices of entry-level feature phones and smartphones coming down significantly. The telecom operators are also expanding their infrastructure to rural parts of the country. In addition, the launch of 3G and LTE services is also driving the demand for telecom infrastructure. Rapid growth in number of internet and broadband subscribers is further adding to the growth of this segment.

- **IT systems and hardware**[ix]

The Indian Government's initiative to provide affordable computing, for example, the "Aakash" tablet, has given a significant push to hardware market in the country. In addition to this, other government programs such as e-governance and Aadhaar as well as several initiatives at state government level such as providing free laptops/tablets to students is driving the demand for hardware sector in the country.

While enterprises were the main focus for many vendors previously, consumer segment has emerged as the main driver of the Indian PC market in the last few years, with 50% share of PC sales in 2011. The average price of a PC has nearly halved over the past few years, and rising incomes is bringing computers within the reach of lower income demographics. In 2013, strong growth opportunities are expected across the next 200–400 smaller cities in India, where hardware vendors are expanding their retail and distribution presence. Around 45% of new PCs sold in the Indian market are now shipping outside the top 75 cities.

- **Industrial electronics**[x]

There has been an increased demand for automation and process control in process industries. The demand for automation and process control equipment is mainly coming from the process based industries such as power generation, chemical, medical, pharmaceutical, fertilizers, and petrochemical industries. Going forward, demand for industrial electronics is expected to be driven by its applications in areas such as artificial intelligence, robotics, decision analytics, smart image processing and nanotechnology.

- **Automotive electronics**[xi]

Indian automotive industry has been growing at a robust rate in recent years. Between FY07 and FY12, the domestic sales of the Indian automobile industry increased at a CAGR of 11.4% to reach 17.4 million units. The growth can be largely attributed to increased sales in the passenger vehicles (PV) segment, followed by the commercial vehicles (CV) and two-wheeler segment. Domestic sales in PV, CV and two-wheeler segments reported a CAGR of 13%, 12% and 10% respectively during FY07

and FY12. Economic growth, favorable government policies and increased affordability have been the significant growth drivers of the Indian automobile industry.

This booming industry is in turn driving the demand for automotive electronics in the country. In India, there is an increasing customer preference toward comfort, convenience and enhanced safety features which is driving the demand for automotive electronic control units. Increased safety awareness among consumers is fueling the demand for anti-lock breaking systems (ABS) and airbags, while demand for convenience features are driving uptake of body control systems. Telematics market, comprising vehicle tracking and vehicle navigation systems is witnessing rapid increase in demand, particularly from commercial transport and truck operators. Moreover, the need for compliance with emission norms and innovation in vehicles using alternative fuels is giving a boost to the domestic auto electronics segment.

- **Other electronics**

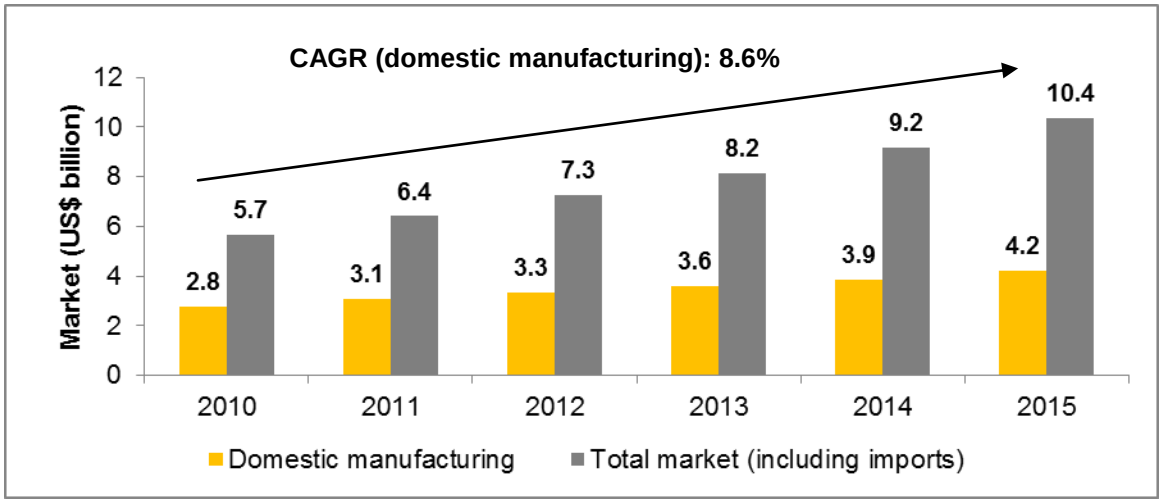
Strategic electronics is a major segment in other electronics category. This segment includes military systems such as radar, sonar, electronic warfare systems, satellite based communication, navigation systems, surveillance systems and other defense systems. GoI is increasingly promoting 'develop and make' model over 'buy and make' model in order to protect strategic interests of the country. As a result, players in the strategic electronics segment are changing their value proposition by developing technology domestically instead of importing technology.

Electronic components[xii]

Electronic components segment includes active components such as transistor, diode and CRT, passive components such as resistors and capacitors, electro-mechanical components such as PCBs, power devices, switches, relays, connectors, cable and associate components such as magnets.

The total electronic components market (including imports) in the country was valued at US$7.3 billion during 2012. The segment is expected to grow at a CAGR of 12.8% from 2010 to 2015 to reach US$10.4 billion. The domestic production of electronic component was valued at US$3.3 billion in 2012 and is expected to grow at a CAGR of 8.6% from 2010 to 2015 to reach US$4.2 billion. The growth in the electronic components segment is primarily driven by the strong demand for electronic products in the verticals including telecommunications, consumer durables, information technology and office automation (IT/OA) and automobiles. Figure 11 below depicts the electronic components segment market:

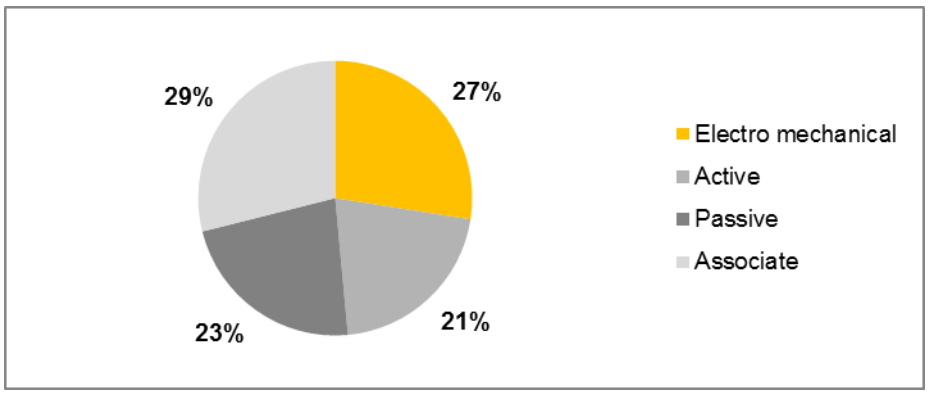
Figure 11: Electronic components market (US$ billion)



Source: ELCINA ELCOMOS report

The Indian electronic component market is dominated by electro-mechanical components and associated components, with these segments having 27% and 29% share respectively. The market composition has mostly been similar in the past and is not expected to change significantly going forward as well. Figure 12 below depicts the revenues by type of electronic components:

Figure 12: Market by type of electronic components, 2012



Source: ELCINA ELCOMOS report

Key trends and growth drivers

Convergence of technologies

With the convergence of technologies, a single device such as a smartphone, is now using diverse technologies to offer multiple services such as communication, gaming, computing and location services. This trend is likely to move across other devices as well generating demand for more sophisticated and integrated high-tech electronic components.

Surface mount technology (SMT)

The concept of surface mount technology involves construction of electronic circuits in which surface mount components are mounted directly on the PCB. The technology, which is being used across modern devices such as tablets, smartphones, laptops etc, offers significant advantages such as automation, high speed assembly, miniaturization and better mechanical and electrical performance.

SMT requires the use of surface mount devices (consisting of passive chip components and integrated circuits) that are not extensively manufactured in the country.

Growing focus on miniaturization

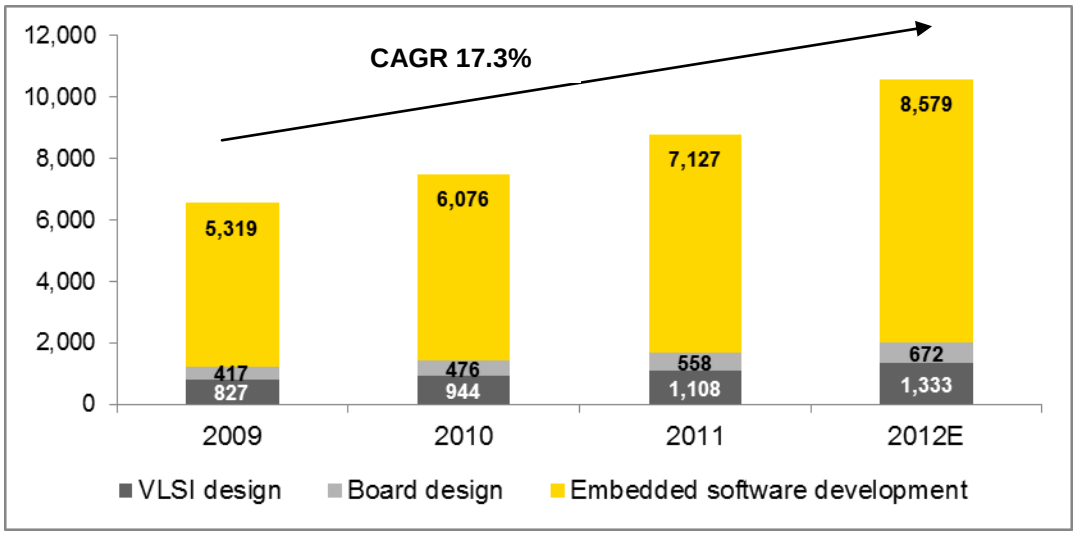
With the advent of surface mount technology and nanotechnology, miniaturization is gaining increasing focus as it results in cost reduction and better aesthetics and quality in the final product. This trend is resulting in discrete components being replaced by integrated components. Since Indian electronic component industry mostly manufactures discrete components, there is a need to move fast to catch up with this trend.

Semiconductor design[xiii]

The revenue generated by India's semiconductor design market is estimated to stand at US$10.6 billion in 2012, growing at a CAGR of 17.3% from 2009 to 2012. The increasing availability of a capable talent pool, coupled with the emergence of India as a consumer market for electronic goods, has led to the increase in design work being done from India.

Embedded software development is the frontrunner in terms of contribution to the Indian semiconductor industry's revenues (81.1%). VLSI design contributed around 12.6% of overall revenues and hardware/board design contributed the remaining 6.3% in 2012. Figure 13 below depicts the revenues of Indian semiconductor design industry:

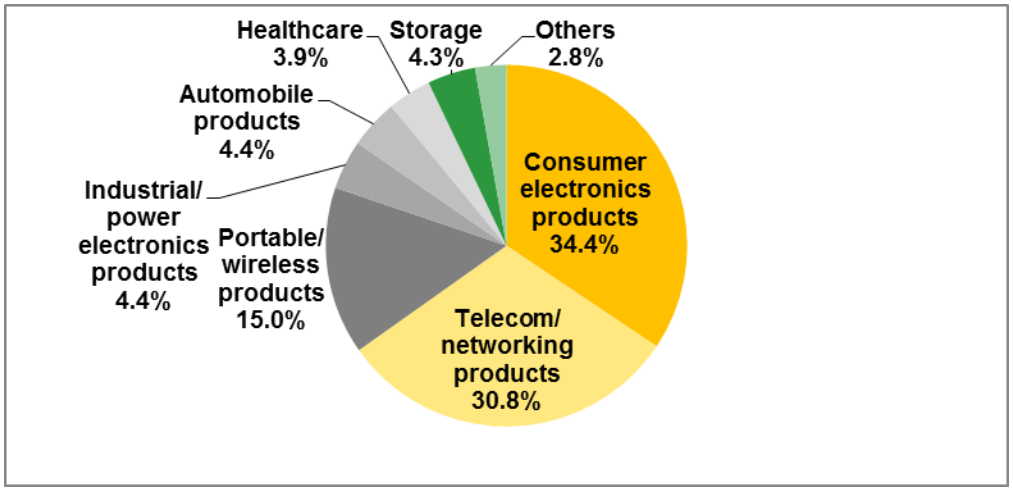
Figure 13: Indian semiconductor design industry revenues (US$ million)



Source: ISA-EY study

The increasing sale of consumer electronic goods, a burgeoning telecom/networking market and the growth in the use of portable/ wireless products globally, a trend which is also being seen in India, is driving the growth of the semiconductor design industry in the country. Today, end users demand a lot more from a particular electronic product in terms of its stand-alone functionality, cross product integration, connectivity and emergence of new technologies such as LED screens, 3G and Wi-Max. This translates into an increased demand for semiconductor design. Increasing markets for such products in India has given rise to an emergent trend, with companies looking at domestic companies for semiconductor design services, since these have better market knowledge and understanding. Figure 14 below depicts semiconductor design projects split by consuming industry segment:

Figure 14: Semiconductor design projects split by consuming industrysegment



Growth drivers

► **Increasing maturity of the semiconductor industry**

With them having gained considerable experience, Indian semiconductor design companies are seeing an increasing number of projects in chip development as compared to derivative chip design earlier. The complexity of work is also increasing with more designs being worked on for the current technology node.

► **Availability of talent pool**

With the Indian Government focusing on improving access to higher education and the increasing number of colleges and universities in the country, India adds a signifi cantly large number of engineers to the talent pool every year. The total engineering headcount for VLSI, board design and embedded software is estimated to have reached 234,000 by 2012.

► **Cost competitiveness**

Although cost structures are gradually increasing in India on an absolute level, India still has a considerably significant overall cost advantage as compared to the US, Europe or Japan.

► **Stringent IP protection measures**

The Government of India and Indian design companies have strict policies on IP protection as compared to other competing Asian countries. There have been instances when companies have sent work to India, even though design turnaround times are considerably higher in the country, as compared to the countries mentioned above, because of the more stringent IP protection measures in India. The focus on intellectual property (IP) development is expected to increase as third-party design services companies look at going up the value chain.

► **Proximity to growing APAC customers**

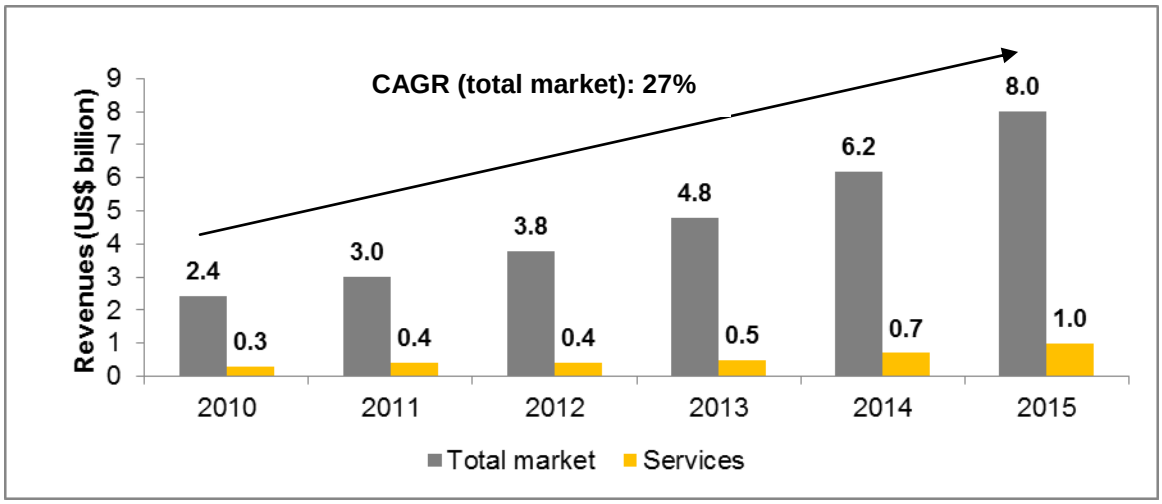
Semiconductor design companies in India are getting an increased amount of design work due to the fact that the country is closer in terms of distance and time zone difference for Asia-Pacific customers.

Electronic manufacturing services[xiv]

Electronic Manufacturing Services (EMS) involves designing, testing, manufacturing, distribution and maintenance of electronic components and assemblies for original equipment manufacturers (OEMs).

In India, the market for EMS is estimated at US$3.8 billion in 2012, growing by 26.7% y-o-y. The growth is mainly led by telecom and consumer electronics segments which together accounted for approximately 49% of overall EMS market revenues in 2011. India has attracted several global EMS players such as Foxconn, Jabil Circuits and Flextronics to set up their operations in the country. The recent policy initiatives from the GoI are also giving a boost to the EMS industry in the country. Figure 15 below depicts electronic manufacturing services market:

Figure 15: Electronic manufacturing services market (US$ billion)



Source: ELCINA ELCOMOS report

Key trends and growth drivers

Following are the growth drivers for Indian EMS industry:

- Increase in outsourcing activity by OEMs both from India and across the globe.
- Increasing labor cost, inflation and overall cost of doing business in China is benefiting Indian EMS industry.
- Good supply of highly talented workforce, specifically for design and engineering services.
- Growing demand for electronic products both locally and internationally.

4.2. Benchmarking of government policies and best practices from ESDM clusters

4.2.1. Government policy initiatives to boost manufacturing in India

Government of India is increasing focus on this sector and aims to transform the country from a consumption driven market to the one that has manufacturing capability to meet local and exports demand while simultaneously has a focus on producing high value add electronic products. This section describes various schemes that GoI has launched to give a boost to electronics manufacturing in the country as well to create an entire electronics ecosystem.

These schemes are increasingly gaining acceptance within the industry with the companies analyzing how to utilize these schemes for business growth. A detailed study to understand the implementation and effectiveness of these schemes will be undertaken in next 12 months.

Electronic Manufacturing Cluster scheme[xv]

In October 2012, the GoI notified Electronics Manufacturing Cluster (EMC) scheme to provide world-class infrastructure for attracting investments in the ESDM sector in the country. As per the scheme, the government will offer financial support for the development of EMCs which will help development of entrepreneurial ecosystem, drive innovation and catalyze the economic growth of the region by increasing employment opportunities and tax revenues.

Key features of the scheme

- The GoI would provide assistance to a Special Purpose Vehicle (SPV) which should be a legal entity duly registered for this purpose. The SPV may be promoted by private companies, industry associations, financial institutions, R&D institutions, state or local governments or their agencies and units within the EMC.
- The SPV will develop, operate and maintain the infrastructure, amenities and other common facilities created in EMCs.
- The SPV should consider including an academic or research institution to be part of the proposed SPV for suitable academic-industry linkages.
- The EMCs will use existing Information Technology Investment Region (ITIR) wherever available.
- The scheme will be open for applications for five years from the date of notification (22 October 2012).

Financial assistance from GoI

The GoI has decided to give following financial assistance to the SPV:

- **Greenfield EMC:** Greenfield EMC refers to an undeveloped or underdeveloped geographical area, (preferably contiguous). In this case, the assistance is restricted to 50% of the project cost subject to a ceiling of INR 500 million for every 100 acres of land. For a larger area pro-rate

ceiling would apply. Remaining project cost will be financed by other stakeholders of the EMCs with a minimum industry contribution of 25% of the project cost.

- **Brownfield EMC:** Brownfield EMC refers to a geographical area where a significant number of existing ESDM units is located. In this case, the assistance is restricted to 75% of the project cost subject to a ceiling of INR 500 million. Remaining project cost will be financed by other stakeholders of the EMCs with a minimum industry contribution of 15% of the project cost.

The financial assistance under the policy would be subject to approval by the Competent Authority following due process.

Modified Special Initiatives Package Scheme (M-SIPS)[xvi]

In July 2012, the GoI approved a proposal to provide fiscal incentives as a part of special incentive package to promote large-scale manufacturing in the ESDM sector, under the Modified Special Incentive Package Scheme (M-SIPS). The objective of the scheme is to remove impediments in manufacture of electronic products such as high cost of power and finance, high transactional costs and poor base of supply chain and create a level-playing field for the development of indigenous manufacturing eco-system for electronics in the country.

Key features of the scheme

- Under M-SIPS, government will provide incentives up to INR 100 billion during the 12th Five-Year Plan period (2012-17).
- The incentives would be available for 29 categories of products, including telecom, information technology hardware, consumer electronics, medical electronics, automotive electronics, strategic electronics, avionics, industrial electronics, nano-electronics, solar photovoltaic and semiconductor chips and chip components.
- Units across the value chain starting from raw materials including assembly, testing, packaging and accessories of these categories of products are included.
- It also includes Electronics Manufacturing Services (EMS) units, which are engaged in providing services related to manufacture of sub-assemblies and parts including integration services to the OEMs.
- Incentives under this scheme are only available to units within notified Electronic Manufacturing Clusters.
- The incentives are available for investments made in a project within a period of 10 years from the date of approval.
- The scheme will be open for applications for three years from the date of notification (27 July 2012).

Financial assistance from GoI

- GoI will provide following financial assistance to the ESDM units:

Type of unit	Incentive in SEZ	Incentive in non-SEZ
New unit in ESDM Sector	20% of capital expenditure	25% of capital expenditure
Existing unit in ESDM sector expanding its capacity/modernization and diversification*	20% of additional fixed capital investment in plant and machinery	25% of additional fixed capital investment in plant and machinery

**To qualify as an expansion of capacity/modernization and diversification of an existing unit, there must be an increase in the value of fixed capital investments in plant and machinery by not less than 25%.*

Capital expenditure for the purpose of this scheme will be treated as total of capital expenditure in land (subject to a maximum of 2% of total capital expenditure), building, plant and machinery and technology including research and development.

- The scheme provides for reimbursement of CVD/excise for capital equipment for the non-SEZ units.
- For high technology and high capital investment units, such as fabs, reimbursement of central taxes and duties is also provided in the scheme.
- Incentives offered by state governments/agencies/local bodies will be over and above these.
- Investment thresholds applicable for units are different depending upon the type and nature of products as defined in the scheme.

Preferential Market Access scheme[xvii]

In February 2012, the GoI notified the policy for providing a preference to domestically manufactured electronic products in procurement by all government ministries/departments (except defense) citing security considerations behind this policy decision. The policy is applicable for goods purchased for government's own purposes rather than for commercial re-sale. Each ministry/department will identify and notify all such electronic products for which the preference would be given to domestic manufacturer. However, generic products that are procured across sectors such as computers and communication equipment, notification will be done by DeitY/DoT.

The policy will eventually notify all such electronic products which are procured by government and government agencies. However, only those products will be notified for which there exists at least one domestic manufacturer.

The notification issued by each ministry/department for providing preference to domestically manufactured products will specify the percentage of procurement to be made from domestic player but it shall be minimum 30% of the total procurement value of that electronic good. Also, each ministry/department would specify the domestic value addition requirement to qualify as a domestic product (subject to minimum requirements prescribed by DeitY).

The definition of domestically manufactured electronic products is as follows: such products which are manufactured by companies that are established and registered in India (including contract manufacturers but excluding traders). These products shall meet the following graded domestic value addition in terms of BOM:

Year	% domestic value addition in terms of BOM from domestic manufacturers
Year 1	25%
Year 2	30%
Year 3	35%
Year 4	40%
Year 5	45%

The table below enlists the electronic products notified including the percentage of procurement from domestic manufacturers and percentage value addition in terms of BOM:

Product	Percentage of procurement from domestic manufacturers	% domestic value addition in terms of BOM from domestic manufacturers
Laptop PC	50%	25% in Year 1
Desktop PC	50%	30% in Year 1
Tablet PC	50%	30% in Year 1
Dot matrix printer	50%	40% in Year 1
Contact smart cards	50%	30% in Year 1 45% in Year 2 65% in Year 3 onwards
Contactless smart cards	50%	40% in Year 1 50% in Year 2 70% in Year 3 onwards
LED products	50%	50% in Year 1

In addition to these, DoT has also notified 26 telecom products for eligible for preference from domestic manufacturers in government procurement.

Setting up semiconductor fabrication units[xviii]

Semiconductor wafer fabrication units play a pivotal role in the overall ESDM ecosystem. Chip manufacturing creates its own upstream and downstream ecosystem and this could kick-start a new wave of electronics hardware manufacturing in India. The GoI intends to set up two semiconductor wafer fabs in the country. In June 2011, the government set up an Empowered Committee for identifying technology and investors for setting up wafer fabs which invited proposals from firms willing to set up semiconductor fabs in the country.

The Government of India has accorded “in-principle” approval for establishing two semiconductor wafer fabrication (FAB) manufacturing facilities in the country.

Electronics Development Fund[xix]

The GoI has planned to set up a US$2 billion Electronics Development Fund (EDF) to aid the domestic electronics manufacturing in the country. EDF will include separate funds for different segments along the value chain in electronics manufacturing. It will float several other funds under its umbrella to identify suitable projects in different hardware manufacturing verticals and fund them. All these funds will be managed by different fund managers and EDF will have between 25% and 100% equity exposure in these funds. EDF will be managed by the DeitY and will be utilized for innovations, R&D, Indian Intellectual Property Rights (IPR) issues, product development and promotion of the electronic manufacturing sector in India. It will not interfere in day-to-day affairs of separate funds under its umbrella.

Union Budget 2013-14 initiatives[xx]

The GoI in its Union Budget 2013-14, announced several incentives for the development of the ESDM sector in the country. Prominent among these include:

- The GoI has increased import duty on STBs from 5% in last fiscal year to 10% in 2013-14. This has been done with an aim to promote domestic manufacturers by increasing their competitiveness against imported STBs.
- The government also announced zero customs duty on capital equipment (plant and machinery) for semiconductor wafer fabs.
- The budget also introduced an investment allowance for new high value investments. A company investing INR 1.0 billion or more in plant and machinery during the period 1 April 2013 to 31 March 2015 will be entitled to deduct an investment allowance of 15% of the investment. This will be in addition to the current rates of depreciation.
- The government will also notify that the funds provided to technology incubators located within academic institutions and approved by the Ministry of Science and Technology or Ministry of MSME will qualify as CSR expenditure. The new Companies Bill will oblige companies to spend 2% of average net profits under CSR. Technology incubators will help entrepreneurs set up new business by offering them financial and technology assistance.

4.2.2. Benchmarking and best practices – state government policies for ESDM sector

Karnataka[xxi]

Incentives as part of Karnataka ESDM Policy 2013

Preferential market access (PMA) Policy

In line with the preferential market access (PMA) policy notified under National Electronics Policy, the Government of Karnataka has also introduced preferential market access for procurement of electronic products by government departments manufactured by the companies registered and engaged in manufacturing in Karnataka. The policy will remain in force seven years from the date of notification.

The following table lists the percentage of domestic value addition in terms of BOM:

Year	Percentage domestic value addition (in terms of BOM)
Year 1	25%
Year 2	30%
Year 3	35%
Year 4	40%
Year 5	45%

Electronics manufacturing clusters (EMCs)

The state will provide additional incentives on top of those offered by GoI for the development of EMCs in the state. The government will support development of seven EMCs in the state by 2020. It will engage in development of necessary infrastructure such as roads and railways and ensure good connectivity of cluster to airport/seaport/railway station. However, its contribution toward infrastructure development in EMCs shall not exceed 20% of the total infrastructure cost.

Semiconductor IP and chip design fund

The Government of Karnataka will set up a fund in collaboration with GoI and other public/private financial institutions to provide money for startup, growth and debt/capital needs of semiconductor design companies. The fund will be in place for the next seven years and Karnataka government's contribution to fund is restricted to 26% of the fund size. The aim of this fund is also to stimulate semiconductor IP creation in the state.

ESDM innovation centers

In order to help entrepreneurs and companies develop product concept and test their prototypes, the government has decided to set up three ESDM innovation centers within the state. These centers will be fully equipped with VLSI design tools, prototype development facilities, testing facilities, characterization labs and compliance and certifications labs.

Post-performance incentives and subsidies

Capital subsidies

The government will offer capital subsidies to Karnataka ESDM companies setting up ESDM design, R&D or high-tech manufacturing facilities in the state. The subsidy will be upto INR 50 million or 10%

of the total investment (whichever is lower) and will be provided to first two anchor units in each greenfield EMC.

R&D grant

The government aims to promote R&D activities by ESDM companies in the state by offering R&D grants to companies in the form of reimbursements of 20% of actual R&D expenses (including manpower) annually, subject to a maximum of 2% of their annual turnover. The upper cap on the grant is INR 10 million and it is in addition to any similar benefits announced by GoI.

Incentives for patent filing

The Karnataka Government aims to further promote innovation activities in the state by providing incentives to companies to file domestic and international patents. The government will reimburse upto 50% of the actual filing costs (including filing fees, attorney fees, search fees and maintenance fees) subject to a maximum of INR 100,000 for domestic and INR 500,000 for international patents. This is in addition to any similar benefits announced by GoI.

Export incentives

Deemed export incentives: The ESDM companies will be eligible for an incentive in the form of interest free loan against the eligible gross VAT for sales within Karnataka under the Industrial Policy 2009-14. For inter-state sales, Karnataka government will reimburse 95% of CST, till GST is implemented, paid by the eligible ESDM units during the first five years of their operations.

For the exports outside the country, the Karnataka Government will formulate a "Duty Drawback Scheme" in respect of the state taxes that do not get refunded to the exporting units in the normal course of implementation of state tax laws, and as a result, get embedded in the exports.

Marketing incentives for international market expansion

The government shall reimburse 50% of the actual costs (subject to a maximum of INR 1 million per year per company) for international marketing, sales promotion, trade show participation, webinars etc. by Karnataka ESDM companies.

Incentives as part of Karnataka Electronics Hardware Policy 2011

Investment promotion subsidy

This subsidy is only available for enterprises availing term loan to an extent of minimum 50% cost of fixed assets.

	Zone 1	Zone 2	Zone 3 and 4
Micro enterprises	25% VFA (max INR 1 mn)	20% VFA (max INR 0.75 mn)	15% VFA (max INR 0.5 mn)
Small enterprises	20% VFA (max INR 2 mn)	15% VFA (max INR 1.5 mn)	10% VFA (max INR 1 mn)
Medium enterprises	INR 3 million	INR 2 million	NA

*VFA: value of fixed assets

Interest free loan on VAT

Investment on fixed assets (INR billion)	Minimum direct employment	Quantum of interest free loan
0.1-0.5	Min 100 and additional 20 for every INR100 million investment	50% assessed gross VAT for initial 5 years subject to 100% of total value of fixed assets.
0.51-2.5	Min 200 and additional 20 for every INR5 billion investment	50% assessed gross VAT for initial 6 years subject to 75% of total value of fixed assets.
2.51-10	Min 400 for upto INR 3.0 billion investment and additional 50 for every INR 1.0 billion investment	25% assessed gross VAT for initial 7 years subject to 50% of total value of fixed assets.
10-30	Min 750 for upto INR 10 billion investment and additional 25 for every INR 1.0 billion investment	25% assessed gross VAT for initial 10 years subject to 50% of total value of fixed assets.
More than 30	1,250	25% assessed gross VAT for initial 15 years subject to 50% of total value of fixed assets.

Zone 4: Nil

Interest subsidy
Available to an extent of 5% to micro enterprises for a period of 5, 4 and 3 years in Zone 1, Zone 2 and Zone 3 respectively.

Electricity duty waiver
100% exemption on electricity duty for 5, 4 and 3 years in Zone 1, Zone 2 and Zone 3 respectively.

Anchor unit subsidy
First two manufacturing enterprises (minimum employment 100 persons) investing atleast INR 500 million in each of the taluks (except those have industrial units with investments more than INR 500 million present) coming in Zone 1, 2 and 3, will be offered a subsidy of INR10 million.

Stamp duty exemption
Stamp duty to be paid on loan agreement/credit deeds/mortgage/hypothecation deeds and lease deeds/lease-cum sale/absolute sale deeds shall be reimbursed as per the following:
Zone 1, 2: 100%
Zone 3: 75%
Zone 4: Nil

Registration charges for loan documents and sale deeds will also be charged at a nominal rate of INR 1 per INR 1,000 transaction.

Entry tax benefit
Electronics hardware manufacturing units shall be exempted for the payment of Entry tax on plant and machinery and capital goods for a period of 3 years and on raw materials/inputs/components for a period of 5 years from date of commencement of operations (not applicable for Zone 4).

West Bengal[xxii]

In order to promote IT/ITeS and ESDM sector in the state, the West Bengal government has launched "ICT Incentive Scheme 2012" that has come into effect from 1 August 2012 and will be valid for a period of five years, ending 31 July 2017. In the following sections, IT units include IT services/software/ITeS as well as IT hardware units involved in the manufacturing of electronic IT equipment, telecom devices, telecom infrastructure equipment, electronic component manufacturing, solar equipment, LED systems and other units engaged in ESDM activities.
The state has been divided into following groups and the incentives are provided by the government based on the location of the companies in these particular groups.

Group	Areas
Group A	Kolkata Municipal Corporation, North 24 Parganas, South 24 Parganas, Howrah
Group B	District Hooghly, and sub-divisions of Siliguri, Kharagpur, Durgapur, Asansol, Haldia, Kalyani
Group C	Districts of Burdwan (excluding sub-divisions of Durgapur, Asansol), Purba Medinipur (excluding sub-division of Haldia), Malda, Jalpaiguri, Naida (sub-division of Kalyani) and Murshidabad.
Group D	Districts of Birbhum, Bankura, Paschim Medinapur (except sub-division of Kharagpur), North and South Dinajpur, Purulia, Coochbehar, Darjeeling (excluding sub-division of Siliguri) and any other places not covered Group A, B, C.

Fiscal incentives

Capital investment subsidy

- An eligible IT hardware unit being set up in Group A (except for areas under Kolkata Municipal Corporation), B and C will be entitled to a capital investment subsidy of 12% of the fixed capital investment subject to a limit of INR 45 million, payable in 5 equal yearly installments.
- An eligible IT hardware unit being set up in Group D will be entitled to a capital investment subsidy of 15% of the fixed capital investment subject to a limit of INR45 million, payable in 5 equal yearly installments.

Interest/training subsidy

The state government will provide interest/training subsidy to all new eligible IT units on the interest liability on term loan borrowed from a commercial bank/financial institution for implementation of an approved project and providing training to employees for such projects at below mentioned rates.

- Group A & B (except hardware units located under Kolkata Municipal corporation): 25% of annual liability on term loan borrowed for an approved project and INR 20,000 or one month salary, whichever is lower, to a maximum 750 candidates subject to a ceiling of INR 15 million per year for 5 years.
- Group C & D: 25% of annual liability on term loan borrowed for an approved project and INR 20,000 or one month salary, whichever is lower, to a maximum 1,000 candidates subject to a ceiling of INR 20 million per year for 7 years.

These incentives can be availed as per either of the following options:

- Option 1: The company may claim only interest subsidy on annual interest liability subject to a

maximum of INR 15 million per year for Group A & B locations and INR 20 million for Group C & D locations.

- Option 2: The company may claim only training subsidy subject to a maximum of INR 15 million per year for Group A & B locations and INR 20 million for Group C & D locations.
- Option 3: The company may claim both interest and training subsidy, but the combined limit of both should not exceed INR 15 million per year for Group A & B locations and INR 20 million for Group C & D locations.

Electricity duty waiver

All eligible IT units will be entitled for a waiver on electricity duty consumed for production/operational activities for a period of 5 years in Group A & B and 7 years in Group C & D from the date of commencement of operations.

CST refund

All eligible hardware units in all locations (except hardware units located under Kolkata Municipal Corporation) will be entitled for a refund of 100% of Central Sales Tax (CST) until the abolition of CST or 5 years, whichever is earlier.

Stamp duty waiver

All eligible IT units will be entitled for a refund of 100% of stamp duty and registration fee for purchase of land and building for setting up the project, irrespective of the location.

Subsidy for patent filing

All eligible IT units in MSME sector shall be reimbursed 50% of the cost of filing patents subject to a maximum of INR 0.5 million per year.

Subsidy for employment generation

All eligible IT units in large and medium sectors shall be reimbursed 50% (75% in case of micro and small) of the expenditure incurred for paying contribution toward Employee State Insurance (ESI) and Employee Provident Fund (EPF) subject to a maximum of INR 10 million (INR 15 million in case of micro and small) per year for following number of years:

Group A &B (except hardware units located under Kolkata Municipal corporation): 5 years

Group C: 7 years

Group D: 10 years

Infrastructure development

- **Cluster creation:** The government plans to develop electronics clusters in the cities of Kolkata, Falta, Asansol, Kharagpur, Purulia, Kalyani and Siliguri. It aims to develop 15 such clusters over the next 5 years, either through assistance from Central Government or state funding.
- SME units interested in setting up plans outside these clusters will be extended assistance for their infrastructural needs. Similarly, large units willing to set up facilities in the state will be offered infrastructural support at reasonable cost and will be assisted through a dedicated hardware cell of the IT department.
- **Semiconductor fabs:** The government plans to carry out necessary policy and promotions for setting up semiconductor fabrication units both in digital and analog – mixed signal segments. For this the government will provide suitable land-sites and facilitate the building of necessary infrastructure.
- The government also plans to set up an electronics design center in the state in collaboration with one or more premier technological institutions.

Mega projects

Apart from the incentives mentioned above, in case of mega projects, the government may consider granting special package of incentives. The mega projects will be decided on a case-to-case basis, based on the pioneering nature of the project, location aspect, introduction of state of art technology, scope of further related investment etc.

Preferential access

Government is considering a review of existing procurement policies in the state, so as to give a preference to local manufacturers in its procurement of hardware.

Focus areas for government

The government aims to focus on verticals such as lighting, smart meters, security systems, set top boxes, industrial and medical electronics and certain specified components. It plans to bring investments in ancillaries focused on LCD and plasma devices, solar photovoltaic, LED equipments, device level packaging and assembly test mark pack.

Madhya Pradesh[xxiii]

Madhya Pradesh government has unveiled Information Technology Investment Policy 2012 which provides various incentives to IT industry that includes IT/ITeS companies as well as electronics hardware manufacturing units.
Following are the major incentives provided to IT industry by the state government:

Interest subsidy
All eligible micro, small and medium enterprises are entitled to get interest subsidies as per the table below:

Category	Districts	% of subsidy	Period	Maximum amount (in INR million)
Micro and small	All districts	5	7	2
Medium	Backward-A	3	5	1
Medium	Backward-B	4	6	1.5
Medium	Backward-C	5	7	2
Medium	No industry block	5	7	2

Capital subsidy
Small scale units in IT sector having fixed capital investment of more than INR 5 million will be given special subsidy 25% subject to a maximum of INR 3 million. In case of medium scale enterprises, a special subsidy of 25% subject to a maximum of INR 1.2 million in backward-A category districts, INR 1.8 million in backward-B category districts, INR 3 million in backward-C category districts.

The government will provide an assistance of 15% of the expenditure incurred by private sector on the establishment/development of industrial/high-tech parks subject to a maximum of INR 50 million. The condition is that such parks will have a minimum area of 100 acres and will have a minimum of 10 industrial units with a total of 250 employees employed on a regular basis.

Land availability at concessional rates
The government will provide land at concessional rates for establishing IT investment area. The land will be made available at the rate of 25% of the prevalent Collector guideline rate, subject to availability of land. In this case, investment in fixed capital will have to be made at within a period of 3 years.

Project cost (in INR million)	Land available at concessional rate
Upto 200	Maximum 10 acres as per requirement
200 to 500	Maximum 15 acres as per requirement
500 to 1,000	Maximum 25 acres as per requirement
More than 1,000	Case to case basis

These rebates are applicable only for government lands.

Minimum number of engineers hired by a company in order to avail the concession shall be 100 per acre, of which, minimum 50% employment shall be for the persons who are residents of Madhya Pradesh.

The lease rent will be charged at the rate of 1% per year of the actual lease premium payable by the company.

Stamp duty waiver

All eligible IT units will be entitled for an exemption of stamp duty and registration fee for purchase/lease of space in IT investment area and stamp duty on mortgage/hypothecation with banks/financial institutions in IT investment area.

Incentives related to statutory regulations

- The hours of work for women employees working in an IT manufacturing unit shall be relaxed under the Factories Act. Women workers shall be allowed to work 24*7 operations with 3 shifts per day subject to the conditions fulfilled by the employers relating to women workers' security and safety at the work place and during the transit.
- IT Units shall be permitted for self-certification of the registers and forms as contemplated under various following Acts viz Payment of Wages Act, Minimum Wages Act, Employees State Insurance Act, etc. and shall also be allowed to maintain unified register and record instead of maintenance of different registers and records under different Labour Acts.

Power incentives

The government will ensure uninterrupted power supply to IT industry through a dedicated feeder as per the prescribed terms and conditions on payment of requisite charges. Also, no prior permission will be required for installation of captive power plants.

Entry tax benefit

Electronics hardware manufacturing units shall be exempted for the payment of Entry tax for a period of 5 years.

Subsidy for patent filing

All manufacturing enterprises shall get full reimbursement for the cost of filing patents subject to a maximum of INR 0.2 million.

Training subsidy

The government will provide one time reimbursement to the companies for providing skill gap trainings to the engineers that are domicile of Madhya Pradesh. The reimbursement will be upto 50% of the cost incurred subject to maximum of INR 10,000 per employee, who are trained by the company within first two years of commencement of operations.

Maharashtra[xxiv]

Maharashtra government launched Maharashtra IT/ITeS Policy in 2009 which covers IT hardware units as well. The state has also recently launched Maharashtra Industrial Policy 2013 in January 2013.

Following are the incentives available as per Maharashtra IT/ITeS Policy 2009:

Stamp duty

All new IT units will be entitled for stamp duty exemption as per the following table:

Areas	Transactions	Exemption
C, D, D+, no industry and low HDI districts	Hypothecation, pawn, pledge, deposit of title deeds, conveyance, charge on mortgage property, lease, mortgage deed and security bond on mortgage deed	100% stamp duty exemption
Public IT parks, IT/IT Hardware/Telecom Hardware manufacturing SEZs in A and B areas	Hypothecation, pawn, pledge, deeds, conveyance and lease	100% stamp duty exemption
Private IT parks (including IT hardware and telecom hardware manufacturing units) in A and B areas	Hypothecation, pawn, pledge, deeds, conveyance, lease and public assignment lease	75% stamp duty exemption
Throughout the state	Merger, de-merger and reconstruction of IT/ITeS units	90% stamp duty exemption

Entry tax benefit

IT units shall be exempted for the payment of entry tax and Octroi tax or any other cess or tax levied in lieu of these.

VAT benefit

The government will charge the minimum floor rate recommended by the concerned Empowered Committee of the Central Government for the VAT on sale of IT products.

Land at concessional rates

The government will provide land at 25% of the prevailing rates for the IT units being set up in Maharashtra Industrial Development Corporation (MIDC) area in Low-HDI[2] districts.

Subsidy for patent filing

All micro, small and medium IT enterprises in the state shall be reimbursed 50% of the cost of filing patents subject to a maximum of INR0.5 million.

[2] Low Human Development Index (HDI) Districts shall refer to the following 10 districts specified in the Package Scheme of Incentives (PSI) 2007: Gadchiroli, Yavatmal, Jalna, Nandurbar, Washim, Dhule, Nanded, Osmanabad, Buldhana, Chandrapur

Electricity duty exemption

IT units will be entitled for a 100% exemption from the payment of electricity duty for a period of 10 years.

EPF reimbursement

All IT units set up in the state in low HDI districts, and employ atleast 75% local people will be reimbursed the 75% amount on expenditure on account of contribution towards Employee Provident Fund and Employee State Insurance schemes. This will be given for five years and is subject to a maximum of 25% of fixed capital investment.

Following are the incentives available as per Maharashtra Industrial Policy 2013:

The manufacturing units in the state receive incentives based on their classification as MSME or large enterprises. Following table has the classification:

Area classification	**Large projects**		**MSME projects**	
	Monetary ceiling as % of admissible fixed capital investment	**Eligibility period (years)**	**Monetary ceiling as % of admissible fixed capital investment**	**Eligibility period (years)**
A	-	7	-	7
B	-	7	20	7
C	30	7	40	7
D	40	7	70	10
D+	50	7	80	10
No industry districts	70	7	90	10
Naxalite affected area	80	7	100	10

Following are the incentives available to these units:

Incentive available	**Large projects**	**MSME projects**
Industrial promotion subsidy	Every year, in areas other than A and B areas, industrial promotion subsidy payable is calculated at the rate of 60% to 100% of VAT on local sales + CST payable on finished products	Every year, in areas other than A, industrial promotion subsidy payable is calculated at the rate of VAT on local sales + CST payable + 20% to 100% of ITC payable on finished products
Energy and water audit	► Reimbursement of water and energy audit upto 75% subject to INR0.1 million for water and INR 0.2 for energy audit ► 50% cost of capital equipment required for undertaking measures to conserve water and energy, limited to INR 0.5 million each	► Reimbursement of water and energy audit upto 75%. Assistance by the way of 50% grant, subject to INR 0.1 million for water and INR 0.2 for energy audit ► 50% cost of capital equipment required for undertaking measures to conserve water and energy, limited to INR 0.5 million each

Stamp duty exemption	Eligible units will be entitled for 100% stamp duty exemption	Eligible units will be entitled for 100% stamp duty exemption within investment period for acquiring land and term loan purposes In A and B areas, stamp duty exemption will be offered to only IT units in IT parks.
Electricity duty exemption	Eligible new units in all areas except A and B will be entitled to exemption from payment of electricity duty for the eligibility period. In A and B areas, electricity duty exemption will be offered to 100% EOU large scale units and IT units for 7 years.	Eligible new units in all areas except A and B will be entitled to exemption from payment of electricity duty for the eligibility period. In A and B areas, electricity duty exemption will be offered to 100% EOU MSME scale units and IT units for 7 years.
Power subsidy	NA	► Applicable for new units located in Vidarbha, Marathwada, North Maharashtra, and districts of Raigarh, Ratnagiri and Sindugarh in Konkan. ► Extent of INR1/unit in the above mentioned areas and INR 0.5/unit in all other areas (except A)

Andhra Pradesh[xxv]

Andhra Pradesh government launched Electronics Hardware Policy 2012-2017 in June 2012 with an aim to promote the hardware and electronics industry in the state. The policy is valid for the period of 5 years till 2017. This policy covers the sectors such as industrial electronics, computers and peripherals, communication, electronic manufacturing services, broadcast equipment, strategic electronics and components.
The state has also identified various tier-II (Visakhapatnam, Vijayawada, Warangal, Tirupati and units located closer to seaports) and tier-III locations (identified in any district other than Hyderabad Metropolitan Development Authority area and tier-II locations).

Following are the incentives for the companies as listed in the Electronics Hardware Policy 2012-2017:

Common incentives to all electronics hardware companies in the state

- **Duty waivers**
  - **Stamp duty exemption:**
    - 100% reimbursement of stamp duty, transfer duty and registration fee paid on sale/lease deeds/mortgages/hypothecations on the first transaction.
    - 50% reimbursement of stamp duty, transfer duty and registration fee paid on sale/lease deeds/mortgages/hypothecations on the second transaction.
  - **Tax exemption:** 100% tax reimbursement of VAT/CST or CGST, for new units started after the date of issue of the state policy, for a period of 5 years from the date of commencement of production for products made in AP and sold in AP.
- **Subsidies**
  - **Interest subsidy:** 3% interest rebates limited to INR 0.5 million for 5 years.
  - **Capital subsidy:** 10% subsidy on capital equipment for technology upgradation.
  - 50% subsidy on expenses incurred for quality certification limited to INR 0.4 million (Conformity European (CE)), China, Compulsory Certificate (CCC), UL Certification, ISO, CMM Certification etc.)
  - 25% subsidy on cleaner/green production measures limited to INR 1 million.
  - **Land availability at concessional rates:** 25% rebate in land cost limited to INR 1 million in industrial estates, industrial parks, SEZs, hubs and clusters.
  - 50% reimbursement on cost involved in skills upgradation and training local manpower limited to INR 2,000 per person.
  - Reimbursement of 50% exhibition subsidy for participating in national/international exhibitions.
  - Investment subsidy of 20% (limited to INR 2.0 million) to micro and small enterprises.

Preferential market access

- The Government of Andhra Pradesh has reserved 20% of order value to electronics hardware SMEs in State government promoted projects.
- The main objective of the state government is to reduce the use of imported products in all state and central government programs.
  - Companies using greater Indian value addition and local language interface will be allocated additional basis points during technical evaluation.

Electronics manufacturing clusters (EMCs)

- The state will create 4 hubs (North, East, West and South) in and around Hyderabad consisting of 300 acres of multiproduct electronic SEZs and another 200 acres for the electronic industry.
- The state government plans to set up a new electronic hardware park in an area of 150 acres with options of SEZ and non-SEZ.
- The state plans to convert existing clusters such as FAB City and Aeronautical SEZ into Centers of excellence, to give fresh impetus to infrastructure.

The manufacturing units in the state receive incentives based on their classification as start-ups, micro, small, medium units or enterprises focused on R&D. Following table has the classification:

Incentive available	Startups/ microenterprises	Small and medium units	R&D focused units
Recruitment assistance	INR 0.25 million for recruitment of upto 50 employees within a period of 2 years.	INR 1.0 million for employing minimum of 200 employees within 2 years.	INR 1.5 million for employing minimum of 150 employees within 2 years.
Leased rentals at concessional rates	25% subsidy on lease rentals of up to INR 0.5 million per annum for a maximum period of three years.		NA
Power subsidy (for a period of 5 years from the date of commencement of operations subject to a maximum of INR3 million)	50% subsidy	40% to small units, 25% to medium units, 10% to large-scale industry	NA

The manufacturing units in the state receive incentives based on their location in tier II and III cities in the state. Following table has the classification:

Incentive available	Tier III locations	Tier II locations
Recruitment assistance	The state provides INR 1.5 million as recruitment assistance for employing a minimum of 100 employees within 2 years of commencement of commercial operations in tier-II and III cities in AP.	
Power subsidy	50% for a period of 5 years	50% to micro units, 40% to small units, 25% to medium units, 10% to large-scale industry for a period of 5 years subject to a maximum of INR 3.0 million
Other incentives	The first five anchor electronics hardware companies employing more than 100 employees in tier-II and III cities are entitled to receive subsidy of INR 1.0 million.	

Other initiatives by the state government

Fund to promote innovation in manufacturing and design

The Government of Andhra Pradesh will set up a fund in collaboration with GoI to promote design, manufacturing, assembling and packaging businesses

ESDM innovation centers

In order to help entrepreneurs and companies develop product concept and test their prototypes, the government has decided to set up incubation centers and electronic hardware parks with full-fledged testing facilities to meet global quality parameters such as safety, endurance, environmental and functional parameters.

Export incentives

For encouraging electronics export, the state proposes to offer a special negotiated package of incentives such as dollar loans, exports guarantee etc.

Priority projects incentives

A special negotiated package of incentives will be offered to priority projects in the ESDM sector proposed to be set up by electronic hardware companies. These companies should have a present employment of more than 100, existing investment of more than INR 100 million and turnover of more than INR 200 million for the last three years and projected employment of 500 to be eligible for this special incentive package.

Incentive to "Go Green"

Units using renewable sources for their operations and manufacturing are eligible for additional incentives such as electricity tax exemption for 5 years. Sales tax exemption for two additional years against carbon credits earned on a yearly basis is also being extended.

Subsidy for patent filing

All existing units in the state (other than large-scale industries) shall be reimbursed 50% of the cost of filing patents subject to a maximum of INR 0.5 million.

Women workers in night shift

Women workers to be allowed to work in three shifts including night shift on similar lines as IT/ITeS industry.

Uttar Pradesh[xxvi]

The Government of UP has unveiled their new IT policy in 2012 as well as new Infrastructure & Industrial Investment Policy 2012. The IT policy provides various incentives to IT industry including IT hardware, software, services and ITeS companies. The major among them are listed below:

Investment Promotion Scheme
All new IT units to be set up in the state with fixed capital investment of INR 50 million or more, will be provided the facility of interest free loan, from the date of first sale up to 10 years, equivalent to the sum of VAT and Central Sales Tax deposited by industrial units or 10% of the annual turnover whichever is less. This loan will be payable after 7 years from the date of disbursement.

Interest subsidy
New IT units will be reimbursed the amount of interest at the rate of 5% payable on term or working capital loan taken by them from banks/financial institutions for a maximum period of 5 years from the date of commencement of operations. The maximum limit of the same will be INR 10 million per annum per unit.

Stamp duty exemption
All IT units will be entitled for a 100% exemption of stamp duty for purchase of land and building for setting up the project, with the condition of commencing operations within three years in Tier II/Tier cities such as Lucknow and Agra, against a bank guarantee in favor of IG Stamps and Registration valid for a period of three years.

Land availability at concessional rates
The government will provide land at concessional rates for establishing IT mega projects. The land will be made available at the rebate of 25% on the prevailing sector rates on purchase of land from state agencies.

Electricity duty waiver
Exemption in Electricity Duty is available to new units for 10 years and to pioneer units for 15 years. The electricity produced by captive power plant for self-use, will be exempted from Electricity Duty.

Special incentives for mega projects
The government will provide special package of incentives for IT units with investments above INR 2 billion over and above the other mentioned incentives. Also, special incentives will be given to investment projects above INR 1 billion focused on skill development, innovation and R&D.

Power incentives
The government will ensure uninterrupted power supply to IT industry through a dedicated feeder from state utilities. The cost of provision of separate feeder and separate transmission line will be borne by the developer.

EPF reimbursement
All new IT units set up in the state, which provide employment to 100 or more employees (and retain at least 75% locals for a period of three years), will be reimbursed the 50% amount on expenditure on account of contribution towards Employee Provident Fund and Employee State Insurance schemes. This will be given for five years and is subject to a maximum of 25% of fixed capital investment.

Other incentives

The policy also allows IT units to have 24*7 operations as well as women to work in all three shifts.

Tamil Nadu[xxvii]

The Government of Tamil Nadu came up with Information Communication Technology (ICT) Policy in 2008 and an Industrial Policy in 2007. The ICT policy covers IT industry including IT services, software, ITeS and hardware units. The government has announced that it will soon come out with a new ICT as well as industrial policy.
Various incentives available to IT companies as part of the ICT policy. Prominent among them are listed below:

Structured package of incentives
New IT units (as well as expansion projects) being setup in Chennai, Tiruvallur and Kancheepuram districts with an investment in eligible fixed assets of over INR 2.5 billion in a period of 3 years would be eligible for a structured package of incentives to be decided on a case-to-case basis. In case of any district other than these three districts, the minimum investment will be INR 1.5 billion in a period of 3 years. Weightage to investment, employment and potential for attracting further investment will be given while deciding the structured package.

Capital subsidy and Electricity Tax exemption
New IT units (as well as expansion projects) being setup in districts other than Chennai, Tiruvallur and Kancheepuram, i.e. tier 2 and tier 3 locations, will be eligible for a back-ended state capital subsidy and Electricity Tax exemption on power purchased from TNEB or generated from captive sources, based on investment in eligible fixed assets made within 3 years from start of commercial production and employment as below:

Investment and employment	Capital subsidy	Duration of electricity tax exemption
Investment between INR 50 million and INR 500 million and employing more than 100 direct workers	INR 3 million	2 years
Investment between INR 500 million and INR 1,000 million and employing more than 200 direct workers	INR 6 million	3 years
Investment between INR 1,000 million and INR 2,000 million and employing more than 300 direct workers	INR 10 million	4 years
Investment more than INR 2,000 million and employing more than 400 direct workers	INR 15 million	5 years

IT units located within specified SEZs will be provided an additional 50% capital subsidy over and above the eligible limit.

Exemptions in Stamp Duty

- IT companies will be provided 50% exemption from the Stamp Duty and the Registration Fee at the time of purchase of a land/building subject to the company putting up the facilities to commence the operations within three years from the date of the transaction.
- No stamp duty will be levied in respect of transfer of lands acquired by Government or alienated by Government to state agencies or their subsidiaries for promotion of IT/ITES parks.
- IT units setup in a Government park or that set up by a Government PSUs such as ELCOT/SIPCOT/TIDCO/SIDCO would be eligible for 50% exemption from stamp duty on lease sale or mortgage of land meant for IT use as well as on lease of new ready built IT space.

Administrative incentives

IT companies will be permitted to self-certify that they are maintaining the registers and forms as contemplated under - Tamil Nadu Shops and Establishments Rules, Tamil Nadu Payment of Gratuity Rules, Tamil Nadu Maternity Benefit Rules, Contract Labour Act, Payment of Gratuity Act, Tamil Nadu Industrial Establishment (National and Festival) Holidays Act, 1958.

ESDM research centers

Through this policy, the government aimed to promote a center of excellence in chip and electronic hardware design in Anna University in collaboration with the electronic industry. Also, a nano-technology research center was planned to be set up in Bharathiar University.

R&D promotion

Capital goods to be used in setting up hi-technology R&D centers would be exempted from entry tax and VAT would be zero rated. The condition is that such capital goods shall not be used for commercial production and be used exclusively for R&D.

Subsidy for patent filing

All technology innovators or stand-alone R&D units shall be reimbursed 50% of the cost of filing patents, cost of registration and first time maintenance fee of the granted application, subject to a maximum of INR 0.2 million.

Investment promotion grant

Reputed industry associations will be offered a back-ended subsidy of 50% of the cost of land or INR 10 million, whichever is less, for setting up international exhibition-cum-convention centers.

Gujarat[xxviii]

Gujarat government unveiled IT Policy 2006-2011 in November 2006 with an objective to attract investments in the IT sector in the state and to promote and develop employment opportunities in the IT sector. In the following sections, IT units include IT services/software/ITeS as well as IT products units involved in the manufacturing of computer, digital-data communication and digital data broadcasting products.

Mega projects

The government considered granting special package of incentives for mega IT projects. The mega projects will be decided on a case-to-case basis and will be defined on the basis of employment created (more than 1,000 in the case of IT units) and investment made (INR 500 million at the time of formulation of the policy).

Infrastructure incentive for the creation of IT Parks

- **Fiscal incentive:** Under the policy, developers of IT parks are entitled for a financial assistance of 50% of fixed capital investment in land, buildings and infrastructure facilities up to a maximum of INR 25 million.
- **Stamp duty exemption:** The developer of the IT Park will be entitled for a 100% exemption of stamp duty on purchase of land. However, the IT units in the said IT park will be required to pay the stamp duty at 50%.This exemption will be limited to first sale only.

Electricity duty exemption

All new IT units and captive power units set up by eligible IT units will be entitled for a 100% exemption from the payment of electricity duty for a period of 5 years from the date of commencement of operations. IT units will also be eligible to receive uninterrupted power supply.

Incentives related to statutory regulations

- Women workers shall be allowed to work 24*7 operations with 3 shifts per day subject to the conditions fulfilled by the employers relating to women workers' security and safety at the work place and during the transit.
- IT Units shall be permitted for self-certification of the registers and forms as contemplated under various following Acts viz Payment of Wages Act, Minimum Wages Act, Employees State Insurance Act, etc. and shall also be allowed to maintain unified register and record instead of maintenance of different registers and records under different Labour Acts.

Special venture fund for IT units

Gujarat government set up Gujarat IT fund for the development of IT units in the state. The fund was started with a corpus of INR 240 million at the time of formulation of the policy.

Comparison of incentives across state policies

	Karnataka	West Bengal	Tamil Nadu	Andhra Pradesh
Capital subsidy	Capital subsidy upto INR 50 million or 10% of the total investment (whichever is lower) and will be provided to first two anchor units in each greenfield EMC.	12%-15% of the fixed capital investment depending on location; subject to a maximum of INR 45 million payable in 5 equal yearly instalments.	Back ended capital subsidy of INR 3 million-15 million based on investment in fixed assets and number of persons employed; IT units located within specified SEZs will be provided an additional 50% capital subsidy over and above the eligible limit.	10% subsidy on capital equipment for technology upgradation.
Interest subsidy	Available to an extent of 5% to micro enterprises for a period of 3-5 years depending on location.	25% of annual liability on term loan borrowed for an approved project and INR20,000 or one month salary, whichever is lower, to a maximum 750-1,000 candidates subject to a ceiling of INR 15-20 million per year for 5 years depending on location.	NA	3% interest rebates limited to INR 0.5 million for 5 years
Training subsidy	NA	25% of annual liability on term loan borrowed for an approved project and INR 20,000 or one month salary, whichever is lower, to maximum 750-1,000 candidates subject to a ceiling of INR 15-20 million per year for 5 years depending on location.	NA	50% reimbursement on cost involved in skills upgradation and training local manpower limited to INR 2,000 per person.
Stamp duty waiver	Exemption on stamp duty to range between 0%-100% depending on location; Registration charges for loan documents and sale deeds to be charged at a nominal rate of INR 1 per INR 1,000 transaction.	100% refund of stamp duty and registration fee for purchase of land and building for setting up the project.	50% exemption from the Stamp Duty and the Registration Fee	100% reimbursement of stamp duty, transfer duty and registration fee paid on sale/lease deeds/mortgages/hypothecations on the first transaction (50% in case of second transaction)
Preferential market access	PMA for procurement of electronic products by government departments manufactured by the companies registered and engaged in	Govt. is considering a review of existing procurement policies in the state, so as to give a preference to local manufacturers in its procurement of hardware.	NA	Govt has reserved 20% of order value to electronics hardware SMEs in State government promoted projects.

	manufacturing in Karnataka. Value addition as % of BOM to increase from 25% in Year 1 to 45% in Year 5.			
ESDM specific fund	Plans to set up a fund in collaboration with GoI and other public/private financial institutions to provide money for startup, growth and debt/capital needs of semiconductor design companies.	NA	NA	Plans to set up a fund in collaboration with GoI to promote design, manufacturing, assembling and packaging businesses.
Incentives for filing patents	Reimbursement of upto 50% of actual filing costs subject to a maximum of INR 100,000 for domestic and INR 500,000 for international patents.	MSME IT units shall be reimbursed 50% of the cost of filing patents subject to a maximum of INR 0.5 million per year	All technology innovators or stand-alone R&D units shall be reimbursed 50% of the cost of filing patents subject to a maximum of INR 0.2 million.	Companies to be reimbursed 50% of the cost of filing patents subject to a maximum of INR 0.5 million (except large enterprises)
CST exemption	For inter-state sales, Karnataka government will reimburse 95% of CST, till GST is implemented, paid by the eligible ESDM units during the first five years of their operations	100% refund of CST until the abolition of CST or 5 years, whichever is earlier.	NA	100% tax reimbursement of VAT/CST or CGST, for new units started after the date of issue of the state policy, for a period of 5 years from the date of commencement of production for products made in AP and sold in AP
Incentives for marketing activities	Reimbursement of 50% of the actual costs (subject to a maximum of INR1 million per year per company) for international marketing and promotion expenses.	NA	Industry associations will be offered a back-ended subsidy of 50% of the cost of land or INR 10 million, whichever is less, for setting up international exhibition-cum-convention centers.	Reimbursement of 50% exhibition subsidy for participating in national/international exhibitions
Power subsidies	NA	NA	NA	Subsidy of 10%-50% depending on location and type of unit (large/medium/small) for a period of 5 years from the date of commencement of operations subject to a maximum of INR 3 million
Land/Office space at concessional rates	NA	NA	NA	25% rebate in land cost limited to INR 1 million in industrial estates, industrial parks, SEZs, hubs and clusters; 25% subsidy on lease rentals of up to INR 0.5 million per annum for a maximum period of three years.

Electricity duty waiver	100% exemption on electricity duty for 3-4 years depending on location	Complete waiver for a period of 5-7 years depending upon location	Exemption of electricity tax for a period of 2-5 years based on investment in fixed assets and number of persons employed	NA
Others	1. The government will support development of seven EMCs in the state by 2020 by providing additional incentives on top of those offered by GoI. 2. Interest free loan against the eligible gross VAT for sales within Karnataka	1. In case of mega projects, the government may consider granting special package of incentives. 2. Govt to provide suitable land sites and building of necessary infra for fabs. 3. Govt. to develop 15 clusters for SME units in cities such as Kolkata, Falta, Kharagpur etc.	1. New IT units (as well as expansion projects) being setup in Chennai, Tiruvallur and Kancheepuram districts with an investment in eligible fixed assets of over INR2.5 billion in a period of 3 years would be eligible for a structured package of incentives to be decided on a case-to-case basis. In case of any district other than these three districts, the minimum investment will be INR 1.5 billion in a period of 3 years.	1. The first five anchor electronics hardware companies employing more than 100 employees in tier-II and III cities are entitled to receive subsidy of INR 1 million. 2. A special package of incentives to priority projects in the ESDM sector. These companies should have a present employment of more than 100, existing investment of more than INR 100 million and turnover of more than INR 200 million for the last three years and projected employment of 500. 3. The state will create 4 hubs in and around Hyderabad consisting of 300 acres of multiproduct electronic SEZs and another 200 acres for the electronic industry.

	Madhya Pradesh	**Gujarat**	**Maharashtra**	**Uttar Pradesh**
Capital subsidy	Small scale units having fixed capital investment of more than INR5 million will be given special subsidy 25% subject to a maximum of INR 3 million. In case of medium scale enterprises, a special subsidy of 25% subject to a maximum of INR 1.2-3 million will be provided depending on the location.	NA	NA	NA
Interest subsidy	3%-5% interest subsidy for a period of 5-7 years subject to a maximum amount of INR 1-2 million based on type of enterprise (micro/small/medium) and location within the state	NA	NA	New IT units will be reimbursed the amount of interest at the rate of 5% payable on term or working capital loan taken by them for a maximum period of 5 years from the date of commencement of operations.
Training subsidy	One time reimbursement upto 50% of the cost incurred (subject to maximum of INR 10,000 per employee) to the companies for providing skill gap trainings to the engineers that are domicile	NA	NA	NA

	of Madhya Pradesh and are trained by the company within first two years of commencement of operations.			
Stamp duty waiver	Exemption of stamp duty and registration fee for purchase/lease of space in IT investment area and stamp duty on mortgage/hypothecation with financial institutions.	IT Park developer will be entitled for a 100% exemption of stamp duty on purchase of land. IT units in the said IT park will be required to pay the stamp duty at 50% (limited to first sale only)	Eligible units will be entitled for 75%-100% stamp duty exemption depending upon location in the state	100% exemption of stamp duty for purchase of land and building for setting up the project, with the condition of commencing operations within three years in Tier II/Tier cities.
Preferential market access	NA	NA	NA	NA
ESDM specific fund	NA	No ESDM specific fund, but the govt set up Gujarat IT fund with a corpus of INR 240 million at the time of formulation of the policy.	NA	NA
Incentives for filing patents	Full reimbursement for the cost of filing patents subject to a maximum of INR 0.2 million	NA	All MSME IT enterprises in the state shall be reimbursed 50% of the cost of filing patents subject to a maximum of INR 0.5 million.	NA
CST exemption	NA	NA	NA	NA
Incentives for marketing activities	NA	NA	NA	NA

Power subsidies	NA	NA	Extent of INR 0.5-INR 1 per unit depending upon location (except area A and B)	NA
Land/Office space at concessional rates	Land will be made available by the govt at the rate of 25% of the prevalent Collector guideline rate. Area allotted to be decided on the basis of project cost.	NA	Government to provide land at 25% of the prevailing rates for the IT units being set up in Maharashtra Industrial Development Corporation (MIDC) area in Low-HDI districts	The land will be made available at the rebate of 25% on the prevailing sector rates on purchase of land from state agencies.
Electricity duty waiver	NA	100% exemption from the payment of electricity duty for a period of 5 years from start of operations.	Eligible new units entitled to exemption from payment of electricity duty for 10 years.	Exemption in Electricity Duty is available to new units for 10 years and to pioneer units for 15 years.
Others	1. Electronics hardware manufacturing units shall be exempted for the payment of Entry tax for a period of 5 years. 2. Assistance of 15% of the expenditure incurred by private sector on the establishment/development of industrial/high-tech parks subject to a maximum of INR 50 million	1. The government considered granting special package of incentives for mega IT projects. The mega projects will be decided on a case-to-case basis and will be defined on the basis of employment created (more than 1,000 in the case of IT units) and investment made (INR 500 million at the time of formulation of the policy). 2. Developers of IT parks are entitled for a financial assistance of 50% of fixed capital investment in land, buildings and infrastructure facilities up to a maximum of INR 25 million.	1. Industrial promotion subsidy payable is calculated at the rate of 60% to 100% of VAT on local sales + CST payable + 0% to 100% of ITC payable on finished products	1. All new IT units to be set up in the state with fixed capital investment of INR 50 million or more, will be provided the facility of interest free loan, from the date of first sale up to 10 years, equivalent to the sum of VAT and CST deposited by industrial units or 10% of the annual turnover whichever is less.

4.2.3. Leading practices from other economies

Israel

Evolution of high-tech industry through support of government programs

During 1990s, Israel was facing a challenge to develop new enterprises especially in the high-tech sector in the country. The Government of Israel addressed the difficulties in raising money for projects or companies at their infancy stages through the Yozma and the Technological Incubators (TI) programs.

Both these programs were set-up and run under the guidance and with the support of the Office of the Chief Scientist (OCS) of the Ministry of Industry and Trade of Israel. These programs have been instrumental in the development of Israel as a major center of hi-tech entrepreneurship.

► **Yozma program**

Until the mid-1980s, all funds that were available for start-ups in Israel came from government sources. In 1991, the government worked on the idea that the participation of government in the risks involved in the venture capital (VC) activity will encourage private money (especially from foreign investors) to enter Israeli VC industry. To achieve this, the government established a wholly owned Yozma Venture Capital Company in 1993 with a total capital of US $100 million.

The aim of this company was to enter into partnership with other VC companies as well as investors from the private sector. The program led to the creation of several new VC companies that had a specific mandate to invest in start-up high-tech companies that were engaged in the development of exportable products and were considered having strong growth potential.

Yozma invested a sum of US $8 million in the individual VC companies or up to 40% of the VC companies' own capital. The government offered lucrative incentives to private investors to enter into this partnership by giving them an option to buy the government (Yozma) shares under pre-determined and favorable conditions.

This program resulted in formation of 9 VC companies with a total capital of US $200 million in a period of three years of operation (1993–1995). These VC companies invested in 130 start-up companies. After achieving its desired objectives, Yozma was privatized in 1997 and is now no longer a government-run program.

► **Technological incubators program**

The technological incubators (TI) program was launched in 1990 and within three years of operation established 28 incubator organizations throughout the country. Currently, the technological incubators in Israel carry out approximately 200 R&D projects at any given moment. 12 of the existing incubators were privatized, with the intent to enhance the involvement of private investors in the incubator's activity.

These incubators enable new entrepreneurs, with innovative concepts, to translate those ideas into commercial products and to establish their own company. Each of these has an annual budget of US $30 million. The incubators support the earliest stages of technological entrepreneurship that are not yet ready for private investors (such as the VC funds) thereby preventing commercially viable technological ideas from going waste due to lack of resources. Since the TI program is more focused to support projects at their inception stages, the involvement of the government is more intensive.

The TI program provides entrepreneurs with the following benefits:

- R & D grants
- R& D infrastructure
- Business guidance
- Administrative assistance

The R&D grant provides 85% of the approved R&D expenditures (upto US $300,000–US $500,000 for two years), with the remainder to be raised by the entrepreneur.

In return, the businesses have an obligation to pay back in the form of royalty, in case of commercial success only. The royalties are being paid from the income generated from the sales of the new product at a rate of 3% of the annual sales, and the total amount paid is up to a ceiling of 100%.

Present state of government incentives

Technology incubators program is still in existence ever since its beginning in 1990. Currently, there are 23 technological incubators in Israel. After privatization, Yozma continues to operate as an independent VC company.

In addition to the above mentioned programs that were initiated by the Office of the Chief Scientist, the government also runs the following programs presently:

- **HEZNEK program – seed fund**

The government has launched HEZNEK seed fund through which the government matches a private investor's (VC company) investment in the share capital of a seed company. This new vehicle has been initiated to provide a positive signal to private investors, thus mobilizing funds for the establishment of start-up companies.

Criteria for government investment

- The government has defined a start-up as a company that has been in existence for 6 months or less, and has not incurred more than US $250,000 in expenses since its establishment.
- The government's investment will not exceed US $1 million over two years and 50% of the start-up's working program.

Incentive to VC companies

The major incentive offered by government to the private investors is that they have an option to buy-out the government's stake at any time within the first seven years in exchange for the investment amount plus interest and cost-of-living linkage.

- **TNUFA program – pre-seed fund**

Through TNUFA program the Government of Israel encourages and supports technological entrepreneurship and innovation by assisting individual inventors and start-up companies during the pre-seed stage.

Support includes the following:

- Assistance in evaluating the concept's technological and economic potential
- Patent proposal preparation

- Prototype construction
- Business plan preparation
- Establishing contact with the appropriate industry representative and attracting investors

The government provides grants upto 85% of approved expenses to a maximum of US $50,000 for each project.

- **R&D fund**

OCS runs an R&D fund which is open to all Israeli registered firms wishing to engage in technological research and development. The government provides grants up to 50% of the total approved R&D expenditures. These grants are a ‘conditional loan’ – in case of a technological and commercial success, it is subject to royalties (3%–5% of the sales); in case of non-commercialization no repayment is required.

China

China, in its 12th Five-Year Plan (2011-2015), has included several preferential taxes, fiscal and procurement policies designed to develop seven Strategic Emerging Industries (SEIs), which will become the backbone of the country's economy in coming years. Information Technology industry (which includes electronics industry) has been chosen as one of these SEIs.

In terms of electronics manufacturing, over the next five year period, China plans to enhance its global competitiveness by optimizing industry structure, eliminating outdated production capacity and improving indigenous innovation capability. To achieve this, the government plans to invest heavily in science and technology R&D in order to bring about key breakthroughs in targeted technology subsectors, such as core electronic devices, integrated circuits and nanotechnology.

The 12th Five-Year Plan targets following structural adjustments for the electronics industry:

- Increased R&D level
- Enhanced product development capabilities, such as hardware and software designs
- Development of high-end/upstream supply chain

The main incentive offered to new high technology enterprises is a 15% preferential corporate tax rate. In addition, there is a geographically based incentive for new high technology enterprises which offers a two-year tax holiday followed by three years of tax levied at 12.5% rate. This incentive is in addition to 15% preferential rate that applies to all new high tech enterprises.

Tax incentives for display devices industry

In order to further encourage and promote the development of the new display devices industry, Chinese government has approved that tax concessions be granted from 1 January 2012 to 31 December 2015 to materials imported by Chinese enterprises producing new display panels including TFT-LCD, plasma and OLED.

As per the policy, enterprises in China manufacturing new display panels importing raw materials and consumables for their own production (including R&D) and where such materials are not produced locally are exempt from import tariffs, but are subject to import VAT according to the relevant tax rules.

Tax incentives for integrated circuit (IC) manufacturers

The government considers IC industry as one of the key emerging industries. Recognized IC manufacturers making ICs with a line width of 0.8 micron or smaller are exempt from enterprise income tax in the first two profit-making years, while a tax rate half of the prescribed 25% will be levied in the subsequent three years (known as the "two-year exemption, three-year reduction policy").

For recognized IC manufacturers producing ICs with a line width smaller than 0.25 micron or those with an investment amount of over RMB8 billion, a reduced enterprise income tax rate of 15% will be levied. Of these enterprises, those with an operation period of over 15 years will be exempt from enterprise income tax in the first five profit-making years and levied a tax rate half of the prescribed 25% in the subsequent five years (known as the "five-year exemption, five-year reduction policy").

Tax incentives for R&D activities

The Chinese government provides R&D tax incentives to high and new technology enterprises. The enterprises which own the intellectual property of the key technologies of their products are eligible for a reduced corporate income tax rate of 15% (as against the normal rate of 25%) for three consecutive years.

In addition, the companies engaged in R&D activity for the production of new technologies, products, or techniques are eligible for following benefits:

- 150% tax deduction on qualified R&D expenses (super deduction) that are incurred during the year if the expenses do not give rise to an intangible asset.
- 150% of capitalized R&D expenses that constitute the cost of the intangible asset.

Taiwan

The Government of Taiwan provides various tax-related and non-tax related incentives for hi-technology industry. The government enacted the Statute for Upgrading Industries (SUI) in 1991. The statute encouraged the hi-technology industry by providing a five-year holiday on corporate income tax, applicable to the entire income for the newly incorporated company, and on incremental income from new construction or expansion for pre-existing and qualifying companies.

The SUI was replaced by Statute for Industrial Innovation (SII) after December 31, 2009. The only tax incentive offered under the SII is R&D credits. According to the SII, the companies may be entitled to a tax credit of up to 15% of the R&D expenditure against their income tax liability. The credit is limited to 30% of the income tax payable for the current year. This incentive is available from January 1, 2010 to December 31, 2019.

Taiwan has also recently reduced its corporate income tax from 25% to 17%, providing a significant incentive to the industry.

The following table compares the incentives available to companies under SII and SUI.

	Statute for Industrial Innovation	Statute for Upgrading Industries
Creditable amount	15% of qualified R&D expenditure of the current year	35% of R&D expenditure of current year and 50% of the portion in excess of the average R&D expenditure in prior two years
Tax credit ceiling	Not exceeding 30% of the tax payable in the current year. Unutilized R&D credits will be forfeited and cannot be carried back or carried forward	The total investment tax credit should not exceed 50% the tax payable in the current year. This ceiling is not applicable in the last year.

Special tax incentives available in science parks, free trade zones, export processing zones

A company may claim certain indirect tax incentives if it is incorporated in a science park, an export processing zone, or a free trade zone. These indirect taxes are in the form of import duty, VAT and commodity tax. The following table enlists the available incentives in these zones.

Items eligible for indirect tax incentive	Science park	Economic processing zone	Free trade zone
Import of raw materials, fuel, supplies, semi-finished materials	0% import duty 0% VAT 0% commodity tax	0% import duty 0% VAT 0% commodity tax	0% import duty 0% VAT 0% commodity tax
Import of machinery	0% import duty 0% VAT 0% commodity tax	0% import duty 0% VAT 0% commodity tax	0% import duty 0% VAT 0% commodity tax
Export of products/services	0% VAT	0% VAT	0% VAT

Purchase of raw materials, fuel, supplies, semi-finished materials from non-bonded area	0% VAT	0% VAT	0% VAT

Tax export incentives or guarantees for exports

The Customs Act in Taiwan has set an Export Tax Rebate System (ETRS) for encouraging exports. It allows the exporters to apply for the offsetting and/or refund of import duties, commodity tax and business tax on the imported raw material processed in Taiwan for exported products. Except for certain restricted raw materials publicized by the government, in general the exporters may apply for offsetting or refund of the duties and taxes in the three types mentioned above on the imported raw materials.

Other government support/initiatives

The Government of Taiwan has taken several initiatives to reduce risks and enhance the competitiveness and innovation capability of businesses engaged in research activities. The government has developed the Hsinchu Science-based Industrial Park (HSIP) following the model of Silicon Valley in the US to create an environment conducive to the development of a high-technology industry.

In order to provide companies with technological and R&D support, the government has established research institutions such as the Industrial Technology Research Institute (ITRI), which has several laboratories that collaborate with private-sector companies to build their research competitiveness.

In terms of non-tax incentives, the government has initiated certain programs to reduce the business operating cost.

- Industrial Technology Development Program (to encourage enterprises to carry out R&D)
- Incentives program for lease and purchase of land in industrial parks
- Low-interest loans for promotion of R&D activities

Thailand

The Thailand government supports the development of the electronics industry through several bodies and tax and non-tax incentives. The government has also recently reduced corporate income tax rate from 30% to 23% in 2012 and to 20% in 2013.

Generally, incentives in Thailand are provided by two organizations; the Thailand Board of Investment (BOI) and the Revenue Department (RD). The BOI provides tax and non-tax benefits mostly to manufacturing companies in certain industries including electrical and electronics, while the RD offers tax incentives to the Regional Operating Headquarter (ROH) which is a Thailand-incorporated company providing managerial, administrative, and technical services as well as other supporting services to its associated enterprises.

Following are the special tax incentives granted to investors in the electrical and electronics sector by the BOI:

Category	Corporate income tax incentives	Other tax incentives
▶ Electronic design: ▶ Micro electronics design ▶ Embedded system design ▶ Manufacture of embedded software	8-year exemption of corporate income tax (without cap)	NA
▶ Manufacture of products, parts, or materials in organics and printed electronics (OPE)	8-year exemption of corporate income tax (with cap)	▶ Exemption from import duties on machinery throughout the period of promotion. ▶ Exemption from import duties on raw materials and components used for producing electronic goods for exports.
▶ Manufacture of hard disk drives and/or hard disk drive parts (except top cover, base plate or peripheral for hard disk drives) ▶ Manufacture of solid state drive and/or solid state drive parts ▶ Manufacture of semiconductors ▶ Manufacture of solar cells and/or raw materials for solar cells ▶ Manufacture of parts and/or photonics equipment ▶ Manufacture of products and/or parts for telecommunication ▶ Manufacture of flexible printed circuits and/or multi-layer printed circuit boards ▶ Manufacture of equipment for solar cell systems: ▶ Solar module ▶ Charge controller ▶ Inverter ▶ Battery (storage) ▶ Manufacture of electronic parts for vehicles and/or scientific equipment and/or medical equipment ▶ Manufacture of material for microelectronics: ▶ Wafer ▶ Manufacture of materials using thin film technology	5-year corporate income tax exemption (with cap)	
▶ Manufacture of digital cameras ▶ Manufacture of flat panel TV and/or flat panel displays ▶ Manufacture of LED electric lamps ▶ Manufacture of passive components ▶ Manufacture of electro-magnetic products	3-year exemption of corporate income tax (with cap)	

► Manufacture of compressor and/or motor for electrical appliances ► Manufacture of printed circuit board assembly ► Manufacture of top cover, base plate or peripheral for hard disk drives ► Manufacture of memory storage equipment ► Manufacture of air conditioners, refrigerators, freezers, washing machines, dryers ► Manufacture of electronic products or parts for offices and/or industry and/or agriculture		

Additional incentives as part of merit-based scheme

The BOI provides additional tax incentives as part of its merit-based scheme which fall under three categories:

R&D (whether it is in-house, cooperation with educational or research institution or donation to Technology and Human Resources Development Fund):

The number of additional years of corporate income tax exemption depends on the percentage of R&D expenditures to revenues:

- 1 % or not less than Baht 150 million, one additional year of corporate income tax exemption
- 2%or not less than Baht 300 million, additional years of corporate income tax exemption
- 3% or not less than Baht 450 million, three additional years of corporate income tax exemption and corporate income tax exemption cap will also be removed.

Environment protection (projects that obtain ISO 14000 certificate, carbon footprint or other standards approved by the BOI):

- One additional year of corporate income tax exemption

Projects located within industrial estates/promoted industrial zones:

- One additional year of corporate income tax exemption

Other non-tax incentives

In addition to the above mentioned tax incentives, the BOI also provides several non-tax incentives such as:

- Land ownership rights for foreign investors
- Permission to bring in foreign experts and technicians
- Work permit and visa facilitation for expatriate employees
- Permit to take out or remit money abroad in foreign currency

South Korea

The Government of South Korea offers tax incentives to attract foreign direct investment in areas of advance technologies which includes electronics manufacturing as well as service industries supporting electronics manufacturing sector. The following table mentions the tax exemptions and deductions for which such foreign investments are eligible.

Type of tax	Incentives
Individual and corporate income taxes	▶ Full exemptions for 5 years ▶ 50% reduction for next 2 years
Local taxes: acquisition tax, property tax and registration tax	▶ Full exemptions for 5 years ▶ 50% reduction for next 2 years(local governments can extend the applicable period up to 15 years)
Customs duties, special excise tax, value-added tax	▶ Full exemption for 3 years on imported capital goods by foreign invested companies

Cash grants for investment in high-tech industry

The government has put in place a cash-grant program since 2004 to attract manufacturers of high-tech parts and materials that have substantial impact on the addition of high value to the final product, or those engaged in the manufacturing industries of R&D equipment.

Greenfield investments, both new and additional, in which a foreign investor has an ownership stake of 30% or more and which meet the following criteria are eligible for these grants:

- High-tech and industry support services: FDI exceeding US $10 million
- Parts and materials: FDI exceeding US $10 million
- R&D centers: FDI exceeding US$5 million with a research workforce exceeding 20 persons

Following activities are eligible for these grants:

- Land acquisition and rental fees
- Construction costs
- Purchase of capital goods and R&D equipment
- Provision of utilities (electricity and communications)
- Subsidies for employment and training

The minimum amount of grant received is 5% of FDI.

Other incentives to foreign investors

The government has created exclusive industrial complexes for foreign corporations engaging in investment in Korea which allow several incentives. Incentives available to companies in these complexes include exemption from or a discount on lease charges, financial subsidies for the development of industrial technology (the capital goods development cost) and industrial base fund support (plant refurbishment and upgrade expenses, replacement cost of old facilities and purchase cost of facilities and equipment).

Foreign companies shall satisfy the following two conditions to get space in these complexes:

- These should be engaged in the production of high technology products which has attained the New Technology (NT) mark under the Industrial Development Law.
- The ratio of the foreign ownership above 30% in case of joint venture company or foreign investment wholly-owned by the foreign corporations.

4.2.4. Case studies on how other manufacturing locales have been created – global

Hsinchu Science Industrial Park (Taiwan)

Hsinchu Science Industrial Park (HSIP) was the first government planned industrial park in Taiwan focused on production of high-technology goods. Modeled on the Stanford Industrial Park in Palo Alto, California and nicknamed as Taiwan's "Silicon Valley", the park was established in 1980 to stimulate indigenous technological advancement and reduce dependence on foreign technology suppliers. The government convinced expats working in the US to come back and build companies in Taiwan just as had been done in the Silicon Valley. The HSIP has since then become a major base for the development of high-tech electronics industry in Taiwan.

Incentives offered to the companies

A series of special investment incentives was launched to ensure successful development of HSIP including:

- Five-year tax holiday
- A maximum income tax rate of 22%
- Duty-free imports of machinery, equipment, raw material and semi-finished products
- Venture capital from the state
- Low interest loans
- Reduced land rent
- No limits on foreign equity
- Capitalization of investors' patents and know-how as equity shares

These incentives contributed around 26% of an individual investor's outlay.

In addition to these incentives, the government also directly entered into industrial production, establishing joint venture companies with private capital.

As a result of this major boost, Taiwan's electronics companies were able to promote their own brand names and conduct their own R&D, while maintaining strong strategic alliances with foreign corporations.

The HSIP houses many Taiwanese heavyweights such as Taiwan Semiconductor Manufacturing Company (TSMC) and United Microelectronics Corp. (UMC) — the world's two largest contract chip-makers.

Industries within the park

The industries run in HSIP consist of:

- Integrated circuits (IC)
- Computers and peripherals
- Telecommunications
- Optoelectronics
- Precision machinery and materials
- Bio-technology

These industry groups form a self-sufficient, closely integrated value chain — from R&D to mass production.

Among these, the IC or semiconductor industry accounts for more than 50% of the park's total revenue. These IC companies focus on producing dynamic random access memory (DRAM) and

static random access memory (SRAM) chips and on the development of foundry services for application-specific electronic modules and systems-in-package. Firms involved in related sectors such as materials, design, testing and packaging provide support for IC manufacturers, forming a complete upstream and downstream production system.

Location advantage

The park was set-up close to the primary public R&D facility in Taiwan – the Industrial Technology Research Institute (ITRI) – as well as the campuses of the two leading technology-focused universities, National Chiaotung University and National Tsinghua University. This was a major positive for the companies as they could leverage R&D facilities and innovations emanating from ITRI as well as were assured of supplies of skilled professional staff from these universities. In addition to these, the government also established a number of national labs at the Hsinchu Science Park including National Center for High-performance Computing, National Space Organization, National Chip Implementation Center, National Nano Device Laboratories, Instrument Technology Research Center and National Synchrotron Radiation Research Center. These research centers and labs cooperate closely with industries inside the park in technology innovation and talent cultivation.

Evolution of the ecosystem

In the first decade of its existence, IT and PC assembly firms were the primary occupants of the park. While these companies enjoyed advantages of a shared labor pool, shared utilities and shared infrastructure, they were lacking opportunities in terms of economies of scope through inter-dependence. But in the 1990s, Taiwan government took active steps to promote the creation of a semiconductor industry (including large fabricators plus upstream IC design firms and suppliers) in Hsinchu. Also during the second decade, a related industry of flat panel display fabrication came up in Hsinchu. Following these, the solar photovoltaic industry emerged as a 'third pillar' of Taiwan's high-tech industrialization efforts in 2000s. The success of these industries is primarily attributed to their clustering in Hsinchu, closeness to ITRI and to the universities.

Development of other science parks

Following the success of the first park in Hsinchu, the government established the Southern Taiwan Science Park, consisting of the Tainan Science Park and the Kaohsiung Science Park in 1996. In addition to companies, several research institutes and universities have set up branches within the park. The Central Taiwan Science Park was established more recently in 2003. The companies in these parks focus on ICs, biotechnology, food and health sciences, TFT-LCD flat panel displays and optoelectronics.

Pearl River Delta (China)

The Pearl River Delta economic zone (PRD) is one of China's leading manufacturing centers. The zone is formed by 9 cities – Guangzhou (the provincial capital), Shenzhen, Foshan, Zhuhai, Jiangmen, Zhongshan, Dongguan, Huizhou and Zhaoqing. Covering less than 1% of China's total land area and less than 4% of its population, the nine cities in the PRD region account for almost 10% of China's GDP, almost 20% of its foreign direct investment (FDI), and a quarter of its trade.

In early 1980s, the PRD started producing labor-intensive consumer goods such as food and beverages, toys and clothes. After 1985, industrial relocation, mainly from Hong Kong, accelerated the growth of light industry in PRD until early 1990s, following which heavy industry featuring hi-tech electronic equipment and machinery started developing in the region.

Currently, the PRD, the Yangtze River Delta (YRD) and the Bohai region constitute the three traditional and largest electronics clusters in China, together accounting for over 85% of China's electronics industry sales. While the PRD focuses on assembly businesses of consumer electronics and computer items like printers and accessories, the YRD and Bohai concentrate more on relatively capital-intensive production, such as integrated circuits and computers.

In the PRD, the east bank focuses on electronics and IT products while the west bank is focused on household appliance products. Following table illustrates the electronics and IT clusters in different cities of the PRD:

City	Clusters
Guangzhou	► Electrical products ► Electronics
Shenzhen	► Electronics ► Computer products ► Telecom products ► ICs
Dongguan	► Electronics ► Computers and peripherals
Huizhou	► Laser diodes ► Digital electronics ► CD-ROMs ► Circuit boards

Government incentives and support

There are currently three complementary plans guiding the development of the PRD region:

- China government's national 12th Five-Year Plan
- Guangdong government's provincial 12th Five-Year Plan
- The National Development and Reform Commission (NDRC) also issued the "Outline Plan for the Reform and Development of the Pearl River Delta (2008-2020)"

While the provincial plan acts as a supplement to and detailing of the national plan, the Reform and Development Plan, which was approved by NDRC in 2008, takes a longer-term approach of the PRD's development up to 2020.

The NDRC plan includes a wide range of measures to improve the region's innovative capacity and skill levels, emphasis on firm-based development, and links with the rest of the world. By 2020, the NDRC envisions the PRD region to move up the value chain, to foster advanced manufacturing and high technology industries, to develop globally advanced capabilities in scientific innovation, and to build strong modern service sectors. The plan also calls for greater autonomy in economic decision-making for the region, the acceleration of infrastructure construction in the region and closer economic links with Hong Kong and Macao.

During the 11th Five Year Plan, the China government chose Guangdong province and the PRD region to play a leading role in innovation, knowledge, and creativity-based economic development. In order to support innovation in Guangdong province, a large number of high-level research and advisory programs were set up. At the city level, the Guangzhou government allocated nearly US $144 million per year in spending to encourage scientific and technological innovation.

Other factors contributing to success of the PRD region

The PRD's huge success in electronics manufacturing can be attributed to the cluster effect. This has resulted in development of supply chain where it is convenient to source all parts, components and accessories of a product, so that orders could be completed quickly. Clustering of upstream and downstream industries has resulted in consolidation of resources, enhanced specialization and efficiency as well as reduced cost.

In addition to this, the PRD has built strong infrastructure facilities in terms of complete network for water, land and air transportation to further boost the industries in the region. Cities in the PRD are interconnected by highways and railways. The region has also built excellent ports facilities, including coastal ports and ports of inland rivers, which play a critical role for transporting manufactured goods abroad. There are 6 airports in the PRD as well.

4.2.5. Case studies on how other manufacturing locales have been created – India

Case study – Chennai manufacturing cluster[xxix]

Chennai has emerged has a prominent electronics manufacturing cluster in India. The city which was long known for its automotive manufacturing hub, has seen tremendous rate of development of electronics manufacturing in last decade. Along with Chennai, its suburb Sriperumbudur (located 40 km west south-west of Chennai) has also got developed into a major electronics production hub.

The table below provides an indicative list of major electronic hardware manufacturing companies that have set up their operations in Chennai and neighborhood.

Company	Location	Products
Nokia India	Nokia Telecom SEZ	Mobile handsets
Flextronics India	Sriperumbudur Hi Tech SEZ	Electronic hardware and mobile phone components
Foxconn India	1. Sriperumbudur Hi Tech SEZ 2. Nokia SEZ	Electronics hardware and mobile phone components
Samsung	Sriperumbudur Hi Tech SEZ	Electronic consumer durables
Motorola	Sriperumbudur Hi Tech SEZ	Mobile handsets
Dell	Sriperumbudur Hi Tech SEZ	Computers
Sanmina SCI	Oragadam Hi Tech SEZ	Electronic hardware
Nokia Siemens Networks	Oragadam Hi Tech SEZ near Chennai	Mobile handsets and communication networks
Salcomp (Finland)	Nokia Telecom SEZ	Mobile handsets components
Perlos (Finland)	Nokia Telecom SEZ	Mobile handsets components
Jabil Circuits	Nokia Telecom SEZ	Mobile handsets components

Nokia's Chennai plant is the world's largest mobile handsets manufacturing project. The company is one of the major exporters of electronic hardware from India. The company signed an MoU with Tamil Nadu government in April 2005 for establishing one plant for manufacturing mobile handsets with an investment of INR6.75 billion. As a result of the highly supportive government policies, the company went on to establish two more plants between 2007 and 2009.

Ecosystem creation

Nokia, which was one of the early entrants in Chennai for electronics manufacturing, has played a vital role in attracting its partners in manufacturing value-chain, including Salcomp and Perlos, to the region. Similarly, some of its other suppliers such as Laird and Jabil Circuits also established factories in the Nokia Telecom Park in Chennai. This helped in development of an electronics manufacturing

ecosystem in the region. Several factors were responsible for the creation and success of the Chennai cluster:

Factors driving development of electronics cluster in Chennai

Talent availability: Tamil Nadu provides abundant supply of highly skilled and unskilled labor. The state has some of the best engineering colleges in the country churning out quality talent. Chennai itself has a large reserve of technical talent that attracts companies to this region.

Excellent airport and sea port logistics[xxx]: In terms of air connectivity, Tamil Nadu has six airports, with three of them international airports – Chennai International Airport, Tiruchirapalli International Airport, Coimbatore International Airport and three domestic airports at Madurai, Salem and Tuticorin. Also, the GoI is in the process of developing an international airport at Sriperumbudur with air cargo complex.

In addition, there are major ports in Tamil Nadu, including Chennai which provides an efficient gateway for imports and exports.

Road infrastructure[xxxi]**:** Chennai is primarily connected with four national highways: Kolkata (NH5), Bengaluru (NH4), Thiruvallur (NH 205), and Trichy (NH 45).

Favorable government policies[xxxii]**:**

In 2007, the state government announced the Industrial Policy 2007 which focused on stimulating further industrial development, attracting investment and facilitating new manufacturing capacity in the state. As a part of the policy, the government offered an attractive structured package of support (to be decided on a case-to-case basis) to electronic hardware units for new and expansion projects. The eligibility for the package was a minimum investment of INR 2.5 billion in eligible fixed assets within a period of 3 years in respect of Chennai, Tiruvallur and Kancheepuram districts. The eligibility in respect of other districts was a minimum investment of INR 1.5 billion in eligible fixed assets within a period of 3 years.

The government provided a back-ended state capital subsidy and electricity tax exemption on power purchased from Tamil Nadu Electricity Board or generated and consumed from captive sources for all manufacturing units.

The government exempted stamp duty levied in respect of transfer of lands acquired by the government or alienated by government to state agencies or their subsidiaries for promotion of industrial parks.

The government also decided to take steps to upgrade infrastructure facilities in all industrial clusters, including water supply, power, communication, roads, railways, etc. in order to improve the competitiveness of industry.

The government also decided to develop a land bank of 10,000 acres for industrial parks over a period of five years to supply adequate land to manufacturing for high technology industries. The parks would have quality infrastructure facilities, including social infrastructure such as skill development centers, housing, business centers, financial services, schools and hospitals.

It was thus a combination of factors – investment-friendly government policies, good infrastructure, proximity to a large port and airport in Chennai, and availability of talent, that resulted in development of electronics manufacturing cluster in Chennai.

Case study – Noida SEZ[xxxiii]

Noida Special Economic Zone, a multi-product SEZ, was set up in 1985 and is spread over 310-acres of land. It is the only Central Government SEZ in the northern India. Presently, the zone has more than 335 operational units, employing approximately 45,000 people. Total investment in the SEZ as on 31 March 2013 was INR 41.8 billion (government – INR 10.6 billion, private – INR 29.7 billion and FDI – INR 1.5 billion).

Sound infrastructure facilities

The SEZ offers excellent infrastructure facilities and supporting services to the units operating in it. For communication infrastructure, BSNL has a high capacity telephone exchange in the zone. Also other major telecom operators are also providing data and voice communication facilities in the zone. There is an independent feeder line for providing uninterrupted power supply to the units. Presence of a customs wing ensures prompt and on the spot clearances of export/import consignments. The zone also has sector specific infrastructure such as high-speed satellite data link facility for software exports. In terms of talent availability, the zone has access to both unskilled as well as highly skilled manpower (engineering/Ph.D. talent) for different sectors as a result of its proximity to National Capital Region (NCR).

Factors leading to success of Noida SEZ

At the time when the SEZ was set up in Noida, there was no existing cluster of electronics units operating in Noida. The positive factors that led to success of this SEZ were – presence of an administrative office of Noida authority through which the government officials were readily accessible, quick turnaround time in paper work and overall business friendly attitude. This assumed more importance at a time when there used to be a lot of bureaucratic procedure involved in setting up business units in the country. In addition to this, a major support was also extended by financial institutions that helped new businesses with their loan requirements for working capital and plant & machinery. The convergence of all these factors led to success of Noida SEZ.

ESDM exports from the SEZ

Electronics hardware is one of the major sectors in the SEZ. The table below indicates the total ESDM exports from the zone over the last five years.

ESDM exports from the Noida SEZ (INR million)

2008-09	2009-10	2010-11	2011-12	2012-13
2,342.7	3,977.6	8,706.9	9,240.5	12,106.9

5. Module II – Location analysis: Odisha as an ESDM destination

Odisha reported an average annual growth rate of 8.23% for the 11th five year plan (at 2004-05 prices). With its rich mineral base and long coastline it is one of the preferred investment destinations for both domestic and foreigner investors. As per an RBI report (Odisha top investment destination in India, 2013), it has emerged as the hottest destination for new projects with a commitment of INR 530,000 billion in investments, 27% of all India investments.

Odisha's industrial base comprises of large, medium and small scale enterprises in steel, aluminum, power, textile and other sectors. Large scale units are mainly mineral based. Some of the leading investors in the metal sector are POSCO, Tata Steel, Jindal Group, Essar Steel, Hindalco, Nalco, Vedanta, Aditya Aluminium etc.

The state is well connected with various strategic points through its 22,364 kms of rail route and 55,000 kms of roadways. A domestic airport is located at Bhubaneswar which is well connected to cities like Delhi, Bangalore, Chennai, Kolkata and Hyderabad. A number of engineering colleges, polytechnics and management institutes provide a strong base of qualified skilled and semi-skilled workforce to get deployed across industries.

The ESDM industry is at a nascent stage in the state. There are a few players who offer R&D services to their clients' base in the US and Europe.

5.1. Availability of industry specific infrastructure for ESDM/Electronics sector

An extensive and good quality infrastructure is the prime requirement for development of ESDM sector in the state. The sections below assess the infrastructure of Odisha on various parameters.

5.1.1. Availability of water resources

Water is an essential component used in electronics manufacturing and other operations in the ESDM industry. Odisha has abundance of water available through its extensive network of rivers and streams. Average annual rainfall in the state is 1452 mm; under normal conditions state receives annual precipitation of about 230.76 billion cubic meters (BCM) of water. Average annual availability of surface water is estimated at 120.39 BCM, out of this the yield from its own drainage boundary is 82.84 BCM and rest is inflow from neighboring states through interstate rivers. As of March 2012, Odisha has a storage water capacity of 17 BCM.

As per the water assessment 2008-09, Odisha has ground water resources of 16.69 Lakh Ha M; out of which 4.36 Lakh Ha M has been explored for various usage.

Ground water resources and sectoral utilization

Basins	Net ground water resources (HM)	Annual ground water utilization				% utilization
		Irrigation	Domestic	Industrial	Total	
River basin						
Mahanadi	685477	123278	35730	3809	162817	23.75
Brahmani	198033	44296	8543	2376	55215	27.88
Subarnarekha	59855	17412	2055	443	19910	33.26
Baitarani	167215	52467	5366	2889	60722	36.31
Budhabalanga & Jambhira	122591	39763	4491	1602	45856	37.41
Rushikulya	117910	24873	6064	689	31626	26.82
Indravati	55912	3969	2966	392	7327	13.1
Kolab	75343	3285	2351	869	6505	8.63
Bahuda	11023	2487	551	51	3089	28.02
Vamsadhara	72402	10002	2025	545	12572	17.36
Nagabali	26167	1710	1235	529	3474	13.28
Area draining directly						
Kansabansa	49614	19980	1531	591	22102	44.55
Chilika	27372	3711	1204	72	4987	18.22
State Total	**1668914**	**347233**	**74112**	**14857**	**436202**	**27.14**

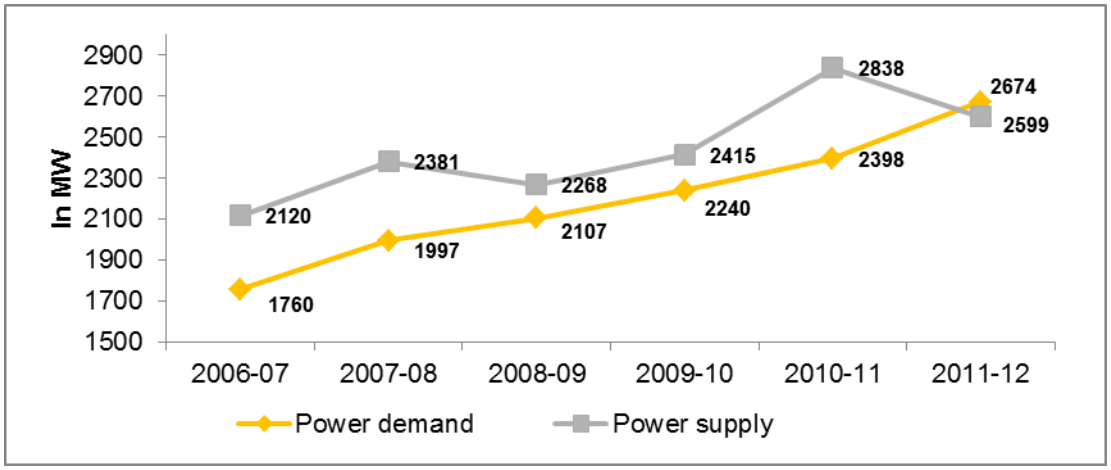
5.1.2. Availability of energy resources

Power is an important infrastructure parameter, as ESDM companies do not consider states with power deficit as attractive investment locations to set up operations. Businesses operating in such locations have to invest in power backup infrastructure, which increases set-up and operating costs.

Odisha has consistently been a power surplus state and has been selling power to other states in India over the last few years. The power availability in the state has usually exceeded demand in the last few years, except in 2011-12, when the average power demand was more than the supply.

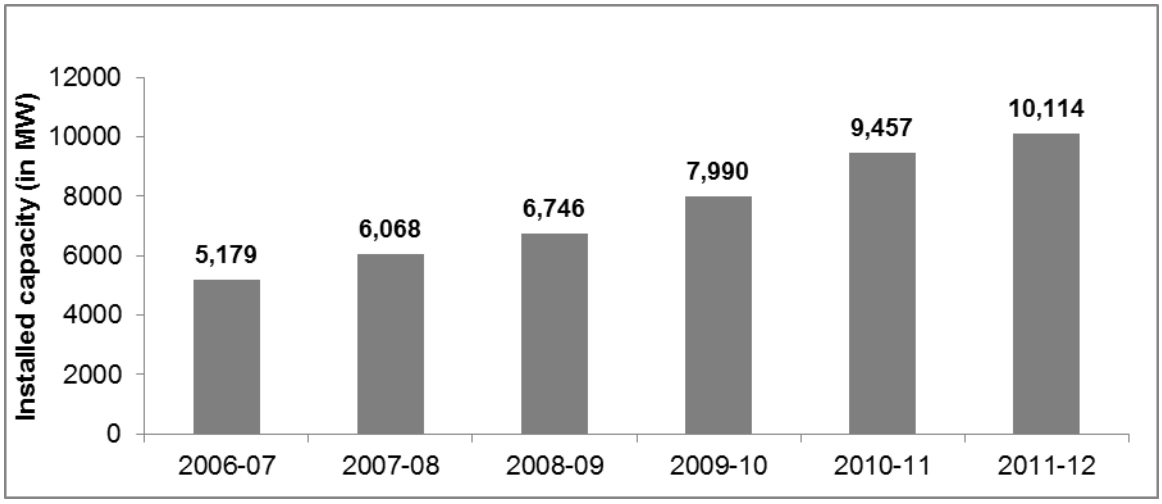
The power demand has been seeing an upward trend due to massive electrification drive, rapid industrialization and increase in consumer profile. Figure 16 below depicts the time series of demand and availability of power in Odisha.

Figure 16: Average power demand and supply in Odisha



The installed capacity of state was 10,114 MW in 2011-12, which has almost doubled from 2006-07. However, the availability of power stands far behind the installed capacity, owing to factors such as low capacity utilization as well as transmission and distribution losses. Figure 17 below depicts the time series of installed capacity from different power projects.

Figure 17: Installed power capacity in Odisha (in MW)



Power tariff in Odisha

Tariff in Paise per unit	2012-13	2011-12	2010-11
EHT	551.04	506.98	416.61
HT	552.09	524.92	423.59
LT	368.52	300.34	219.21

Power subsidies to manufacturing industry in Odisha

- Relaxation of 50 paise per unit for the EHT and HT industrial consumers committed in writing to pay energy bills at 70% load factor irrespective of their consumption below 70% load factor.
- Any LT consumer who wants to avail quality power by installing own transformers either in single phase or in three phase and pay the monthly bills regularly within the rebate time shall get additional rebate/concession of 5% of energy charges in addition to normal rebate. If energy bills are not paid within the rebate period no rebate shall be allowed.
- **Negative incentive:** Industries having captive generating plants, availing power in EHT or HT shall have to pay 690 paise and 708 paise respectively instead of 640 paise and 650 paise fixed during 2011-12.

5.1.3. Ports

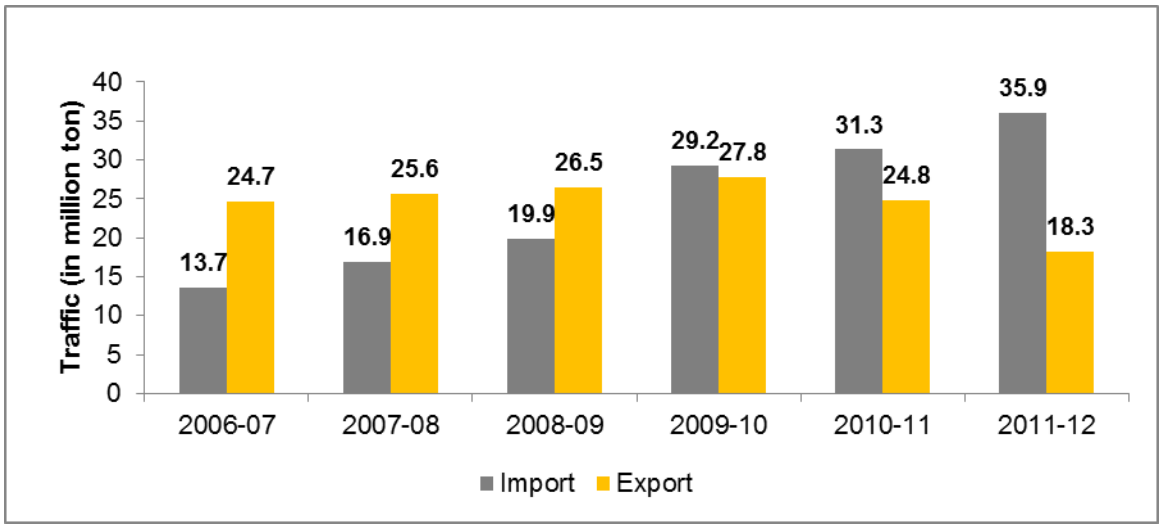
Odisha with a coastline of 480 km, has many strategic and natural port locations. It has one major port (Paradeep port) and one non-major port (Gopalpur port) functional. Also, there is a private port (Dharma port) in the state. Some other locations are being developed as non-major ports. It has 14 potential sites for development of minor ports.

Paradeep port

It is one of the 12 major ports across India. It is main port for trade from eastern part of the country serving states such as Andhra Pradesh, Madhya Pradesh, Uttar Pradesh, West Bengal and Bihar. The cargo mix at this port includes coal, mineral ores, semi processed ore, fertilizers, food grains and petroleum products.

The port has cargo handling capacity of 80 million tons. In 2011-12, the traffic of the port included 18.3 million tons of export and 35.9 million tons of import. Figure 18 below depicts traffic through Paradeep port.

Figure 18: Traffic through Paradeep port



Competitive advantage of Paradeep port

- Major port with natural draught of 13 meters, capable of handling Panamax vessels, 14 berths – 2 captives for fertilizers and one oil jetty
- Adequate land available in proximity to the port
- Air connectivity at Bhubaneswar – 119 km from Paradeep
- Excellent rail, road and telecom connectivity available
- Adequate fresh water available

Dharma port

Dharma Port Company is a 50:50 joint venture between Tata and L&T. It is situated between Haldia and Paradeep and is in close proximity to Odisha mineral belts, Jharkhand and West Bengal. The

master plan of the port envisages 15 berths to handle more than 100 million MT per annum of dry, liquid and break bulk, containerized and general cargo.

Salient features of Dharma port

- Deepest port with 18 meter draught capable of handling 180000 DWT vessels
- Adequate land, fresh water and power availability
- Air connectivity at Bhubaneswar – 200 Km
- Dedicated road connecting NH-5
- Dedicated rail link connecting to Howrah-Chennai national rail grid

Gopalpur port

Gopalpur port is one of the deep sea ports located on the east coast of India. The port is capable of handling capsize vessels. It is being developed as all-weather port. First phase of development will have 3 deep water berths with 2 dry bulk cargo berths and for break bulk cargo berth.

Salient features of Gopalpur port:

- Deep draught port
- 1300 hectare land close to port, readily available
- Connected to Howrah-Chennai national rail grid
- 200 MW of power system available
- Gopalpur airfield for small aircraft available
- Air connectivity at Bhubaneswar – 179 km
- 18 MGD water supply system under development

Odisha government has also identified others locations for the development of non-major ports - Subarnarekha Port and Astaranga Port, Baliharachandi in Puri district, Bahuda in Ganjam district, Bahabalpur and Bichitrapur in Balasore district.

Rail connectivity to ports

- Gopalpur is 6 km off broad-gauge line.
- Paradeep has broad-gauge connectivity.
- Dhamara is 62 km away from EoCR, but is connected with a dedicated line to EoCR.

Road connectivity to ports

- Gopalpur port is 6 km from NH5.
- Paradeep port is connected to NH 5.
- Dhamara port has a 4 lane road under construction connecting it.

5.1.4. Airports[xxxiv]

Biju Patnaik Airport, also known as Bhubaneswar Airport, is the only major airport present in Odisha. The airport is well connected will all the metro airports on a daily basis. The airport is located approximately 3 km from the city center and south of the city and also approximately 3 km from Bhubaneswar railway station.

Some of the airlines have started international operations from this airport as well. In terms of cargo handled, the amount of cargo flown out of the airport was 3,400 tons in 2011-12.

In addition to this major airport, the state presently has 17 airstrips and 16 helipads.

Future development plans[xxxv]

The Government of Odisha is considering development of greenfield airports in five locations in the state to boost intra-state and inter-state civil aviation facilities. The proposed districts are the industrial hubs of Rayagada, Paradip, Dhamara, Angul and Kalinganagar.

The government is also considering upgradation of existing 11 airfields at Keonjhar, Dhenkanal, Sambalpur, Jeypore (Koraput district), Khariar (Nuapada district), Bargarh, Phulbani, Rairangpur (Jharsuguda district), Ganjam, Balangir, Bhawanipatna and Malkangiri.

The government has also initiated actions to encourage private players to utilize air cargo routes and develop world class cargo hub in Odisha.

5.1.5. Railways

Odisha railway network is part of the East Coast Railways and has rail lines of 2,417 km including 54 km of narrow gauge lines by the end of 2010-11. Although the density of railway coverage is relatively high in some regions of the state, the central parts remain largely untouched. The railways cover 23 districts of the state excluding Boudh, Deogarh, Kandhamal, Kendrapara, Malkangiri, Nabrangpur and Nayagarh. The railway density (i.e. route length per thousand sq. km) in Odisha is 16 km, which is below the national railway density of 20 km.

Therefore, overall, the railway coverage and density is poor and this is one of the factors that have hampered the rate of industrial development in the state.

5.1.6. Roads

Odisha has a road network of around 250,000 km which includes more than 3,500 km of national highways and more than 3,600 km of state highways by the end of 2011-12. The state also had approximately 18,600 km of urban roads by 2011-12. The state has 16 national highways and while they constitute less than 2% of the total road network in the state, they carry 40% of the total road traffic.

Even though Odisha has a fairly extensive road network, which gains even more importance given the

relatively less coverage of railways, the quality of roads is low. The surface road density (defined as the percentage of length of roads that is surfaced) for the state, has remained in the range of 20%-30% in the last few years. It was 28.6% during 2010-11 while the national average is usually more than 50%.

5.1.7. Availability of office space

In terms of availability of Grade A office space in the state, Odisha has 700,000 sq. ft. area in operation, while approximately 2,618,000 sq. ft. is under construction in various zones throughout the state.

State (Sq. Ft in Lakh)	North Zone (Sq. Ft in Lakh)	South Zone (Sq. Ft in Lakh)	Central Zone (Sq. Ft in Lakh)	Status
26.18	11.5	2	12.68	Approved (Under construction)*
7			7	In operation

*Under construction - Period for completion: 6 months to 4 year); may vary from project to project.

Location	Zone	Area in Sqft (In Lakh)
Paradeep	Central	3
Kalinga Nagar (Jajpur Road)	Central	3
Rourkela	Northern	2
Jharsuguda	Northern	2
Sambalpur	Northern	2
Dhenkanal	Northern	2
Angul	Northern	2
Balangir	Northern	1.5
Balasore	Central	2
Berhampur	Southern	2
Bhubaneswar Purposing (19th Floor) as to be completed within one year **Already in operation**	Central	4.68 7

Paradeep and Jajpur Road Kalinga Nagar projects are on high demand because of the presence of large number of industries in these districts.

5.2. Talent availability

Availability of manpower[xxxvi]

The total number of workers (including skilled and unskilled labor) in Odisha in 2011 was 17,541,589, which grew by 22.9% in last 10 years as compared to 2001 census. This number includes the people who are working and those who are seeking work opportunities. Of the total workers, almost 61.8% of them are involved in agricultural/cultivation activities, while the remaining 38.1% were engaged in household and other industries. Also, of the total workers in 2011, 61% were main workers (those who have worked for more than 6 months in reference year) while 39% were marginal workers (those who have worked for less than 6 months in the reference year).

The table below mentions total number of workers in the state as per census 2011:

Number of workers in Odisha (as per census 2011)	
Male workers	11,902,655
Female workers	5,638,934
Total	**17,541,589**
Break-up by urban/rural	
Workers in rural areas	15,103,714
Workers in urban areas	2,437,875
Classification based on economic activities	
Cultivators	4,103,989
Agricultural laborers	6,739,993
Household industries	783,080
Other workers	5,914,527

Employment in organized sector

In terms of employment in organized sector, Odisha had 722,000 employees working with public and private sector organizations in 2011. Of the total employees, women employees formed 16.8% of the workforce. Also, approximately 83.8% of the total workers were employed with the public sector and 16.2% in private sector in 2011.

Table: Number of workers in Odisha

Number of workers in organized sector in Odisha (2011)	
Male workers	601,000
Female workers	121,000
Total	**722,000**
Break-up by public/private	
Workers in private sector	117,000
Workers in public sector	605,000

Presence of academic, research and training institutions

The number of technical institutes in a state reflects the state's ability to produce engineering and other technical graduates each year. The higher the number of engineering/polytechnics/ITI colleges, the higher is the number of professionals produced every year, equipped with requisite skills for ESDM sector.

Technical education in Odisha is imparted through engineering colleges, polytechnic colleges, industrial training institutes (ITI), industrial training centres (ITC) and vocational educational institutions and universities. The Industrial Policy of the state envisages a series of measures to improve technical education and enhance the quality of technical manpower.

In 2011-12, there were 150 engineering colleges in the state (including National Institute of Technology, Rourkela) with a sanctioned intake of 38,253 seats. The engineering schools/polytechnics have a sanctioned intake of 28,665 while ITIs/ITCs can admit 67,251 students annually.

Table: Technical institutions in Odisha (2011-12)

Type of institution	Number	Sanctioned intake
Engineering colleges	**150**	**38,253**
Government	8	2,223
Private	141	35,670
National Institute of Technology	1	360
Number of engineering schools/polytechnics	**92**	**28,665**
Government	13	3,376
Private	79	25,289
Number of ITIs/ITCs	**610**	**67,251**

At present, there are two major technical universities under the administrative control of the State Government:

- **Veer Surendra Sai University of Technology, Burla** – offers B.Tech in seven disciplines, M.Tech in five disciplines and MCA
- **Biju Patnaik University of Technology (BPUT), Rourkela** – has six constituent colleges under its jurisdiction and one aided autonomous college affiliated to the University.

Skill development programs

The State Employment Mission under GoO conducts several skill development training programs to create employment/self-employment opportunities for the youth in the state in association with various departments. It has trained more than 145,000 people till 2011-12 in various demand driven trades.

The State Employment Mission has also entered into Memorandums of Understanding (MoUs) with nine selected training partners under the of National Skill Development Corporation (NSDC)/MoRD for conducting placement linked training program as a Public Private Partnership (PPP) undertaking in the first phase. As a part of this program, the training partners have to ensure at least 75% placement of trained youth after the completion of training. During the 12th Five Year Plan, the state aims to train at least one million employable skilled youth and provide job opportunities for them.

5.3. Availability of mineral resources

Odisha has vast reserve of mineral deposits like coal, iron, bauxite, graphite, manganese ore, limestone, clay, quartz and quartzite, nickel, copper and others. Some of the minerals extensively used in the ESDM industry are present in abundance in the state.

Mineral reserves in Odisha by the end of 2011-12

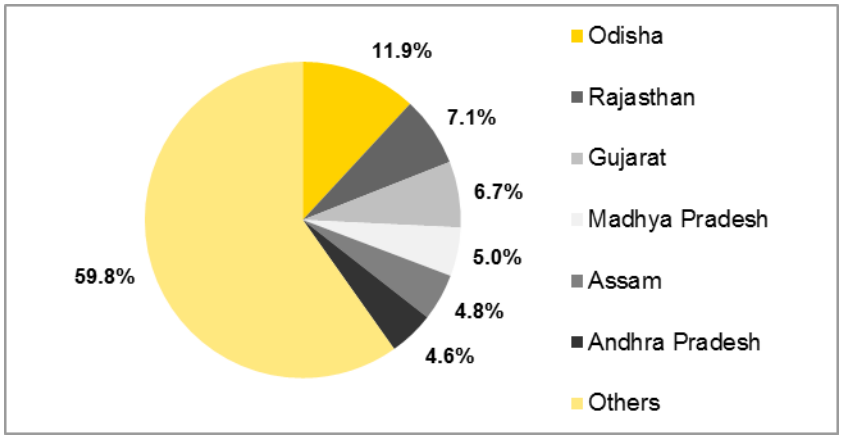
Minerals	Reserves in Odisha (million tons)	Production (in '000s MT)	Value (in INR million)
Iron Ore	4,967	66,085	191,053.3
Chromite	162.3	3,793	46,694
Coal	71,447.4	105,120	55,795.8
Bauxite	1,795.8	5,046	1,965.2
Lime Stone	997.6	3,135	868.4
Dolomite	327	1,114	347.6
Fire Clay	175.5	0	0
China Clay	313.9	1	0.2
Nickel ore	174	-	-
Heavy minerals	226	-	-
Manganese ore	119.9	543	4,465.4
Mineral Sand	222.1	244	889.9
Graphite	4.3	31	13
Pyrophilite	8.3	9	1.6
Lead and Zinc Ore (Base metal)	5	-	-
Vanadium ore	2.5	-	-
Quartz and Quartzite	70.1	17	8.2
Tin ore (tons)	0.000347	-	-
Talc- Soap Stone	1.1	-	-

District-wise mineral deposits

District	Major minerals
Koraput	Bauxite, Chinaclay, Dolomite, Limestone, Mica, Quartz
Mayurbhanj	Asbestos, Fireclay, Chinaclay, Iron Ore, Kyanite, Quartzite, Soapstone, Talc, Base metal (Lead and Copper), Coal, Dolomite, Manganese, Nickel Ore, Vanadiferous/Magnetite, Gold.
Malkangiri	Limestone, Tin ore, Quartz
Nabarangapur	Chinaclay, Iron ore.
Rayagada	Bauxite, Graphite, Manganese, Quartz
Sundergarh	Lead, copper, Coal, Dolomite, Fireclay, Iron ore, Limestone, Manganese, Quartz, Bauxite,
Sambalpur	Coal, Base metal (Lead and Copper), Chinaclay, Fireclay,
Keonjhar	Asbestos, Pyroxenite, Iron Ore,Chromite, Chinaclay, yrophyllite,Manganese, Gold, Dolomite, Limestone, uartzite, Quartz
Kadhamal	Graphite
Balasore	Vanadiferous / magnetite
Phulbani	Graphite

The state occupies a prominent place in the minerals map of the country, both in term of deposits and production. In terms of value of output of minerals, Odisha ranks the highest in India in recent years and its share has been increasing. The figure 19 below compares Odisha with other major states in terms of percentage share of total value of mineral output in India.

Figure 19: Value of mineral production across major states in 2010-11 (Total value for India: INR 1639 billion)



5.4. Odisha's ESDM industry – Analysis of Advantages & Challenges

5.4.1. Areas of competitive advantage for Odisha

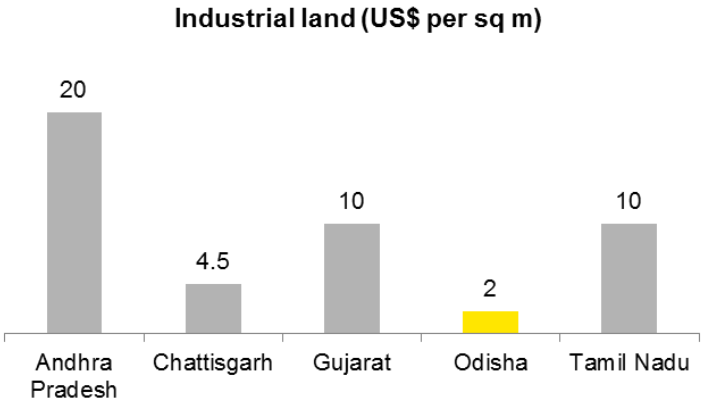
1) Low cost of doing business[xxxvii]:

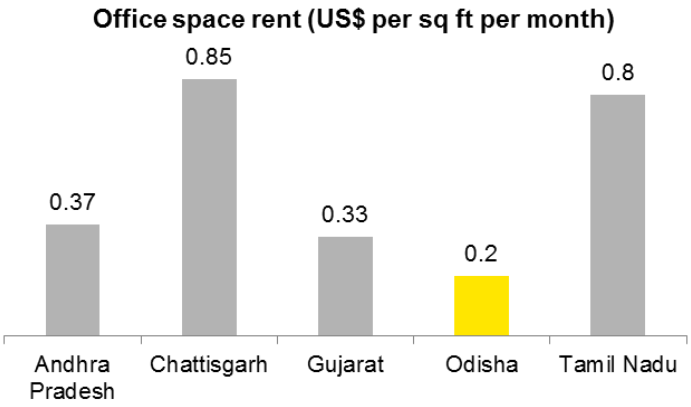
Conversion costs in ESDM industry can be high as 35% of the overall selling price for electronic component manufacturing while for electronic products, it varies from 10%-20%.

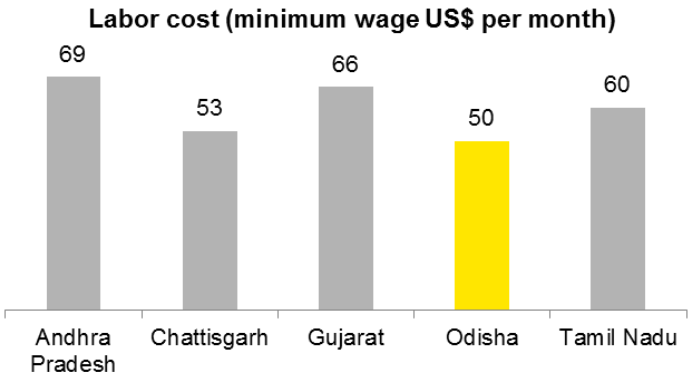
Cost of manpower, power, water, land constitutes a major proportion of the manufacturing costs with an estimated 60% - 70% of the manufacturing costs. Thus availability of factor inputs like power, water, labour, land etc. at competitive prices is crucial to carry out electronics manufacturing at globally competitive prices. This assumes greater importance in today's scenario where India is trying to compete with other countries like China which have been well knows as 'low-cost' manufacturing locations in the world.

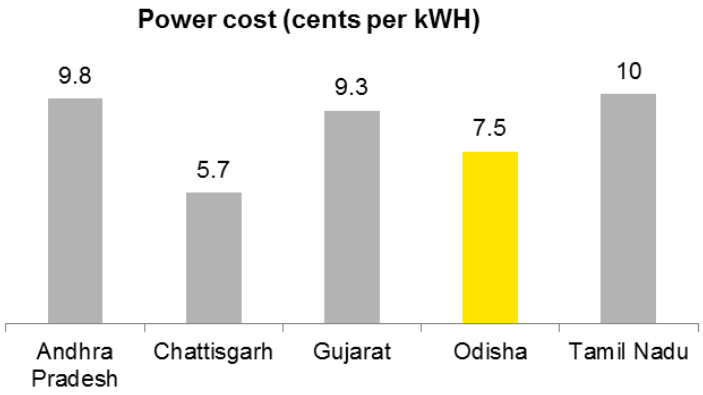
The state of Odisha has the advantage of some of these inputs being available at highly competitive costs as illustrated in the table below. When leveraged rightly, this could act as a major driver for electronic manufacturing in Odisha.

Figure 20: Cost of industrial land, office space rent, labour and power cost









2) Proximity to global electronics trading hubs & presence of ports[xxxviii]:

Global trading hubs:

South East Asian countries like Thailand, Singapore, Indonesia etc. have emerged into trading hubs for electronic products as well as components and raw materials used for manufacture of components. Most manufacturers operating in India procure components / raw materials required for manufacturing from warehouses in countries like Singapore. Being on the East coast, Odisha's ports are some of the least distant ports in India from these South East Asian countries.

This would reduce the transit time for import of goods and can help manufacturers save on inventory carrying cost and freight cost.

Presence of ports:

Odisha has 3 actively functional ports and recognized 14 potential sites for development of ports. With 95% of India's trade by volume and 70% by value being carried out through ports, it is evident that ports play a crucial role in the trade of an economy. Trade of electronic products and components/raw materials is no exception to this. Ports are more crucial to domestic electronics manufacturing as currently a large portion of components used to manufacture electronic products or raw materials used to manufacture components or manufacturing equipment is imported for other nations including China and South-East Asian countries.

- Odisha has the advantage of having Paradip, one of the 12 major ports in India, with 13 meters of natural draught and 14 berths.
- The port also appears to have adequate capacity currently and for the near future with a capacity ulilization of around 53%.

- Paradip handled the second highest traffic among ports on east coast (4th in India).
- It also happens to be the closest major port on eastern coast to trading hubs like Singapore.
- 60% of the gap in capacity of cargo handling in Odisha by 2016 will be filled by Paradip alone.
- Gopalpur and Dhamra ports also augment the freight handling capacity in Odisha.

3) Mineral rich state[xxxix]:

Odisha is a mineral rich state and In terms of value of output of minerals, Odisha ranks the highest in India in recent years. Table 1 gives a snapshot of the mineral reserves of Odisha.

Metals like Aluminum and Copper are widely used in the manufacture of electronic components like electrolytic capacitors, printed circuit boards, connectors etc. As per the 2010-11 economic survey report, Odisha houses 55% of the total Bauxite reserves in India. Odisha occupies the first place in the country in aluminium production, both in terms of production capacity and actual output.

The availability of such metals within the state, if leveraged well, can encourage component manufacturers to set-up manufacturing units in the state. However, the metals have to produced and processed in the form required for manufacturing electronic components (as explained in the 'weaknesses' section)

Nickel ore **92%** of total India reserves	**Chromite** **Reserves** **95%** of total India reserves	**Bauxite** **reserves** **55%** of total India reserves
Manganese ore **40.4%** of total India reserves	**Iron ore** **33%** of total India reserves	**Graphite ore** **29%** of total India's reserves
Pyrophilite **36%** of total India reserves	**Fire clay** **25%** of total India reserves	**Coal** **24.5%** of total India reserves

4) Sufficient supply of water resources:

Odisha has sufficient availability of water resources through natural sources. Presence of Hirakund reservoir and rivers like Mahanadi, Ib, Tel etc. catering to the industrial water requirements is acting as a strong positive factor for establishment of industries. Electronic

component manufacturing requires large quantities of pure water and the abundance of water in Odisha helps in satisfying this requirement.

5) Regulatory scenario[xl]:

Odisha has the advantage of having a visionary government with a stable policy and political scenario, which helps in creating confidence to investors.
The state also offers some sops for the IT/ITeS industry, which act as positive influencers for investors in these sectors. It is suggested the incentives for the ESDM sector be structured better than the incentives offered for the IT/ITeS Sector, as the ESDM sector has very limited presence and needs to be suitably incentivized to attract investments and promote its growth in the state. (Please refer to the detailed list of incentives under the 'Govt. Initiatives' section)

6) Institutional framework:

Presence of an enabling institutional framework can greatly help in providing a hassle-free experience of investors and can be a strong encouraging factor to manufacturers including electronic manufacturers.

The state of Odisha has set-up an institutional framework for investor promotion in the IT sector through the organizations of Department Of Information Technology, Odisha Computer Application Centre, State Information Technology Services Board, IPICOL etc.

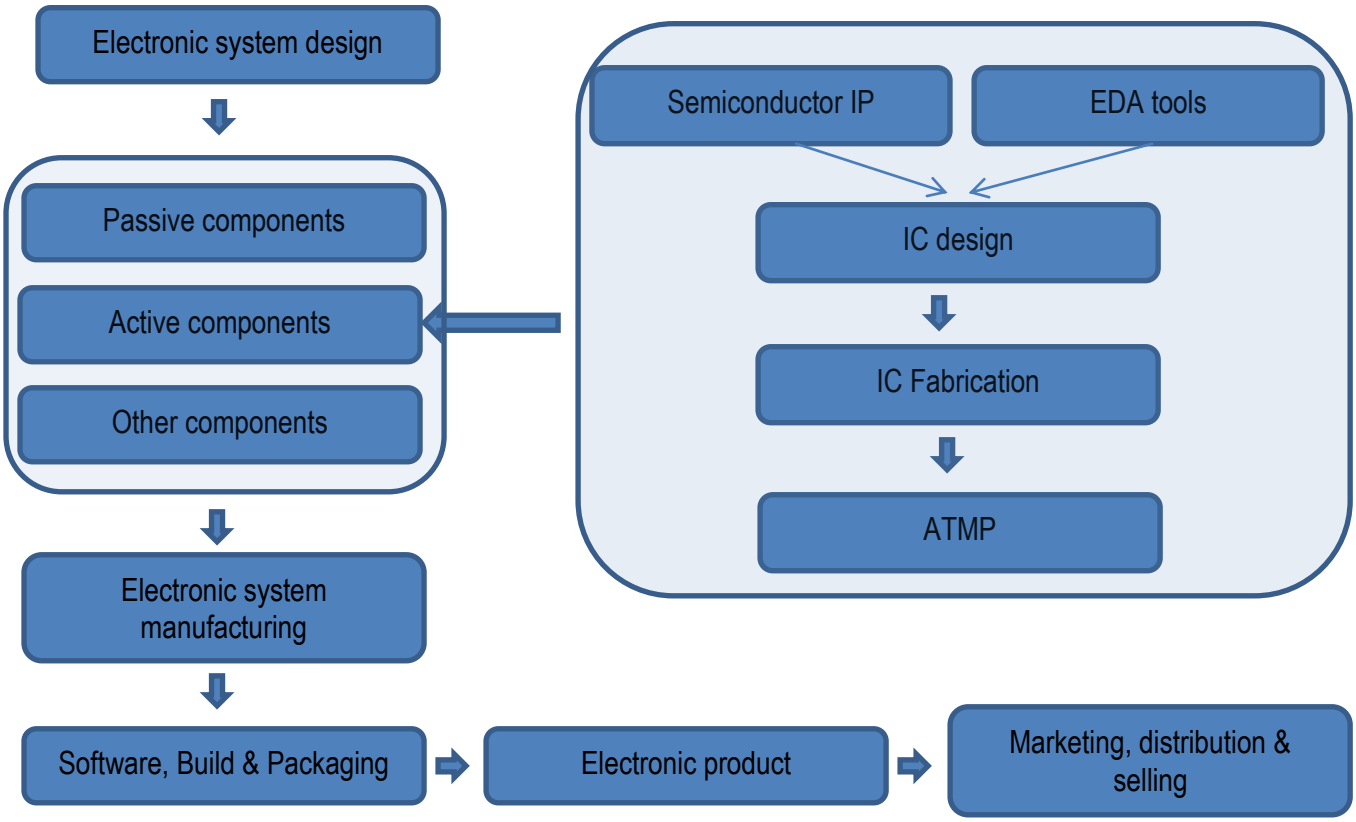
5.4.2. Key challenges for ESDM industry growth in the State

1) Poor presence of ESDM ecosystem in the state[xli]:

In order to promote ESDM sector and attract more companies in the sector, it is essential to achieve a critical mass in terms of the number of companies working in the ESDM sector. The value chain of electronics manufacturing is highly integrated and interdependent and thus the attractiveness of a region as the investment destination for electronics manufacturing depends on the maturity of the value chain and the presence of players across the value chain in that region.

However, currently Odisha houses very few companies like Semtech, Perfectus, Sankalp Semiconductor etc. in the ESDM space. This presence is also confined to only two subsectors / parts of the value chain (namely Semiconductor design & component manufacturing). There are little or no ESDM exports from the state in the recent years. Thus there is an urgent need to strengthen the ESDM ecosystem in the state.

The below diagram illustrates the complexity of electronics value chain (with active component manufacturing expanded).



2) Poor availability of talent[xlii]:

Availability of relevant manpower is crucial to the development of any industry. As ESDM industry has higher dependence on skilled manpower, especially for highly specialized activities like electronics system design, IC design & manufacturing etc., the availability of talent with relevant skill sets assumes greater importance.

However currently, there is little availability of experienced skilled or highly skilled manpower for ESDM sector. This is due to the poor presence of ESDM companies in Odisha currently. Other states like Karnataka, Tamil Nadu, Andhra Pradesh where the ESDM industry is already present are much ahead on this aspect.

The availability of fresh talent is also poor in comparison to other states, as indicated below.

State	Electronics related Engg. graduates (Current Capacity)	Total Engg. graduates (Current Capacity)	No of colleges offering Engineering courses
Odisha	17800	41000	150
Andhra Pradesh	140000	320000	700
Tamil Nadu	77000	234000	570

Apart from poor availability of total fresh talent, poor availability of employable talent specific to electronics is a huge challenge.

In addition, the presence of private ESDM training/finishing schools is very low in comparison with other states like Karnataka or Andhra Pradesh.

As ESDM is currently not included in Odisha state employment mission (2012)'s targets for skill development in various sectors during the 12th 5-year plan, it may be included as suggested in the 'Skill development' section of Govt. initiatives.

3) Absence of electronics specific clusters:

As per the National Electronics Policy, the Govt. of India has set a target to create 200 electronics clusters by 2020 in order to promote electronics manufacturing.

The GoO has planned to set up Greenfield Electronics Manufacturing Cluster (EMC) at Infovalley, Bhubaneswar, and, in this regard, would be submitting the application to Department of Electronics & IT (DeitY), Government of India under the latter's EMC Scheme. .

The number of special economic zones in the state is low as compared to other states as shown in the table below.

State	Operational SEZs	Notified SEZs	Approved (formally or in principle) SEZs
Odisha	1	2	14
Andhra Pradesh	39	78	115
Tamil Nadu	33	53	73
Karnataka	22	40	62
West Bengal	6	9	21

In addition, ESDM is recognized by the Govt. as a priority sector and not a thrust sector. Thrust sector has additional advantages like higher stamp duty exemption, VAT reimbursement for 10 years, Entry tax exemption, CST reimbursement, Interest subsidy etc, which do not apply for or have lower incentives in case of priority sector. Thus, as suggested in the 'Govt. initiatives' section, the incentives applicable for 'Thrust sector' should be provided for ESDM as well.

4) Raw material availability[xliii]:

Though Aluminium is produced in large quantities in Odisha, the purity does not meet the requirement for Aluminium foils for manufacture of electrolytic capacitors etc.

5) Poor social indicators[xliv]:

Quality of life in a particular location is one of the aspects considered while attracting existing talent from other locations. However, data below shows that there is scope of improvement for Odisha on some such parameters.

- One of the least urbanized states (less than national average of 27.8%) – Next only to Bihar among the 16 major states in India.
- Low per capital income – 5th lowest among 16 major states in India.
- Unemployment rate among the highest (among 15 major states) – rural – 32%; urban – 42%
- Highest (among 16 major states) in BPL population %
- One of the highest infant mortality
- Life expectancy among the lowest in 15 major states

6) Some issues with infrastructure still exist:

Though Odisha fares well on the cost of infrastructure, there are some issues with quality and availability of such infrastructure.

Telecommunications connectivity (Broadband for enterprises) is relatively poor in Odisha.

Power:

- Though production capacity and supply scenario are better, the quality of power needs to be improved.

Ports[xlv]:

Though Paradeep port is one of the largest traffic handling port in India, it has shown poor performance on parameters like turnaround time and pre-berthing time. In 2010 – 11, the average turnaround time was 7.73 days (highest among all major ports in India) and pre-berthing time was 120.9 hours during the same period. Even as per the latest numbers for April 2013 – June 2013, Paradip port has one of the highest turnaround time of 5.25 days (next only to KPT).

6. Module III – Strategic roadmap for ESDM sector development in Odisha

6.1. Vision

The National Electronics Policy (2011) sets a target to generate turnover of US$400 bn from the ESDM industry by 2020, of which US$80 bn would be through exports. It aims to attract an investment of US$100 bn and build a strong supply chain of raw materials, parts and components. It also sets 'enhancing the availability of skilled manpower' as one of its objectives. In order to achieve these objectives the Government of India has announced a slew of policy measures in the last three years.

In view of the enhanced focus on ESDM sector at a national level, Odisha can contribute to this national target by promoting and developing the ESDM sector within Odisha and establishing itself as a preferred destination for investment in this sector.

Thus Odisha can envision to become a significant player in Electronic System Design and Manufacturing, especially in the sectors of consumer, Industrial, IT/OA, Telecom/Mobile and Strategic electronics, across the value chain of ESDM.

Targets: Based on analysis of various factors like demand for electronic products and manufacturing services within India, East India & Odisha, current status of ESDM industry in Odisha, strengths & challenges of Odisha in ESDM industry etc., the following projections have been made for Odisha in the ESDM sector:

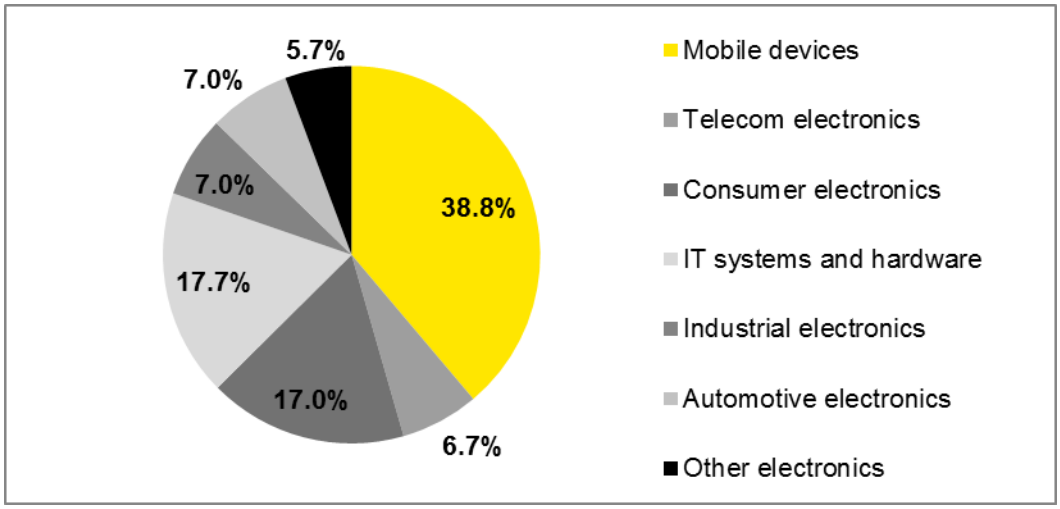
1) As the current share of revenue from Odisha in ESDM sector is negligible unlike some other states like Karnataka, the revenue of INR 18,800 Cr is planned to be achieved over the next 10 years in this sector in Odisha.
2) An employment generation of around 60000 jobs is estimated in the ESDM sector during the same time period.
3) Odisha to become a significant player in the segments of Consumer, Industrial, IT/OA, Telecom/Mobile and Strategic Electronics.
4) Odisha to focus on development of the ESDM sector across the value chain and not just the end products
5) SMEs and domestic manufacturers to be encouraged equally with multinational and large investors

A detailed study has been undertaken to identify segments within the ESDM sector to be targeted by Odisha to achieve this vision and to provide a roadmap for the state to reach the set targets. The following sections provide a detailed description of the segments / products identified, Investments required, phase-wise approach, mode of investments, resources required, locations to be focused on and Govt. initiatives to bridge the gaps.

6.2. Target segments, product verticals and manufacturing horizontals

This section focuses on identifying and selecting the segments, electronic product vertical and manufacturing horizontals focus for Odisha. The electronic product market is a combination of total domestic consumption and total exports of these products from India. The figure 21 below depicts the break-up of total Indian electronic product market in 2012:

Figure 21: Indian electronic products total market (2012): US$54.3 billion



In order to select the target products and segments, as a first step, top 25 electronic products in terms of their market size and growth potential were identified. These products were then analysed on several criteria including:

- Categorization as ITA1 / non ITA1
- Market size and growth potential at India level
- Potential demand from Odisha
- Potential demand from Eastern India region[3]
- Complexity of product manufacturing

The tables below summarize the analysis of top 25 products on various parameters and arrive at a selection of chosen products.

[3] Eastern region comprises Odisha, West Bengal and Jharkhand.

Analysis of top 25 electronic products

Target products

Segment	Product	ITA 1	Market size (US$ million)	Potential demand in Odisha (US$ million)	Potential demand in Eastern region[4] (US$ million)	Product complexity
Mobile devices	Mobile Phones	Yes	17,800.4	564	1776	Very high
Telecom products and equipment	Routers/Switches	Yes	544.3	10	53	Very High
Consumer electronics	Flat Panel Display TV	No	3,839.1	146	570	High
	Set top boxes	No				Medium
IT systems and hardware	Notebooks	Yes	3,280	154.2	535	High
	Printers/ MFD	Yes (Printers); No (MFD)				Low
	Tablets	Yes				High
Industrial electronics	Inverters	No	2030	85.4	275	Low
	LED lighting – Luminaire	No				Low
	Solar PV modules	Yes				Low
	Power supply	No				Low
	Energy Meters	No				Low

Source: IESA-F&S study, EY analysis

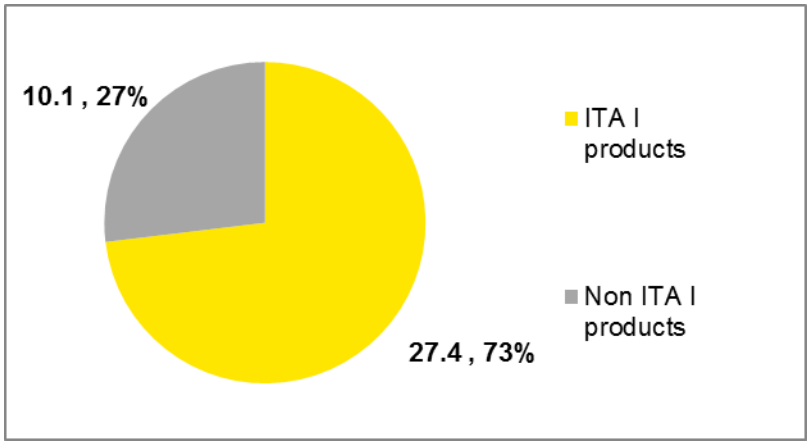
[4] Eastern region comprises Odisha, West Bengal and Jharkhand.

Other products

Segment	Product	ITA 1	Market size (US$ million)	CAGR till 2015
IT systems and hardware	Desktops	Yes	1,981.90	0.4%
	USB flash memory drives and memory cards	Yes	1,141.10	11.7%
	LCD Monitor	Yes	907.00	11.1%
	Servers	Yes	788.20	11.2%
Automotive electronics	Engine Management System (EMS) - 4 Wheeler	No	1,067.40	7.8%
	Car radio	No	472.20	8.4%
Telecom products and equipment	BTS - GSM/CDMA	Yes	1,051.70	8.7%
	PON, GPON ONT	Yes	21.10	126.4%
	BTS – WiMax	Yes	13.30	-57.8%
Consumer electronics	Digital camera	No	1,075.10	19.5%
Automotive electronics	Instrument Clusters (2W+4W) – Automotive	No	313.70	9.7%
	2W – Ignition	No	231.50	10.0%
Industrial electronics	Online UPS	No	418.80	-6.9%
	Offline UPS	No	172.60	6.8%
	CFL	No	533.30	18.5%
Other electronics	Smart Cards	Yes	263.40	25.0%

Source: IESA-F&S study, EY analysis

Figure 22: Top 25 electronic products by total market in India (2012): US$37.5 billion



Non ITA 1 product focus

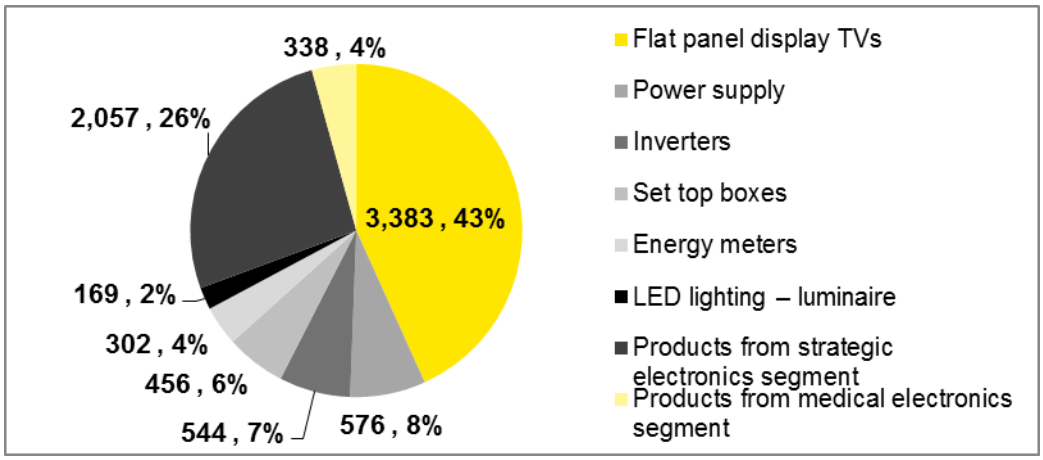
Addressable market: US$7.8 billion for chosen products;[5]

The competition for ITA 1 product manufacturers in India is higher as these products invite zero import duty and the domestic manufacturers face certain disabilities compared to companies that import these.

Therefore, as a starting point, Odisha should focus on the following listed products where there will be a lesser extent of competition from importers as compared to ITA 1 products. The combined addressable market for these products is **US$ 7.8 billion**.

- Set top boxes
- LED lighting – luminaire
- Inverters
- Flat panel display TVs
- Energy meters
- Power supply
- Products from strategic electronics segment
- Products from medical electronics segment

Figure 23: Non ITA 1- Addressable market: US$ 7.8 billion



5 Source: IESA-F&S study; EY analysis

ITA 1 product focus

Addressable market: US$22.2 billion[6]

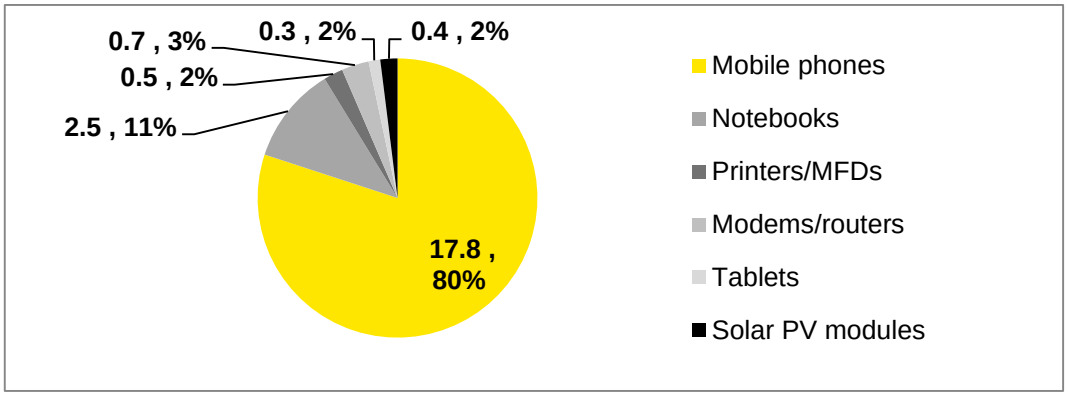
One of the recommendations of this report to GoO is the provision of preferential market access scheme, i.e. preference to procurement of electronic products by government departments manufactured by the companies registered and engaged in manufacturing in Odisha. As a large portion of this procurement will be primarily of ICT products, as a starting point, the GoO should focus on the below mentioned IT hardware products.

In addition, since mobile phones have the largest share of the Indian electronics product market, GoO can look at attracting handset manufacturers as well. Modems/routers have been chosen in this category as well due to huge potential of broadband penetration in the country. With increasing focus on meeting energy demand for the country, solar PV is getting a forward push from government. Hence, it is also a chosen product in this category.

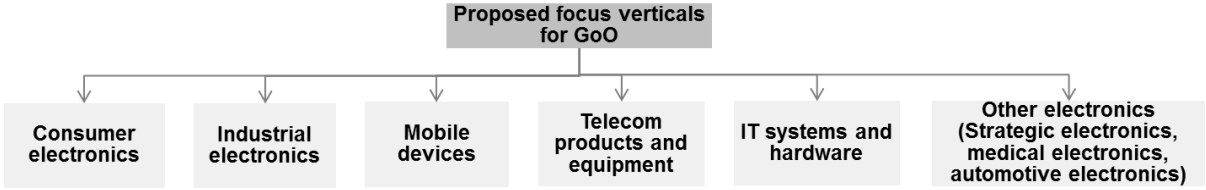
Following are target products in this category:

- Tablets
- Notebooks
- Printers/MFD
- Modem/routers
- Mobile phones
- Solar PV modules

Figure 24: ITA 1- Addressable market: US$22.2 billion



Total addressable market (including both ITA 1 and non ITA 1 products): US$30 billion



Total addressable market: US$30 billion
Market share of proposed verticals in total electronic product market: ~55.2%

6 Source: IESA-F&S study; EY analysis

Summary of demand drivers of chosen products/segments

A key decision criterion to choose the specific set of products/segments is their current and future growth potential. The following table enlists the key demand drivers for the chosen products/segments

Demand drivers

Segment	Target product	Demand drivers in India
Mobile devices	Mobile phones	► Growth driven by a strong increase in the number of wireless telephone subscriptions. ► Sharp drop in prices of entry-level feature phones and smartphones. ► Expansion of mobile infrastructure to rural areas by telecom operators. Increasing adoption in tier 2, 3 cities as well. ► Launch of 3G and LTE services is also driving the demand.
Telecom products and equipment	Modem/routers	► Rapid growth in number of internet and broadband subscribers is further adding to the growth.
IT systems and hardware	Notebooks Tablets Printers/MFD	► Government's initiatives – affordable computing through "Aakash" tablets, providing free laptops to students driving demand. ► Rising incomes is bringing computers within the reach of lower income demographics. ► Shift in preference of SMB segment toward adopting laptops instead of desktops due to decreasing price gaps, increased mobility requirements etc. ► Demand for printers primarily driven by SMBs and the Small Office Home Office (SOHO) users. ► Consolidation of printing devices in offices leading to sharp growth of MFDs.
Consumer electronics	Flat panel display TVs Set top boxes	► Rising incomes and growing affordability resulting in robust spending growth. ► Shift in consumer preference from CRT TVs to LCDs, LEDs and smart LED TVs. ► Growth is also driven by first-time buyers, as household TV penetration is estimated at less than 60%. ► Cable TV digitization policy of the GoI as well as digitization of terrestrial TV network operated by Doordarshan is driving the demand for set-top boxes.
Industrial electronics	LED lighting – luminaire Inverters Solar PV modules Power supply Energy meters	► LED lighting witnessing an increasing adoption in traffic lights, billboards, signages etc. Declining prices, higher return on investment, less maintenance costs and longer life are primary growth drivers. ► Acute power shortage and frequent power outages are the primary reasons for rapid growth of inverter market. Demand is mainly driven by households and small office segment. ► Power supply demand driven by robust growth of mobile phones, tablets and PCs. ► GoI has embarked on US$900 billion investment in power infrastructure by 2020 and aims to achieve 100% metering. ► Launch of pilots by state utilities to install prepaid meters and automatic meter reading (AMR) schemes as a result of growing focus on energy conservation and reducing power theft.

		▶ Increasing use of solar PV based electricity generation due to sharp drop in prices of solar modules over the last few years and supported by the policies of Government
Other electronics	Products from strategic electronics segment Products from medical electronics segment Products from automotive electronics segment	▶ GoI is increasingly promoting 'develop and make' model over 'buy and make' model in strategic electronics segment in order to protect strategic interests of the country. ▶ Increasing health consciousness among Indians, government programs to provide affordable health care facilities to rural areas. ▶ Indian automotive industry has been growing at a robust rate in recent years as a result of strong economic growth, favorable government policies and increased affordability. This is in turn driving the demand for automotive electronics in the country. In India, there is an increasing customer preference toward comfort, convenience and enhanced safety features which is driving the demand for automotive electronic control units. Increased safety awareness among consumers is fueling the demand for anti-lock breaking systems (ABS) and airbags, while demand for convenience features are driving uptake of body control systems.

Design/Manufacturing Horizontals to be focussed on:

ESDM sector not only comprises the assembly / manufacture of end products, but also includes various stages in the manufacturing like manufacturing of components like PCB, passives, actives, electro mechanical etc., Assembly of such components into the product, design of ICs, system / board design, ATMP etc. Most of these stages are common across the manufacturing of various products. These stages are henceforth referred to as 'Horizontals' as they cut across products / verticals.

As the horizontal processes are equally crucial to the development of the overall ESDM ecosystem, the roadmap must lay appropriate emphasis on the horizontals as well. Thus the below horizontal processes are chosen to be targeted by Odisha.

Horizontal	Description
EMS	Electronic manufacturing services which involves assembly of components into systems or sub-assemblies
PCB manufacturing	Bare printed circuit boards used in the manufacture of electronic product assemblies
Connectors	Connectors & cables used in electronic product assemblies
Passive components	Passive components used in electronic circuits like capacitors, resistors, inductors etc.
Other Active components	Active components other than ICs used in electronic circuits. E.g.: Thyristors, Diodes, Transistors etc.
ATMP	Assembly, Test, Mark & Packaging for bare Integrated Circuit chips
Product Design & Development	VLSI Design - Design of ASICs, SoCs etc. including RTL coding, verification, other frontend & backend activities Hardware/ Board Design- System or sub-system design for circuit boards Embedded Software Development - Development of embedded software including hardware abstraction layer, device drivers, kernel programming, application programming etc. that are integral to the functioning of electronic products

Target volume and revenue from chosen segments:

Each of the products have been analysed on multiple parameters listed below to arrive at the target volume of production and the target revenue.

- Current market demand for the product
- Projected demand for the product
- Current level of domestic manufacturing of the product in India
- Current level of manufacturing in Odisha
- Specific factors such as demand for a product within Odisha and Eastern region
- Complexity of manufacturing

The target production volume & the expected revenue from the manufacture of the products in the various verticals by 2020-24 are given below. Full potential for some investments made in phase 3, would start appearing after 2024.

Implementation phase, cluster location and expected revenue

Segment	**Product**	**Expected revenue contribution by 2022 - 2024 (INR Cr)**
Mobile Devices	Mobile phones	2475
Telecommunication products & Accessories	Modem/routers	540
	Mobile accessories	
IT/OA	Notebooks	2910
	Tablets	
	Printers/MFD	
Consumer Electronics	Flat panel display TVs	2775
	Set top boxes	
Industrial Electronics	LED lighting – luminaire	5250
	Inverters	
	Solar PV modules	
	Power supply	
	Energy meters	
Strategic Electronics	Products from strategic electronics segment	500
Medical Electronics	BP Measuring instrument, Diabetes measuring instruments	150
All Products		**14600**

* Assuming additional investments will be made

Depending upon investors' interest, Automotive Electronics could also be considered for investment.

Similarly the horizontals have also been analysed on various parameters given below and the target revenue from each of the horizontals by 2024 is estimated.

- Current demand within India
- Projected future demand within India
- Extent of current demand being addressed by domestic players
- Demand within Odisha from the expected manufacture of end products (as per the roadmap) and Eastern Region
- Need for companies that offer separate horizontal services within Odisha

Horizontal	**Details**	**Expected revenue contribution by 2022 - 2024 (INR Cr)**
EMS	EMS	190
Components	PCB manufacturing	2360
	Connectors	
	Passive components	
	Active components	
ATMP	ATMP	210
Design	VLSI Design	1440
	Hardware / Board Design	
	Embedded software development	
All Horizontals		**4200**

* Assuming additional investments will be made in these horizontals

Phases of manufacturing:

The period of from 2014 – 2024 has been divided into 3 major phases for the purpose of implementation of the roadmap. In addition the duration (2014 – 2015) is identified as Phase 0, where all the essentials required for electronic manufacturing are to be put in place. The activities to be undertaken in this phase are detailed in the “Roadmap to bridge the gap” section.

Phase 1: (Mid 2015 – 2018):

Phase 1 can start with system integration and assembly of low complexity products and components and SKD (Semi-Knocked down kits) assembly of relatively lower complex products like Tablets.

Products with high demand:

Manufacturing of products that have very high demand in the short term is to be initiated in this phase. For e.g. set-top-boxes would have a large demand in the short term due to push to implementation of digitalisation programme. Thus immediate focus on manufacturing such products is required.

Low complexity products:

Products whose manufacturing process is of low complexity are easy to start with and thus manufacturing of products with medium to high demand but with low complexity is suggested to be initiated in this phase. For e.g.: LED luminaires have medium to high demand currently, but have less complex process manufacture. Odisha can focus on such products in the first phase.

Horizontals:

In this phase horizontal activities that can be carried out independently (e.g.: plastic and sheet metal components) and those where Odisha already has some presence (e.g.: Design) are to be focussed upon. In addition, horizontals that support the product manufacturing (e.g.: EMS) have been planned to be initiated with the focus increasing in phase 2.

Phase 2 (2019 – 2021):

In phase 2 the manufacturing activities would get deeper into CKD assembly, component manufacturing and manufacture of products with medium to high complexity. This would lead to increased value addition, which benefits the state in terms of the strengthening of the supply chain etc. and higher employment generation.

Products with low/medium demand in the short term and relatively high demand in the long term (e.g.: Medical measuring instruments) are to be focussed on in this phase. Products with high/very high complexity, but with high demand (e.g.: Notebook) are suggested to be focussed on in the second phase of manufacturing

Similarly, horizontals that are essential for the manufacture of almost all products, but with low to medium complexity (PCB, Passives, EMS) are also to be focussed on in this stage. The demand for these horizontals is expected to pick up as the manufacturing of the phase1 verticals gains steam.

Phase 3 (2022 – 2024):

This phase should focus on complex products that require a fairly evolved ecosystem to be in place like medical electronics and strategic electronics. Horizontals that involve a complex manufacturing process and require large investment (e.g.: LED chip fabrication, Solar Cells) are to be focussed on in this phase.

A summary of the phase-wise focus on manufacturing verticals / horizontals is provided below:

The diagram below indicates the focus on a product or horizontal across phases. The investment activity in that product / horizontal will continue in the subsequent phase as well. Indicative revenue expected by the end of each phase is also provided.

Phase 0 (2014-'15)	Phase 1 ('16 - '18)	Phase 2 ('19 - '21)	Phase 3 ('22 - '24)
• Getting the essentials in place	• STB • Invertors • Energy meters • LED Luminaire • Printer/MFD • Solar PV modules • Accessories • Tablet#	• Notebook • Mobile phone • Modem / Router • Solar PV Cells • FPD TV • Medical Measuring instruments	• Medical electronics – other equipment • Strategic electronics • Solar PV Wafers • LED chip fabrication
	• EMS • Connectors • Plastics / Sheetmetal parts • Design*	• PCBs • Passive Components	• Other Active components • ATMP
Revenue by end of each phase:	Verticals: INR 1050 Cr Horizontals: INR 460 Cr Total: INR 1510 Cr	Verticals: INR 6520 Cr Horizontals: INR 2140Cr Total: INR 8660 Cr	Verticals: INR 14600 Cr Horizontals: INR 4200 Cr **Total: INR 18800 Cr

* Design includes Embedded software development, VLSI design and Hardware / Board design

**Total expected revenue by 2026 is INR 23500 Cr as complete revenue realisation of investments made during the Phase 3 period would be realized later

Provided Govt. schemes to promote tablet consumption are put in place. Else tablet manufacturing can be started in phase 2.

The split of estimated revenue from each product segment or horizontal phase-wise is provided in the charts below:

Figure 25: Expected revenue split by end of Phase 1 (INR Cr) – Total: 1510 Cr

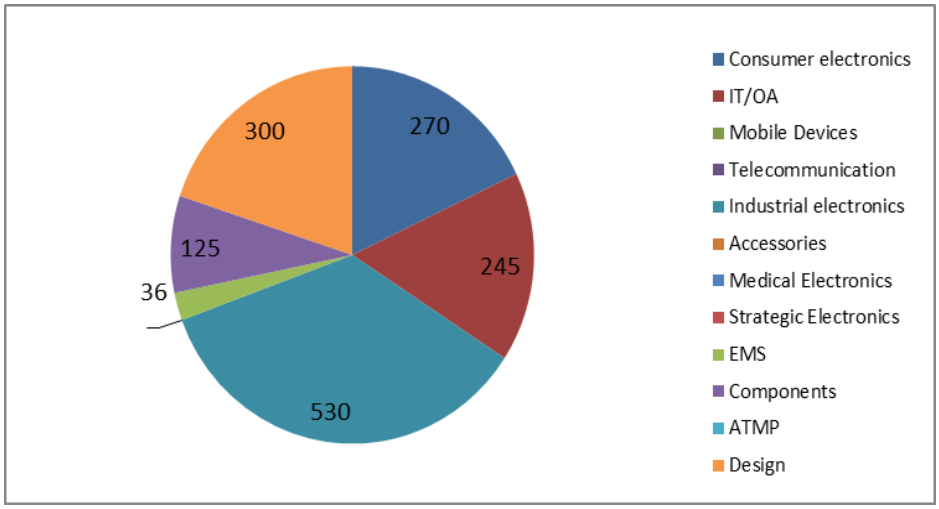


Figure 26: Expected revenue split by end of Phase 2 (INR Cr) – Total: 8660Cr

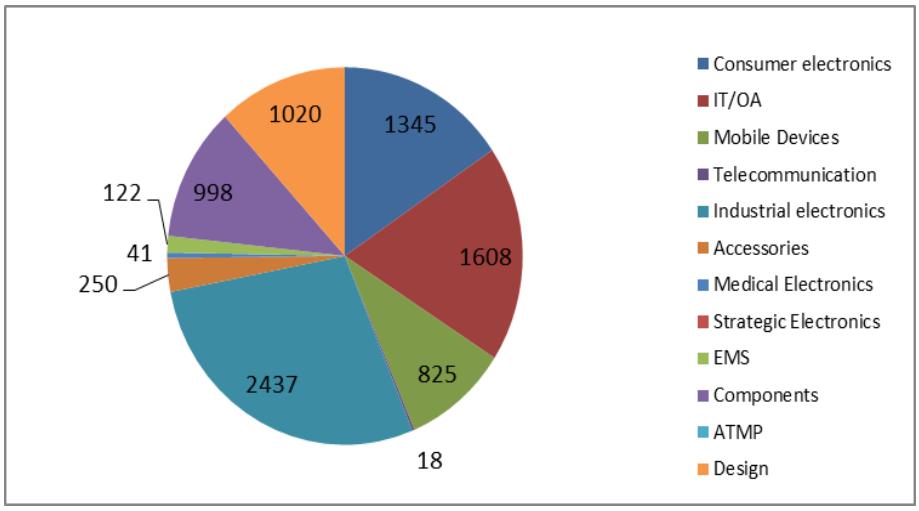
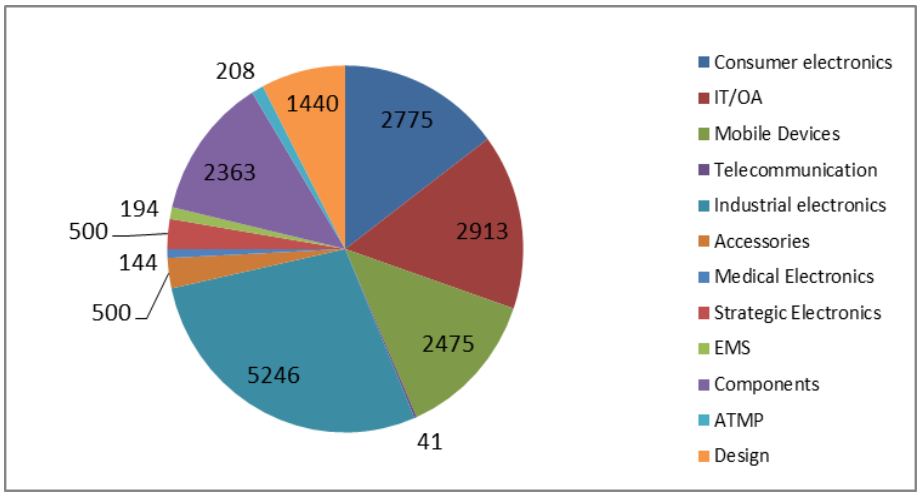


Figure 27: Revenue split by end of Phase 3 (INR Cr) – Total: 18800Cr



6.3. Investment required

The overall investment that is required, in order to achieve the expected revenues is estimated to be INR 7340 Cr.

The table below summarizes the investments needed to be made phase-wise.

(INR Cr)	Phase 1	Phase 2	Phase 3	All Phases
Investment for product verticals	330	1510	2870	4710
Investment for Horizontals	240	1110	1280	2630
Total Investment required	**570**	**2620**	**4150**	**7340**

The source of investment varies from large anchor investors to medium investors to small investors, depending on various parameters as explained below.

Anchor investors: Anchor investors are large global / domestic companies that are major players in the specific product vertical or horizontal or large corporates that have the ability to make huge investments. The investment brought in by such players is generally upwards of INR 200 Cr.
Medium investors: These are global or domestic companies / groups that bring in investments above INR 10 Cr and less than 200 Cr. These constitute established players in the ESDM space or new investors willing to invest in ESDM sector.
Small investors: Small investors can be any interested entity willing to make an investment less than INR 10Cr.

The following parameters have been used to identify whether the product / horizontal requires anchor investors, medium investors or small investors or a mix of the three.

- Level of investment required per manufacturing unit
- Complexity of the product / manufacturing process
- Brand consciousness of consumers for the product
- Target volume for Odisha

The table below summarizes the mode of investment and the amount of investment required for various product verticals / horizontals for all the three phases:

Product vertical	**Total investment required (INR Cr)**	**Category of investors***
Mobile Devices	110	Medium
Telecommunication & Accessories	135	Medium & Small
IT/OA	535	Anchor, Medium & Small
Consumer Electronics	515	Anchor, Medium & Small
Industrial Electronics	2575	Anchor, Medium & Small
Strategic Electronics	700	Anchor
Medical Electronics	150	Medium
All Products	**4720**	

Horizontal	Details	Total investment required (INR Cr)	Category of investor*
EMS	EMS	170	Medium
Components	PCB manufacturing	1870	Anchor, Medium, Small
	Connectors		
	Plastic/Sheet metal		
	Passive components		
	Active components		
ATMP	ATMP	400	Anchor
Design	VLSI Design	190	Medium, Small
	Hardware / Board Design		
	Embedded software development		
All Horizontals		**2630**	

* The category of investor mentioned above is indicative. However, other type of investors can be welcome if they are willing to invest

The table below indicates the phase-wise estimated investment.

	Phase 1	Phase 2	Phase 3	All Phases
Total Investment required (INR Cr)	**570**	**2620**	**4150**	**7340**

The figures 28-31 below provide a phase-wise investment requirement in various product vertical and horizontal segments:

Figure 28: All Phases: Investment split by segments (INR Cr) – Total: 7340 Cr

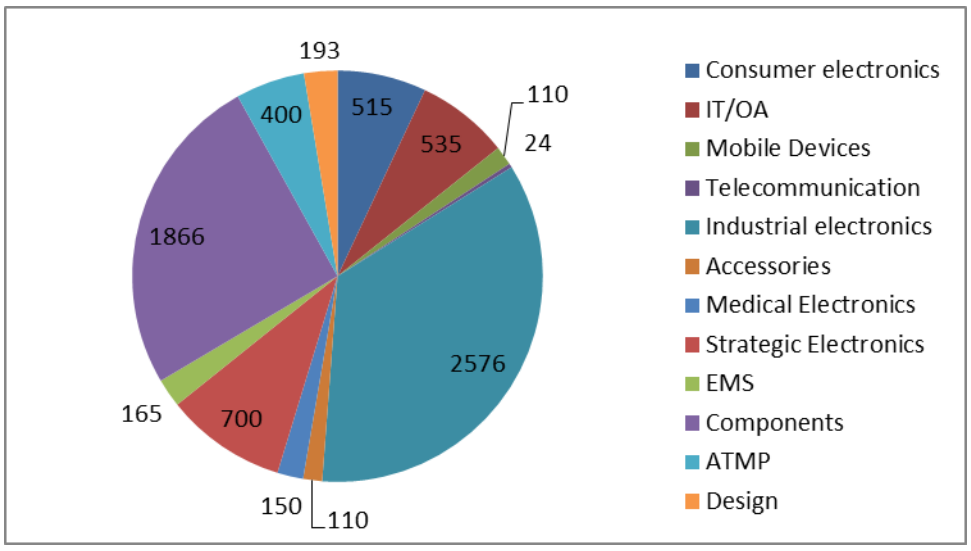


Figure 29: Phase 1: Investment split by segments (INR Cr) – Total: 570 Cr

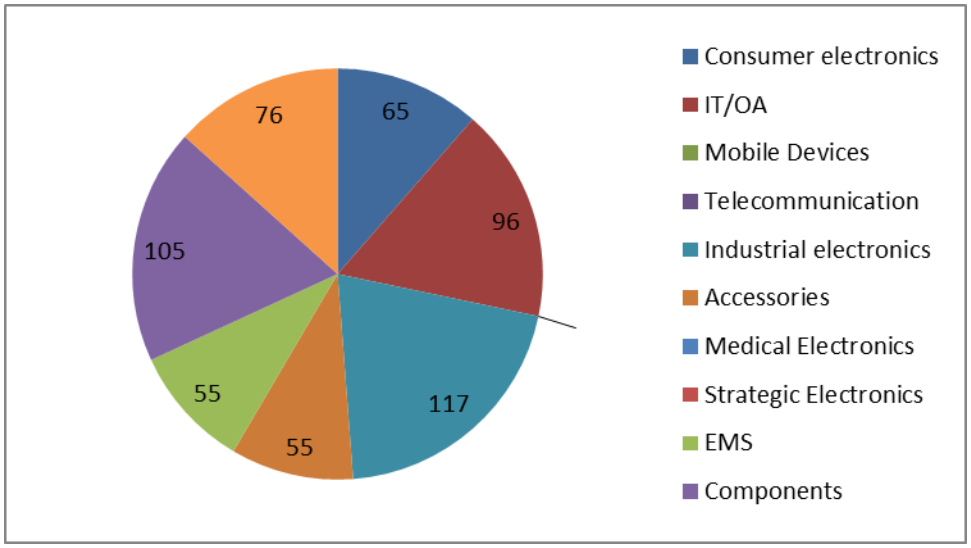


Figure 30: Phase 2 Investment split by segments (INR Cr) – Total: 2620 Cr

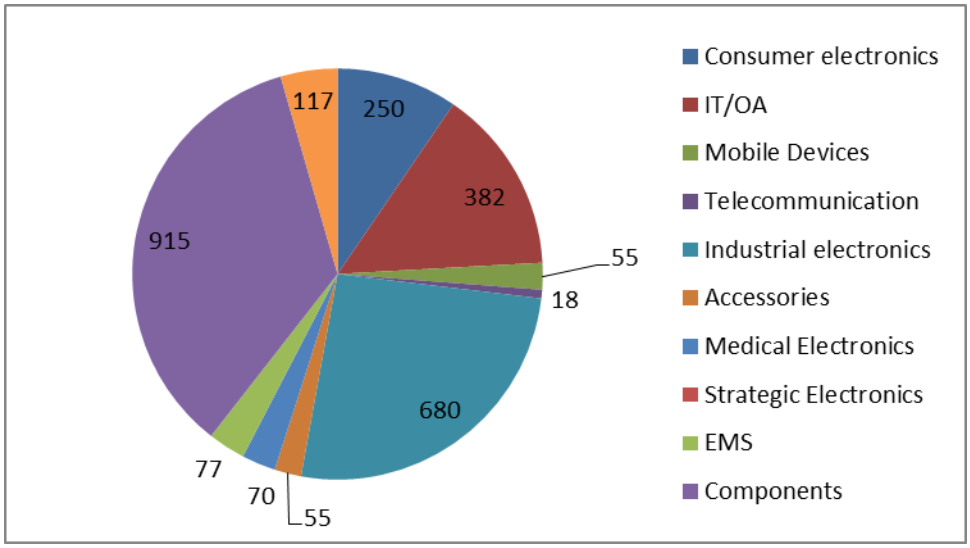
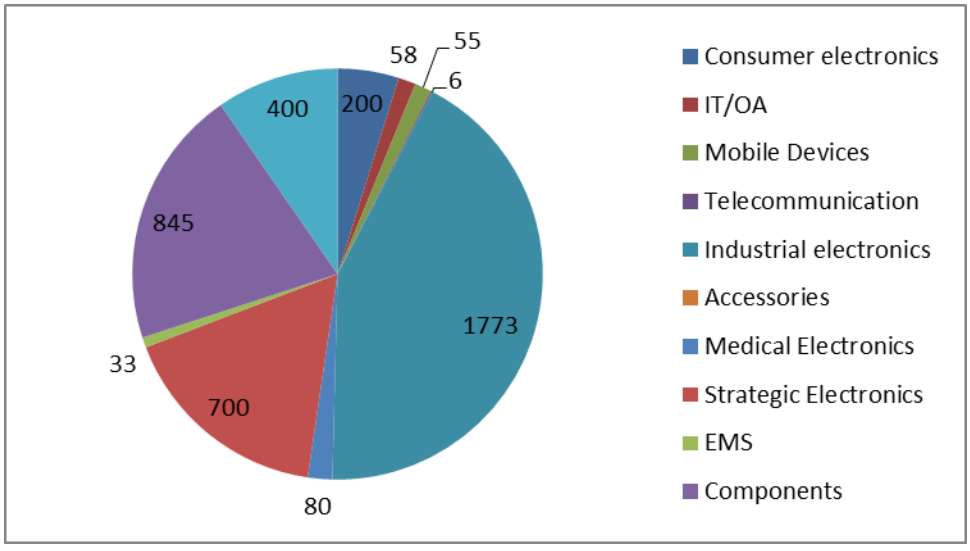


Figure 31: Phase 3 Investment split (INR Cr) – Total: 4150 Cr



6.4. Resources required:

Manpower:

Electronic manufacturing for product verticals involves design of electronic systems as well as the manufacturing process. While system design requires highly skilled workforce (with an educational qualification of B.E / B.Tech or higher), the manufacturing process predominantly requires semi-skilled / skilled workforce (with an educational qualification of ITI / Diploma).

In case of horizontals, the workforce requirement depends on the nature of the sub-segment. For eg. VLSI design is highly complex in nature and would require workforce with educational qualification of at least B.E / B.Tech in electronics or related domain. Passive component manufacturing, on the other hand requires semi-skilled workforce predominantly.

Various factors as listed below have been considered while estimating the level of workforce required:

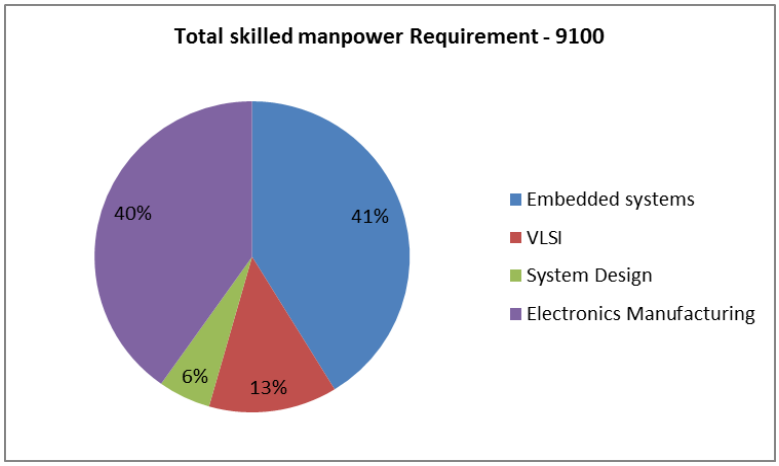
- Complexity of the product design
- Scale of operations
- Level of automation in manufacturing
- Nature of the segment (Design intensive / manufacturing intensive etc.)
- Current industry norms

The table below summarizes the overall manpower required in order to achieve the above level of production.

Phase	Skilled Manpower	Semi-skilled manpower	Managerial / Other functions	All functions
Phase 1	1500	5850	150	7500
Phase 2	4050	19700	450	24200
Phase 3	3550	23050	520	27120
Total (by 2024)	**9100**	**48600**	**1120**	**58820**

Within the skilled manpower, the split of skillset requirement is as indicated in the figure 31 below.

Figure 32: Total skilled manpower requirement



Infrastructure:

Power is one of the crucial factors for electronics manufacturing and it is important to maintain continuous and good quality power supply. In view of the current shortage of power supply across various states in the country, power supply can become a crucial differentiator for Odisha, if it can maintain reliable, low cost and good quality supply to the electronic clusters.

Certain sub-segments of ESDM involve processes that require large quantities of pure water. Thus availability of water is a key parameter in location selection for such sub-segments. Some examples of such sub-segments include Solar & LED chip Fabrication and PCB manufacturing.

The below table summarizes the estimated power, water and land requirements for ESDM industry in Odisha:

Phase	Power requirement (MW)	Water requirement (Million Liters per day)	Land requirement (Acres)
Phase1	20	1.5	105
Phase2	48	10	400
Phase3	72	18.5	405
Total	**140**	**30**	**910**

Logistics & Connectivity:

The manufacture of electronic products or sub-systems requires many individual components or raw-materials. The domestic manufacture of such components / raw materials is limited and thus a large proportion is imported. Even within India, manufacturers of such components are located in regions like Noida, Sriperumbudur etc.

Similarly ESDM manufacturers would have customers across India and the world. Therefore, it is important to maintain excellent facilities for In-bound and out-bound logistics.

As most electronic components are light weight and of high value, air freight is a preferred mode for manufacturers of end products. Thus proximity to an international airport is one of the key considerations for manufacturers who import components to manufacture products in Odisha.

Similarly, raw materials required for component manufacturing require a good sea port to be in the proximity of such manufacturing units.

The following logistics facilities are key for the operation of electronics manufacturing firms:

- Quick turn-around time at sea/airports
- Excellent road/rail connectivity between the ports/airports and the manufacturing clusters
- Warehousing facilities
- Waste disposal / recycling facilities

As design firms are generally global in nature, the following logistic facilities are key for their operation:

- High speed and reliable data connectivity
- Proximity to international airport

Review:

As the resource requirements listed above for the long term are indicative, a review of the targets, based on the progress of investments in the first phase is recommended be taken up after Phase 1.

6.5. Location assessment – ESDM cluster development in Odisha

Having estimated the resource requirement in the previous section, this section focusses on selection of appropriate locations that best satisfy resource requirements. This section identifies and assesses the locations within Odisha that are ideal for establishing of ESDM clusters. In order to select the target locations, the districts within the state were assessed on several parameters which are very important for the development of ESDM industry, including:

- Proximity to major talent hubs
- Availability of water resources
- Presence of SEZs/STPIs/manufacturing clusters
- Distance to ports/airport
- Present industrial activity in the district
- Availability of minerals
- Other positive factors

On the basis of assessment on these parameters, following are the top five locations that are being proposed for the development of ESDM cluster.

- **Khurda**
- Berhampur (Ganjam district)
- Rourkela (Sundergarh district)
- Balasore
- Rayagada

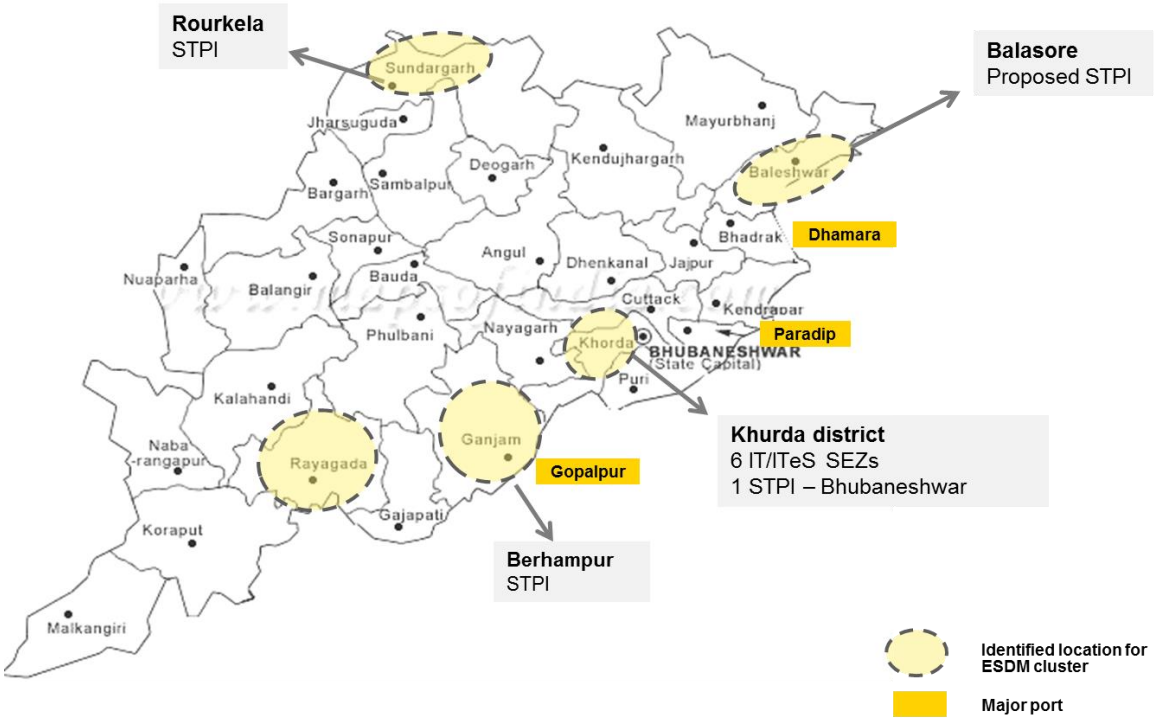
The following table presents the comparative standing of these districts on the above mentioned selection parameters:

District	Proximity to talent hubs	Availability of water resources	Presence of SEZs/STPIs/ manufacturing clusters	Distance to ports/airport	Major minerals	Other positive factors
Khurda	IIIT, Bhubaneswar; Silicon Institute of Technology, Bhubaneswar	**Rivers through district:** Daya, Kuakhai **Rivers near district:** Mahanadi	6 IT/ITeS SEZs; 1 STPI – Bhubaneswar	Bhubaneswar : 26 (NH5) Paradip: 141 Dhamra: 235 (NH5) Gopalpur: 129 (NH5)	Not significant	Emerging as the IT hub of the Odisha with presence of major IT companies; Government has already earmarked land to be developed as ESDM cluster;

						Bhubaneswar, the capital city is located in the district
Ganjam (Berhampur)	National Institute of Science and Technology (NIST), Berhampur, Parala Maharaja Engineering College, Berhampur IIIT, Bhubaneswar; Silicon Institute of Technology, Bhubaneswar	**Rivers through district:** Rushikulya, Dhanei, Bahuda, Ghoda Hada	Gopalpur SEZ (multiproduct); Saraf Agencies SEZ (mineral based industries)	Bhubaneswar: 141 (NH5) Paradip: 256 (NH5) Dhamra: 351 (NH5) Gopalpur: 34 (NH5)	Abrasives and grinding materials, lime stone (kankar), manganese, monazite, sand, talc	Approx. 10,000 industrial units present; more than 32,000 workers employed
Sundergarh (Rourkela)	NIT Rourkela UCE, Burla	**Rivers through district:** Brahmani, Sankh & Koel – tributary of Brahmani IB – tributary of Mahanadi; **Proximity to Hirakud Reservoir**	STPI, Rourkela	Bhubaneswar: 388 Paradip: 437 Dhamra: 474 Gopalpur: 431	Lead, copper, Coal, Dolomite, Fireclay, Iron ore, Limestone, Manganese, Quartz, Bauxite	More than 11,000 industrial units present (around 170 micro and small enterprises in electrical machinery and electronics); more than 130,000 workers employed
Balasore	Balasore College of Engineering and Technology, Balasore	**Rivers through district:** Subarnarekha, Budhabalanga, Jalaka, Kansabansa, Sono **Rivers near**	Proposed STPI to be set up in this district	Kolkata: 255 Bhubaneswar: 199 Paradip: 215 Dhamra: 118 Gopalpur: 363	Vanadiferous / magnetite, Limestone	More than 8,000 industrial units present (around 59 micro and small enterprises in electrical machinery and electronics);

		district: Salandi				more than 50,000 workers employed
Rayagada	National Institute of Science and Technology (NIST), Berhampur, Government College of Engineering, Kalahandi, Centurion University of Technology and Management, Gajapati	**Rivers through district:** Nagavali, Vamsadhara **Rivers near district:** Tel	–	Bhubaneswar: 375 Paradip: 485 Dhamra: 592 Gopalpur: 235	Bauxite, Graphite, Manganese, Quartz	More than 2,500 industrial units present; approx. 12,000 workers employed

Identified locations for ESDM cluster development



Cluster summary:

All products whose manufacturing starts in Phase 1 can be started in Khurda cluster. The expansion of operations for manufacturing such products in phase 2 and certain components and horizontal activities may be considered for a second location such as Berhampur.
A phase-wise summary of the manufacturing planned in various clusters is given below. It has to be noted that the phase-wise classification only represents the phase in which the manufacturing is started and the investments typically continue to the next phase.

Khurda Cluster:

Khurda		
Phase 1	Phase 2	Phase 3
• STB • Tablet • Mobile & Computer Accessories • Invertors • LED Luminaire • Solar PV Module • Energy Meters • Printer / MFD	• Notebook • Mobile Phone • Modem / Router • FPD TV	• Medical Electronics • Strategic Electronics
• Design (Embedded software, VLSI, Hardware/board) • EMS • Plastic/Sheeetmetal • Connectors		

Investment:

The phase-wise investment expected in Khurda cluster is indicated below:

	Phase 1	Phase 2	Phase 3	All Phases
Total Investment required	**570**	**1360**	**1350**	**3280**

Second Location:

These activities could also be taken up by expanding Khurda cluster.

Activities that can be considered in second location starting from Phase 2		
Phase 1	Phase 2	Phase 3
	• Solar PV Cells	• Solar Wafer Fabrication • LED Chip Fabrication
	• PCB • Passive Components	• ATMP • Active components •

Investment:

The phase-wise investment expected is indicated below:

	Phase 1	Phase 2	Phase 3	All Phases
Total Investment required	**-**	**1260**	**2800**	**4060**

6.6. Cluster-wise resource requirement and gap analysis:

As per the cluster-wise revenue and investment estimates provided in the previous section, a cluster-wise requirement of resources has been estimated. This is compared against the current state of availability of such resources and a gap analysis is presented below:

1) Talent pool:

Cluster-wise talent requirement:

a) Khurda cluster:

Highly skilled manpower of 8,500, semiskilled manpower of 41,600 and managerial/other function manpower of 950 are required in Khurda cluster from 2015 – 2024.
A phase-wise split of this talent requirement in Khurda cluster is provided below:

Talent requirement (Number) – Khurda	Highly Skilled (Employable) workforce requirement	Semi-Skilled workforce requirement	Managerial / Other functions
Phase 1	1500	5850	150
Phase 2	3950	18000	410
Phase 3	3050	17750	400
Total	**8500**	**41600**	**960**

b) Second location:

For the indicated list of products/horizontals for the second location, highly skilled manpower of 600, semiskilled manpower of 7,000 and managerial/other function manpower of 160 are required from 2014 – 2024.
A phase-wise split of this talent requirement in the second location cluster is provided below:

Talent requirement (Number)	Highly Skilled (Employable) workforce requirement	Semi-Skilled workforce requirement	Managerial / Other functions
Phase 1	-	-	-
Phase 2	100	1700	40
Phase 3	500	5300	120
Total	**600**	**7000**	**160**

Availability of talent:

While the supply of highly skilled and managerial workforce can be from across Odisha, the semi-skilled workforce needs to be trained in the close proximity of the respective clusters.

Talent available (Number)	Highly Skilled workforce available – Odisha	Semi-Skilled workforce availability – Khurda	Semi-Skilled workforce availability – Berhampur**
Annual Passouts	9400	4530	2390
Proportion job ready passouts*	Negligible	Negligible	Negligible

*Passouts that have been trained to become job ready (through ESDM finishing schools, internships etc.)

** Assuming the second location is chosen at Berhampur

Gap in talent availability:

Gap in talent availability (Number)	Highly Skilled (Employable) workforce gap – Odisha*	Semi-Skilled workforce gap – Khurda*	Semi-Skilled workforce gap – Berhampur**
Annual Passouts	-	2700	-
ESDM trained workforce	Large	Large	Large

*Assuming 50% of talent with relevant education is willing to work in this sector

* Assuming uniform recruitment over the 10 years chosen

**Assuming the second location is chosen at Berhampur

2) Land & Buildings:

Requirement:

Given below is the estimated cluster-wise, phase-wise land requirement for ESDM industry.

Land required (Acres)	Khurda	Second location
Phase 1	105	-
Phase 2	285	115
Phase 3	250	155
Total	**640**	**270**

Availability of ready to occupy land/buildings:

160 acres of land has been identified in Khurda for development as a cluster for ESDM industry. Government of Odisha is requested to take suitable measures to acquire land and develop clusters in line with the phased manufacturing plan mentioned above

Land to be identified:

Land to be identified (Acres)	Khurda	Second location
Phase 1	-	-
Phase 2	230	115
Phase 3	250	155
Total	**480**	**270**

In addition, all the land identified and to be identified needs to be developed for occupation. The details of the required resources are provided in the 'Roadmap to bridge the gap' section.

3) Power:

Requirement:
The cluster-wise, phase-wise requirement for power is provided in the table below.

Power retirement (MW)	Khurda	Second location
Phase 1	20	-
Phase 2 (Additional requirement)	26	22
Phase 3 (Additional requirement)	34	38
Total	80	60

Current state of availability of power:

While Odisha has been a power surplus state in 2010-'11 from an average power requirement vs. average production standpoint, the peak power requirement far exceeds the supply resulting in scheduled and unscheduled power cuts.

In 2011-'12, the average demand slightly exceeded the average production. Peak hour power deficit in Odisha was 21.2% in 2011-'12 against a national average of 9.81%

In addition, owing to high dependence of Odisha on hydro power, the state experiences power shortages during summer.

Gap in power availability:

ESDM industry adds an additional requirement of an estimated 140 MW by 2022-2024 period. Apart from stepping up the production to meet the average demand and peak demand for power, the state should ensure availability of high quality, continuous and uninterrupted power supply for ESDM industry.

4) Water:

Requirement:
The cluster-wise, phase-wise requirement for water is provided in the table below.

Water requirement (Million Litres per day)	Khurda	Second location
Phase 1	1.5	-
Phase 2 (Additional requirement)	3.0	7.0
Phase 3 (Additional requirement)	4.0	14.5
Total (by end of phase 3)	8.5	21.5

Current state of availability:

Khurda district has Daya, Kuakhai rivers flowing through it and river Mahanadi flows in the proximity of this district.

Similarly, if Berhampur is chosen as the second location, Rushikulya, Dhanei, Bahuda, Ghoda Hada rivers flowing through the district (Ganjam) can act as source of water.

Gap in water availability:

- The river water needs to be routed to the cluster and be made usable.
- The water required for some of the manufacturing processes like fabrication, PCB etc. has to be of high purity. Thus the water supplied for such units needs to be purified.

5) Other gaps:

- Certain other states have already announced multiple incentives to attract investors in the ESDM sector. As Odisha currently lacks a well-developed ESDM ecosystem owing to the delayed start in this sector, the Govt. needs to stay ahead of other states and offer lucrative incentives for ESDM sector.
- As Odisha currently has little presence in the ESDM space, there exists a gap in the perception of the state as an ESDM destination. In addition, with respect to certain positive aspects of Odisha like power & water availability etc., there is a significant gap in the awareness levels of investors about such enabling factors in Odisha.
- Poor turnaround time at Paradip port is an issue of concern.
- Availability of high speed data connectivity in Berhampur (if chosen as second location) is also a concern.
- Bhubaneswar airport currently has a low level of national connectivity (especially with existing ESDM clusters like Bangalore) and has no international connectivity.

Review:

- As the resource requirements listed above for the long term are indicative, a review of the targets based on the progress of investments in the first phase is recommended be taken up after Phase 1.

6.7. Govt. initiatives to bridge the gaps:

Government initiatives required to achieve the targets set for the ESDM sector and to bridge the gaps identified in the previous sections are elaborated in this section. The initiatives are broadly classified under the below heads:

- Infrastructure development
- Institutional mechanism
- Investment promotion including reaching out to investors & Branding
- Skill development
- Incentives
- Others

1) Infrastructure development:

a) Development of Clusters:

An additional land of 480 acres in Khurda to be identified in addition to the existing 160 acres by 2020 (230 acres by start of Phase 2 and 250 acres by start of Phase 3)

A land of 270 acres (preferably contiguous stretch) to be identified in the second location by 2020 (115 acres by start of phase 2, 155 acres by start of phase 3)

The identified land is to be made occupation ready before the start of each phase (as per the phase-wise plan stated above) by providing common infrastructure as listed below:

- Roads with street lighting
- Power Sub-station and electricity lines
- Water supply system including transmission pipelines to carry the water for the capacity envisaged
- Data communication cables and network through underground ducts
- Built-up office space for incubation center, offices of the investment promotion and clearance bodies and other common facilities
- Concessional rate of for land and buildings to ESDM clusters as indicated in the “Govt. incentives” section
- Customs clearing facilities in the clusters

The following common facilities are suggested in each of the clusters before start of operations: (some of them can be planned depending upon the flow of investments / product focus)

- BIS testing laboratory with preferential access to end products manufactured in Odisha
- Water treatment plant for drinking as well as usage water
- Effluent treatment plant for treating effluents from the manufacturing units
- Common mechanism for solid waste collection and disposal
- Water recycling plant
- Common storage & warehousing facility for components, raw materials and finished goods

Connectivity:

Connectivity and transportation requirements as listed below are essential for successful ESDM clusters to come up. (Some of them can be planned depending upon the flow of investments / product focus)

- High speed road connectivity between the identified cluster area in Khurda and Bhubaneswar airport, and between Khurda cluster and Paradeep port (4-6 lane can be planned in the long run)
- High speed road connectivity and dedicated railway line for wagons between Berhampur (if chosen as the second location) and Gopalpur port as investments start flowing into Berhampur and freight traffic to/from Gopalpur starts picking up.
- High speed road connectivity between the second location and Bhubaneswar. If Berhampur is chosen as the second location, ensuring NH5 between Berhampur and Bhubaneswar is 6 lanes all throughout and the 4-6 lane road connecting the cluster areas (in Both Khurda and Berhampur) with NH5 are developed in line with the increasing freight traffic between the clusters.
- An efficient passenger commute system connecting the cluster area to the rest of the city/district in Khurda and the second cluster
- Clearance process for international operations at Biju Patnaik Airport to be expedited.
- A cargo complex at Biju Patnaik Airport to handle cargo for both regular and freighter operations is a must to handle the freight requirements as investments flow, as most of the components are imported. Good road connectivity to large cities within Odisha and neighbouring states can ensure increased passenger traffic from Bhubaneswar airport and thus increased connecting flights to existing domestic ESDM hubs like Bangalore, Chennai etc.
- High speed data connectivity to the ESDM cluster has to be ensured through public or private telecom service providers. Creation of additional infrastructure required for this and the clearances from the local authorities needs to be expedited.
- Measures to be taken to significantly improve turn around time at Paradeep and Gopalpur ports

b) Power:

- As ESDM units get set-up, a group captive power plant is suggested to be set up simultaneously at Khurda and Berhampur (if chosen as the second location) with capacity to meet the envisaged power demand of the clusters
- The power supply from the plant to the clusters may be allowed by the state distribution company under open access power norms. The excess power generated, until the clusters start operating at full capacity, may be supplied to the grid.
- The Government must ensure uninterrupted power supply until the group captive power plant becomes operational

c) Water

- Dedicated pipelines and necessary equipment to draw estimated water requirement in Khurda from the rivers near Khurda clusters are to be put in place by the Government. Similar infrastructure to be created in the second cluster before start of operations, which will be scaled up as operations gain traction.

Responsibility:

The progress of infrastructure creation should be monitored by a Committee of Government and industry representatives.

2) Reaching out to investors & Branding:

Rename Department of IT as Department of Electronics & IT on the lines of the Government of India's Department of Information Technology being renamed as Department of Electronics & IT (DeitY)

Constitute an ESDM specific nodal agency under the Department of Electronics & IT. The agency's key functions and responsibilities are given as under-

a) Investment promotion & monitoring:

Proactively contact potential investors, and liase with them to attract investments in ESDM as per the detailed investment plan in "Investment required" section

A SPoC (single point of contact) office to be created under the nodal agency to handle and answer all queries & follow-up with potential investors using the leads generated. Defined service levels for the office for query handling are to be put in place.

b) Promoting Brand Odisha:

The Odisha advantage needs to be marketed vigorously within India as well as globally.

Advertising: Undertake and monitor print and digital media marketing which would be in line with each of the three phases. The campaigns can focus on infrastructural advantages in Odisha, Govt. incentives for ESDM sector and highlight the progress in ESDM in the previous phases.

Roadshows: Conduct road shows in countries like US, Taiwan, Japan, Korea etc. that are potential investors

The investment promotion team from Odisha to conduct road shows to showcase Odisha's strengths as investment destination for ESDM

In addition, International Desks to be created in key geographies to reach out to the foreign investors and pro-actively follow-up on a regular basis; the Desk can also later support the domestic investors in providing market lead and assist in technical collaborations with foreign companies.

c) Single window clearance of proposals and disbursement of incentives to new projects:

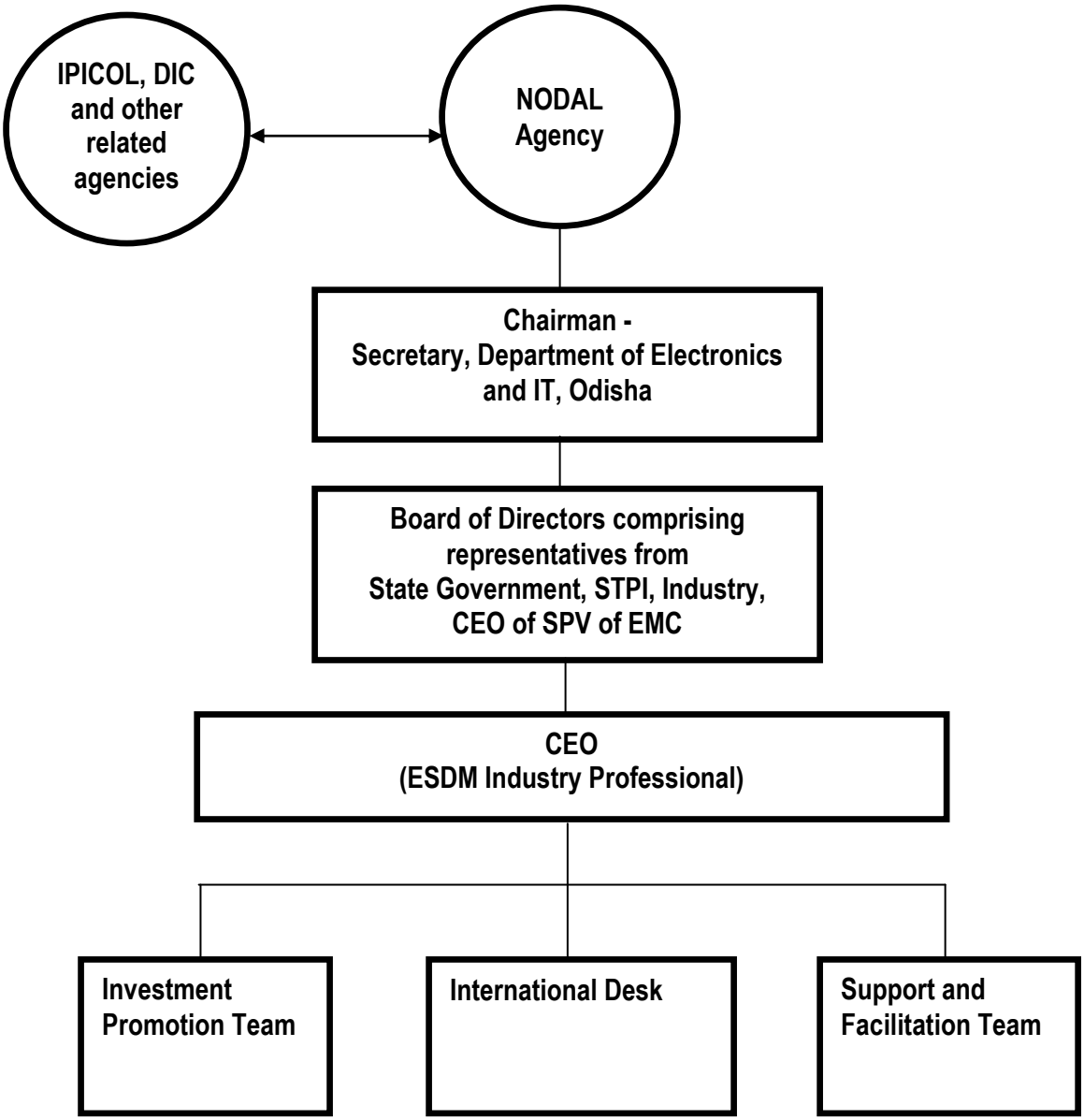
The nodal agency would oversee the clearances of incentives offered to companies and liaise with the existing clearing bodies (like IPICOL and DICs) for a smooth clearance process for setting up ESDM industries in the clusters. The agency would have representative offices set up in each of the identified clusters.

Composition of the nodal agency:

- The Nodal Agency can be 'Not-for-profit' Section 25 Company headed by an ESDM industry professional as the CEO.
- It would have a Board of Directors (BoD) with representatives from the industry, state government, STPI, Bhubaneswar, with the BoD being headed by Secretary, Department of Electronics and IT.

- The Nodal Agency will require a professional team with appropriate skill-sets to facilitate and carry out the groundwork for ESDM industry promotion, attracting investment and other initiatives.
- The CEOs of the proposed SPVs at the respective EMC locations can be part of the BoD and support the Nodal Agency in its initiatives.

Proposed Structure of the Nodal Agency



3) Skill development:

a) Semi-skilled workforce:

- The gap between average annual requirement and average annual passouts of suitable candidates (In Electronics related courses) is 2700 in Khurda cluster. Thus Govt. to establish more ITI and diploma colleges in the vicinity of Khurda cluster with ESDM specific courses. The annual intake in these institutes and the number of such institutes would be in line with the talent requirements in each of the phases

- The curriculum at these institutes and the existing ITI/Diploma institutes in Khurda & other regions would be decided and reviewed in collaboration with the industry. The courses at these institutes to include aspects of servicing & maintenance of products and manufacturing equipment.

- Odisha state employment mission's targets for the 12th five year plan to include skill development in the ESDM sector as well with a target of 10,000 trained students, which can increase in line with the phase-wise requirement for trained manpower.

b) Highly skilled workforce:

- Masters courses on VLSI, Embedded systems, communications engineering etc. to be introduced in all major institutions in the state. The curriculum of these courses is to be decided and periodically reviewed in collaboration with the industry
- Once the operations of companies that invest in Odisha stabilize, they should be encouraged to establish joint R&D labs in the universities
- An internship program with a duration of 6 month to 1-year for Master's and Bachelor's degree (in ESDM related disciplines) students in the industry to be made mandatory to make the students industry ready. Alternatively, institutes that offer such programs may be incentivized to increase the uptake of the program
    - The mandating of the internship may be taken up in a phased manner, with the initial phases targeting 10 institutions including those in Bhubaneswar and top institutes in other parts of Odisha.
    - The Govt. to incentivize companies by reimbursing 50% of the cost of the internship . Companies stand to gain through the incentive and also through the work done by interns for the duration.

4) Govt. Incentives to be provided:

Capital subsidy	GoO should provide capital subsidy upto of 20% of the total investment to new ESDM units in each greenfield EMC on capital investments until 2020 limited to INR 50 mn per unit. This will be over and above the capital subsidy offered by GoI through its M-SIPS scheme. In addition, first 2 anchor investors meeting the investment threshold as indicated in the "investment required" section are eligible for Co-investment from Government in return for equity, provided the investment is in the focus sectors and clusters. The Govt. may provide favourable exit terms (with its returns linked to inflation/interest rates) to the remaining investing partners to buy out its equity at a later point of time.
Value-addition linked Interest subsidy	Interest subsidy of 5% should be provided to new ESDM units and expansion projects on working capital loan taken by them for a maximum period of 5 years from the date of commencement of operations (not later than 2020) (extent of interest subsidy linked to domestic value addition)
Training subsidy	One time reimbursement of upto 50% of the cost incurred to the companies for providing skill gap training to the employees that are domicile of Odisha and are trained by the company within first two years of commencement of operations. The subsidy will be subject to maximum of INR 20,000 per employee.
Stamp duty waiver	100% exemption of stamp duty and registration fee for the purchase/lease of land and building or office space for setting up the project as well as stamp duty on mortgage/hypothecation with financial institutions, with the condition of commencing operations within three years.
VAT reimbursement	Reimbursement of VAT from 75% - 100% for a period of 10 years, not exceeding 200% of capital investment
CST exemption	100% refund of CST until the abolition of CST or 5 years, whichever is earlier.
Value Added market access	In line with the existing preferential market access (PMA) policy notified under National Electronics Policy, the GoO should also introduce Value Added Market access policy for procurement of electronic products by government departments and public sector units manufactured by the companies registered and engaged in manufacturing in Odisha. Following is the percentage of domestic value addition proposed in terms of BOM: Year 1 – 10% Year 2 – 15% Year 3 – 20% Year 4 – 25% Year 5 – 30%

ESDM specific fund	GoO should set up a fund to provide financial assistance to start-ups, growth and debt/capital needs of ESDM companies. This can be done in collaboration with GoI as well as other public/private financial institutions and PE/VC players.
Incentives for filing patents	All ESDM units in the state shall be reimbursed 50% of the cost of filing patents subject to a maximum of INR 0.5 million for international filing and INR 0.2 million for domestic filing.
Land/Office space at concessional rates	25% rebate in land cost limited to INR 10 million in industrial parks, SEZs, manufacturing hubs and clusters; 25% subsidy on lease rentals of up to INR 0.5 million per annum for a maximum period of 5 years Anchor units: The two anchor units to get upto 50% rebate in land cost limited to INR25 million in industrial parks, SEZs, manufacturing hubs and clusters.
Incentives for marketing activities	Reimbursement of 50% of the actual costs (subject to a maximum of INR1 million per year per company) for international marketing and promotion expenses.
Power subsidies	Subsidy to ESDM of 20% on power cost for a period of 5 years from the date of commencement of operations subject to a maximum of INR 3 million per company Anchor units: Subsidy to anchor units of 30% on power cost for a period of 5 years from the date of commencement of operations subject to a maximum of INR15 million
Electricity duty waiver	100% exemption from the payment of electricity duty for a period of 5 years from the start of operations. Anchor units: The two anchor units to get this exemption for 10 years from the start of operations.
Relaxation from labor laws	Keeping in view the nascent stage of the ESDM industry in the state, an exemption from the 'Standing orders for Industrial Employment' to be provided for a period of 5 years in the clusters without compromising on the health and safety aspects
Customized incentive packages	In addition to the above mentioned incentives, customized incentives are to be negotiated with large investors depending on the revenue potential and long term employment generation potential.

5) Other Initiatives:

a. Creating Start-up ecosystem:

In line with the growth of the ESDM industry in the state, enable an ecosystem to groom ESDM start-ups.

Establish Centres of Excellence in partnership with Industry, academia, state government and STPI.

- For design start-ups, set-up state of the art ESDM Centers of Excellence (CoEs), which can act as technology incubators and provide technology and infrastructure support to the industry. Such infrastructure can be set up at leading educational institutes. In the initial phases the Govt. may focus on institutes in Khurda. The Characterisation Lab will give an impetus to semiconductor design activity.
- Such incubators to receive financial assistance from Govt. for setting up the infrastructure
- Encourage companies with major operations in Odisha to spend a part of their CSR fund on funding the setting up of such incubators in Odisha.
- Set up Centres of Excellence (CoEs) at universities as the ESDM ecosystem builds up. Multiple universities can collaborate to share a common facility
  - The following facilities can be made available at the CoEs.
  - Licenses to tools (like Design tools, CAS SDKs etc.) of all major vendors (that can be used by start-up or other companies during the development phase for non-commercial purpose, but the same companies need to buy the licenses once they start commercializing
  - In-house SMT line and PCB manufacturing in order to provide sample boards.

b. **Component FTWZ*:***

A component free trade and warehousing zone to be established adjacent to the Khurda / second cluster with high speed road and rail carriage connectivity to the nearby port.

Development of infrastructure in the zone to receive the same incentives as those of Brownfield cluster. A major global electronic component distributor to be the anchor investor

This activity can start simultaneously when investment flow gains traction.

c. BIS testing labs:

- A BIS testing lab to be set up in Khurda cluster with preferential access to products manufactured in Odisha. The products may be manufactured by the ODM or assembled in the EMS facility and/or Assembled (final assembly)/packaged in Odisha.
- The demand for testing and certification requirement under Compulsory Registration Scheme (CRS)of GoI will continue as every electronic goods with a different size, rating, variety etc. will need to obtain the certification at least once every 2 years.
- Financial assistance from the GoI is already available for setting up of such labs.

7. Appendix

7.1. Qualitative rating table for analysis of products on various parameters

Product Vertical	Segment	ITA-1	Complexity of product/technology	Market demand	Short term demand growth	Long term demand growth	Investment required	Ecosystem presence in Odisha	Aggregated demand in Odisha	Bargaining power of Govt. of Odisha	Customer's brand preference	Preferred mode for importing raw materials (shipping)
STB	Consumer electronics	NI	Medium	Very high	Very high	Low	Low	None	Very High	Low	Low	Air
Tablet	IT/OA	I	High	High	Very high	High	Medium	None	High	High	Medium	Air
Notebook	IT/OA	I	High	High	High	High	Medium	None	High	High	High	Air
Mobile phone	Mobile Devices	I	Very high	Very high	Very high	High	Medium	None	Very High	Low	Medium	Air
Modem/ Router (CPE)	Telecommunication	I	High	High	High	High	Low	None		Low	Low	Air
Printer/MFD	IT/OA	I/NI	Medium	Low	Medium	Medium	Low	None	Medium	High	Medium	Air
Inverters	Industrial electronics	NI	Low	High	Very High	Medium	Low	None	Low	Low	Medium	Air
Flat panel Displays TVs	Consumer electronics	NI	Low	High	High	High	Low	None	Medium	Low	High	Sea
Mobile & computer accessories	Accessories		Low	High	High	High	Low	None	High	Low	Low	Depends
Energy Meters	Industrial electronics	NI	Medium	High	High	High	Low		High	High	Low	
LED Luminaire	Industrial electronics	NI	Low	Medium	High	Very high	Low	None	Medium	Medium - High	Low	Air
Solar PV Module	Industrial electronics	NI	Low	High	Very high	High	Low	None	High	High	Low	Sea
Medical electronics	Medical Electronics	NI	Very high	Low	Low	Very high		None		Low	Very High	Air
Strategic electronics	Strategic Electronics	NI	Very high	Medium	Medium	Medium		None		Low		Air

* I: ITA1 product; NI: Non-ITA1 product

7.2. Indicative list of players for each product

Product Vertical / Horizontal	Segment	Indicative players in the segment
Tablet	IT/OA	Samsung, Micromax, Karbonn, Lenovo, Simmtronics
Notebook	IT/OA	Lenovo, HCL, HP
Mobile phone	Mobile Devices	Lava, Karbonn, Micromax, Lenovo
Printer/MFD	IT/OA	Canon, Epson
Flat panel Displays TVs	Consumer electronics	Panasonic, Toshiba, Sony
Energy Meters	Industrial electronics	HPL, Secure Meter, Genus Power, L&T, Landys & Gyr, NEC
Solar PV Module	Industrial electronics	Renesola, First solar
Medical electronics	Medical Electronics	GE, Philips, J&J, India Medtronic
Strategic electronics	Strategic Electronics	BHEL
PCB	Components	Copper mining/processing companies in Odisha or across India
Other Actives	Components	Vishay, CDIL
Passives	Components	Vishay
ATMP (Including LED packaging)	ATMP	ASE, Amkor, SPIL, STATSChip Pac, Powertech Technologies
Design (Embedded software)	Design	Tata Elxsi, Robert Bosch
Solar PV Cells	Fabrication	Moser Baer, Indo -Solar, BHEL, CEL, Solar Semiconductor
Solar Wafer fabrication	Fabrication	First Solar, SuntechPowe, Sharp, Q Cell
LED Chip fabrication	Fabrication	Osram, Toshiba, Azzurro , Philips Lumileds, Samsung, Lattice power (China), Epistar (Taiwan)

7.3. River map of Odisha

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